Environmental Screening Report

Brooks Road Landfill Vertical and Horizontal Expansion

2270386 Ontario Limited

April 3, 2024

The Power of Commitment

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Executive summary

Brooks Road Landfill (the Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent).

The Site, which operates under Environmental Compliance Approval (ECA)[1] No. A110302, has an approved annual fill rate of 250,000 tonnes per year and a total approved capacity of 1,045,065 cubic metres (m^3) (including waste and daily/final cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (C of A, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP)) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021.

Under the ECA, the Site is licensed to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3 hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the Site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process, as stated in Section 15 of the Waste Management Projects Regulation (O. Reg. 101/07) of the *EA Act*.

BRE is seeking to increase the capacity of the existing Site by approximately 219,400 m^3 (including waste and daily cover) through a combination of vertical and horizontal expansion of the existing landfill. The proposed vertical and horizontal expansion will allow BRE to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their residual material. Expanding the capacity of the Site by 219,400 m^3, as proposed through this Project, will allow operations to continue at the current fill rate and annual waste filling capacity for approximately two additional years once the current approved capacity is reached. There are no changes to the annual fill rate limits nor to the annual waste filling capacity of the Site proposed as part of this Project.

The vertical and horizontal capacity expansion proposed under this Project is subject to the Environmental Screening Process (Screening) in accordance with Section 13 of O. Reg. 101/07 – Waste Management Projects of the *EA Act*. The Environmental Screening Process was conducted in accordance with the Ontario Ministry of Environment, Conservation and Parks (MECP) "Guide to Environmental Assessment Requirements for Waste Management Projects". Through the Environmental Screening Process, the potential for the Project to result in adverse environmental effects was assessed. As there will be changes to the currently approved total landfill volume, footprint, and final site contours, it was concluded in the Screening Criteria Checklist that the Project could have potential environmental effects on the following environmental components:

– Surface Water;
– Geology and Hydrogeology;
– Land Use & Socio-Economic;
– Air Quality and Odour;

[1] The Ontario *Environmental Protection Act* in 2011 the term 'Certificate of Approval' (C of A) was changed to 'Environmental Compliance Approval' (ECA). All previously issued CA's are now referred to as ECAs.

– Noise;
– Natural Environment and,
– Traffic.

To further evaluate the potential effects on the environmental components identified through the initial Screening process, studies were completed to review the existing environmental conditions within the Site Study Area (SSA) and Local Study Area (LSA), identify potential effects, apply appropriate mitigation measures and determine the resultant net effects to the environment. With this in mind, separate stand-alone evaluations were completed for the following environmental components:

1. Surface Water Assessment
2. Geology and Hydrogeology Assessment
3. Land Use and Socio-Economic Assessment
4. Air Quality and Odour Assessment
5. Noise Impact Assessment
6. Natural Environment Assessment
7. Traffic Impact Assessment

Through the assessment of the Project's potential environmental effects of the Project, it was determined that increasing the total waste disposal capacity would result in minor environmental impacts. However, through the application of mitigation measures, the Project is not anticipated to result in any new net negative effects on the environment. As a result, the advantages of the Project outweigh the disadvantages.

Upon completion of the Environmental Screening Process an application will be made to amend the existing ECA No. A110302.

Contents

Table index

Figure index

Appendices

1. Introduction

Brooks Road Environmental (BRE, Owner, Proponent) has undertaken an Environmental Screening Process (Screening) in accordance with the Waste Management Project Regulation (Ontario Regulation [O. Reg.] 101/07) of the Ontario *Environmental Assessment Act* (*EA Act*) in order to expand the existing Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. This Environmental Screening Report (ESR) documents the Screening carried out and includes a description of the Project, a description of the existing environment, consultation activities, mitigation and monitoring measures, and net effects of the project.

1.1 Project Proponent

BRE is a Canadian operating company in Haldimand County, Ontario, owned and operated by 2270386 Ontario Limited. The BRE contact for this project is as follows:

Tim Danyliw, P.Eng, PMP
Project Manager, Brooks Road Environmental
160 Brooks Road
Cayuga, Ontario, N0A 1E0
Tel: (226) 979-2468
Email: **tim@gpnvironmental.ca**

1.2 Project Location

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The location of the Site is shown in **Figure 1.1.**

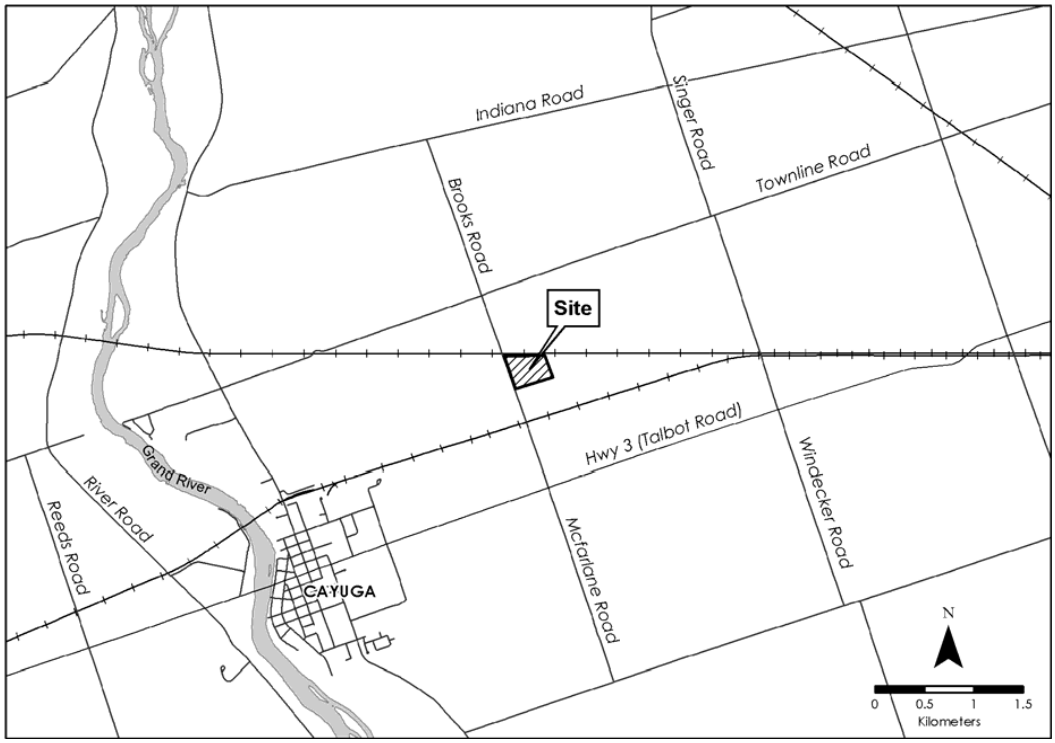


Figure 1.1 Site Location Map

1.3 Project Background

The Site, which operates under Environmental Compliance Approval (ECA)[2] No. A110302, has an approved annual fill rate of 250,000 tonnes per year and a total approved capacity of 1,045,065 cubic metres (m^3) (including waste and daily/final cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (C of A, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP)) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021.

Under the ECA, the Site is licensed to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3 hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the Site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process, as stated in Section 15 of the Waste Management Projects Regulation (O. Reg. 101/07) of the *EA Act*.

BRE is seeking to increase the capacity of the existing Site by approximately 219,400 m^3 (including waste and daily cover) through a combination of vertical and horizontal expansion of the existing landfill. The proposed vertical and horizontal expansion will allow BRE to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their residual material. Expanding the capacity of the Site by 219,400 m^3, as proposed through this Project, will allow operations to continue at the current fill rate and annual waste filling capacity for approximately two additional years once the current approved capacity is reached. There are no changes to the annual fill rate limits nor to the annual waste filling capacity of the Site proposed as part of this Project.

The vertical and horizontal capacity expansion proposed under this Project is subject to the Environmental Screening Process (Screening) in accordance with Section 13 of O. Reg. 101/07 – Waste Management Projects of the *EA Act* as follows:

> *A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:*
>
> 1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
> 2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
> 3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

[2] The Ontario *Environmental Protection Act* in 2011 the term 'Certificate of Approval' (C of A) was changed to 'Environmental Compliance Approval' (ECA). All previously issued CA's are now referred to as ECAs.

Section 13 of O. Reg. 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. This Screening is being conducted in accordance with the planning and design process outlined in Ontario MECP "Guide to Environmental Assessment Requirements for Waste Management Projects" (Guide)[3]. A Screening includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identify environmental effects. The results of the Screening are documented within this ESR, which will be released for review by Indigenous communities, the public, and government agencies for a defined comment period. BRE will incorporate feedback received during the comment period, as appropriate and where possible, into a Final ESR to be posted for a 60-day review and comment period. Upon completion of the Environmental Screening Process, an application will be made to amend the existing ECA No. A110302.

1.3.1 History of the Brooks Road Landfill Site

The Site has gone from being a rural 'dump' (i.e., non-engineered, unlined, waste disposal pits) to a modern engineered and operated waste management facility/landfill. Due to the nature of some of the waste that was historically disposed at the Site, the Site was remediated to remove previous waste deposited on-Site from the unlined disposal pits, some of which was deemed to be hazardous under Ontario Regulations. Since BRE has taken Ownership, the Site has undergone numerous improvements from an operational and safety standpoint, received approval for a vertical capacity expansion under the *EA Act*, and been granted amendments to its ECA. A short summary of the Site's history is provided in the subsections below.

Establishment of the Brooks Road Landfill Site

The Site was first established in 1959 as a rural dump for the surrounding area. A lack of provincial environmental protections and waste legislation at the time allowed for the accumulation of hazardous wastes in areas of the Site that gave rise to concerns about toxic contamination. In 1971, provincial legislation was enacted requiring that all waste disposal operators apply for a C of A (now referred to as an ECA), resulting in the renaming of the Site to Edwards Landfill. Edwards Landfill continued to operate and accept IC&I waste from the County between 1971 and 1977.

From 1977 to 2002 waste disposal at Edwards Landfill occurred only on an intermittent basis. The Site was purchased by Haldimand-Norfolk Sanitary Landfill Inc. in 2002, and an application was submitted to reopen the Site. The Ministry of the Environment (now MECP) granted an ECA for Edwards Landfill to reopen, subject to a list of conditions. The main requirement of Haldimand-Norfolk Sanitary Landfill Inc. was to decommission the disposal pits that had historically accepted potentially hazardous wastes.

Haldimand-Norfolk Sanitary Landfill Inc. submitted an application in 2004 to amend the maximum daily fill rate from 10 tonnes per day to 500 tonnes per day. The proposal was granted by the Ministry of the Environment in February 2005; however, an application seeking leave to appeal the decision was filed in June of that same year. A Settlement Agreement was reached between the appellants, Haldimand-Norfolk Sanitary Landfill Inc., and the Ministry of the Environment in November of 2006, and the appeal was withdrawn. A number of important issues and concerns related to the Edwards Landfill and its operation were raised during the appeal and are summarized as follows:

Inexperience of Operator (Haldimand-Norfolk Sanitary Landfill Inc. at the time) – no experience, expertise, or capability to operate a landfill receiving up to 500 tonnes of waste per day, nor to decommission historic waste disposal pits.

Non-compliance – not in compliance with a number of the conditions contained in the existing Site ECA and the County's Tree Control Bylaw.

Inadequacies of Site Decommissioning Plan – Site Decommissioning Plan at the time of the previous application was inadequate and its implementation could have resulted in significant harm to the environment.

[3] Ministry of the Environment, Conservation and Parks. (2007). *Guide to Environmental Assessment Requirements for Waste Management Projects*.

Truck Traffic Impacts – suitability of the Site to sustain the traffic volumes and loads associated with a fill rate of 500 tonnes per day was not assessed, nor was the impact of truck traffic on several other area roads.

Fundamental Unsuitability of Site – the location is fundamentally unsuitable for a landfill, particularly in regard to hydrogeological conditions, including the potential presence of karst topography and abandoned gypsum mines in the Site vicinity and the proximity of Provincially Significant Wetlands (PSW) and a National Historic Site.

Flawed Approvals Process – a proponent wishing to establish a new 600,000 m^3 landfill in Ontario will ordinarily be subject to a mandatory public hearing, and the approval process followed by Haldimand-Norfolk Sanitary Landfill Inc. was designed to purposely circumvent that requirement.

Significant management and financing issues led Haldimand-Norfolk Sanitary Landfill Inc. to declare bankruptcy in 2007, leaving no plan in place for cleaning up the areas of concern at the Site. The Site went into receivership in September 2007, with SF Partnership Chartered Accountants as acting receivers. Community members and Indigenous communities expressed concerns over the following years about mismanagement of the Site.

Brooks Road Environmental Purchase of the Site

In May 2012, BRE purchased the Site with a plan for the future of the landfill as a modern facility managed in accordance with MECP requirements. Although the above concerns were raised with a different owner, BRE reviewed these issues as a starting point to address community concerns.

By January 2014, the Site had been fully decommissioned, which included excavation and the off-Site disposal of 193.37 tonnes of suspected hazardous waste and impacted soils at Newalta's waste disposal facility at 65 Green Mountain Road in Stoney Creek, Ontario, the excavation and off-Site disposal of five over-packed drums of solid non-hazardous waste to Tervita's waste transfer station at 1650 Upper Ottawa Street in Hamilton, Ontario, the off-Site disposal of 27,680 litres of liquid industrial waste to Newalta's facility at 1131 Snow Valley Road, Barrie, Ontario, and the relocation of 60,204 m^3 of non-hazardous solid waste and impacted soil from the unlined disposal pits (referred to as the Original Landfill Area or OLA) to the on-Site engineered landfill cells. Results of the soil sampling program confirmed that all waste and impacted soils had been removed from the OLA and the remaining native soil within the decommissioning area met the applicable Ontario Soil Criteria standards provided in O. Reg. 153/04. All decommissioning activities are documented in the Site Decommissioning Report[4] submitted to the Ministry of the Environment (now MECP) on January 30, 2014, and BRE provided an irrevocable letter of credit to the Ontario Government to satisfy the Financial Assurance requirements. Further, a renewed Indigenous community, Agency and public consultation/outreach program was put in place upon BRE's purchase of the Site – and continues today – to provide immediate data and to consult on future plans for the Site. In short, a significant improvement to the Site and its operations came about as a result of the new ownership.

Brooks Road Landfill Vertical Capacity Expansion EA 2019 Approval

In 2018, BRE completed an Individual EA (known as the Brooks Road Landfill Vertical Capacity Expansion EA) to increase the total approved capacity at the Site by 421,000 m^3 to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period. The approved Brooks Road Landfill Vertical Capacity Expansion EA also proposed a change to the rate of waste received on-Site from a daily maximum of 500 tonnes per day to an annual maximum of 151,000 tonnes per year to accommodate busier months of operation in the spring and summer when more construction waste is produced compared to the winter months. Any proposed change in the annual fill rate limits requires a modification to Condition 3(7) of the approved ECA, which specifies that the maximum amount of waste that may be received at the landfill on an annual basis. The approved Brooks Road Landfill Vertical Capacity Expansion EA assessed the effects to the environment based on a maximum daily fill rate of 1,000 tonnes per day to demonstrate that the Site could manage this daily quantity, while maintaining the same annual limits (151,000 tonnes per year). Therefore, the 1,000 tonnes per day was used in the EA as a benchmark for the environmental effects analysis. On January 15, 2019, the MECP approved the Brooks Road Landfill Vertical Capacity Expansion EA. The

[4] Report was provided by Conestoga-Rivers & Associates. (2014, October 9).

resulting March 27, 2020 amendment to the ECA reflected a daily maximum of 1,000 tonnes per day and annual maximum of 151,000 tonnes per year.

Environmental Compliance Approval Amendment 2021

The Site ECA was recently amended to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process, as stated in Section 15 of the Waste Management Projects Regulation (O. Reg. 101/07) of the *EA Act*. The Environmental Screening Process to amend the approved ECA that commenced in November 2020 was completed in early 2021. The results of the Screening were documented in an ESR, which was released for a 60-calender day review to government agencies, Indigenous communities, and the public on April 15, 2021.

1.4 Problem, Purpose, and Opportunity

The purpose of the Project is to increase the capacity of the Site by approximately 219,400 m^3 (including waste and daily cover). This will be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically, as well as increasing the existing landfill footprint to expand the Site horizontally. The former railway property will continue to provide buffer land for the Site. Additionally, a revision of the final contours proposed under the ESR will require modification to the northern perimeter access road and stormwater drainage ditch.

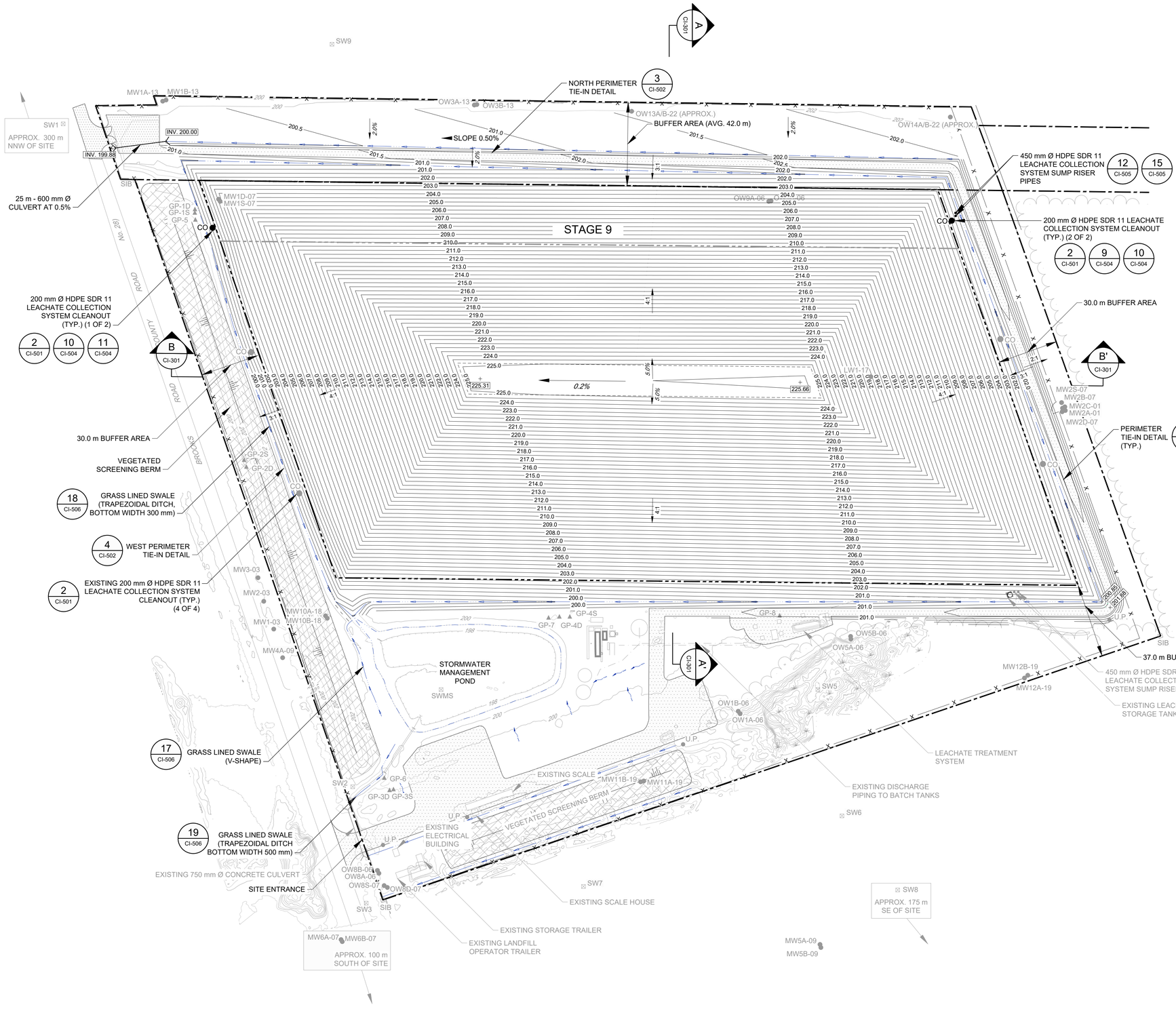
The Site accepts only non-hazardous solid waste, and serves a primarily industrial customer base, who have already extracted the value from their residual material and need a permitted, environmentally secure facility to manage the residual material their operations generate.

BRE intends to continue serving its existing customer base and is responding to the economic opportunity of providing waste management services to address the continued and growing demand from local and regional customers that require a facility that is permitted to manage the residual materials they generate. Extending the life of the Site will provide BRE with increased flexibility in terms of how best to serve its existing waste clients while remaining competitive within the marketplace. As part of its business plan, BRE reviewed the following:

- The current post-diversion solid, non-hazardous industrial residual material generated in Ontario, requiring a local, safe, and secure disposal facility
- Future post-diversion solid, non-hazardous industrial residual material generated in Ontario, requiring a local, safe, and secure disposal facility
- Development and analysis of potential long-term disposal capacity options that BRE could implement in order to continue providing waste management disposal services to their current businesses and customers

1.5 Description of Project Components and Activities

The Project for which the Screening is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final Site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This will be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (exceeding current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch will be required to accommodate the proposed changes to the final Site contours. The former railway property will continue to provide buffer land for the Site (see **Figure 1.2**). Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.



LEGEND:

- TOP OF FINAL COVER CONTOUR (1.0 m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5 m INTERVAL (m AMSL))
- EXISTING CONTOUR (2.0 m INTERVAL)
- EXISTING CONTOUR (1.0 m INTERVAL)
- PROPERTY LINE
- FENCE LINE
- DRAINAGE DITCH
- EXISTING FORCEMAIN
- APPROVED LIMIT OF WASTE
- EXISTING LOW AREA
- GRANULAR SURFACE / ACCESS ROADS
- SCREENING BERM
- EXISTING TREELINE
- EXISTING OBSERVATION WELL
- EXISTING MONITORING WELL
- EXISTING CLEANOUT
- CLEANOUT
- EXISTING SURFACE WATER MONITORING LOCATION
- EXISTING GAS PROBE
- EXISTING UTILITY POLE
- EXISTING LEACHATE WELL
- EXISTING CULVERT
- CULVERT
- EXISTING DOUBLE GATE
- EXISTING SINGLE GATE
- EXISTING STANDARD IRON BAR
- DOUBLE GATE

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HIGHWAY No. 3, APPROXIMATELY 550 m EAST OF THE INTERSECTION OF BROOKS ROAD AND HIGHWAY No. 3.
3. EXISTING NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY 17, 2013.
4. FOR STAGE 1 THOUGHT STAGE 3 LANDFILL BASE DESIGN, REFER TO DESIGN AND OPERATION PLAN, EDWARDS LANDFILL, GHD 2003.

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56 m AMSL.

SOURCE:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.

EXISTING WASTE CONTOURS SURVEYED DECEMBER 21, 2022, BY GHD.

DRAFT

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Bar is 25mm on original size sheet
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Figure 1.2

No.	Issue	Checked	Approved	Date
P03.	ISSUED FOR CLIENT REVIEW	R.L.	D.B.	10-27-2023
P02.	ISSUED FOR CLIENT REVIEW	R.L.	D.B.	04-26-2023
P01.	ISSUED FOR REVIEW	R.L.	D.B.	09-19-2022

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Drafting Check	M. WOLFER	Design Check	D. GATRELL
Project Manager	R. LOVEDAY	Project Director	D. BARTON

Client
BROOKS ROAD LANDFILL SITE HALDIMAND COUNTY, ONTARIO

Project
DESIGN AND OPERATIONS REPORT LANDFILL EXPANSION

Date	Scale
OCTOBER 20, 2023	1:1000

Project No.
12561524

Title
FINAL CONTOUR PLAN (TOP OF TOPSOIL)

Size
ANSI D

Sheet No.
CI-103

Plot Date: 14 November 2023 - 9:54 AM Plotted By: Spencer Holland Path and Filename: N:\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Sheets\REPORT 1\CI\12561524-GHD-00-00-CGP-CI-003.dwg

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in Table 1.1.

Table 1.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted north by 30 m. East and west ditches will extend north to maintain full perimeter ditch.
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

Environmental investigations were carried out as part of the Screening to confirm the potential environmental effects associated with the implementation of the Project; identify mitigation or compensation measures required to address potential adverse environmental effects; and determine the remaining net effects following the application of mitigation and/or compensation measures.

1.6 Approval Requirements

A change in the capacity of the landfill requires a modification to Condition 3(6) of the approved ECA, which specifies the maximum volumetric capacity for the Site including waste and daily cover. This proposed vertical and horizontal capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of the Waste Management Projects Regulation, (O. Reg. 101/07) of the *EA Act*.

When the Environmental Screening Process has been completed, BRE will prepare and apply to the MECP to amend ECA No. A110302.

2. Environmental Screening Process for Waste Management Projects

As stated above, the Environmental Screening Process under the Waste Management Projects Regulation (O. Reg. 101/07) of the *EA Act* was followed for the proposed Project. As per Section 13 of O. Reg. 101/07,

> *A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:*
>
> 1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
> 2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
> 3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

In accordance with Section 13 of O. Reg. 101/07, the proposed 219,400 m^3 expansion is exempt from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. In support of O. Reg. 101/07, the MECP published the *Guide to Environmental Assessment Requirements for Waste Management Project* (Guide), which outlines the planning and design process for the Environmental Screening Process. This Screening was conducted in accordance with the planning and design process outlined in the Guide, following the process as illustrated in **Table 2.1**.

This ESR has been prepared as a part of the Environmental Screening Process, documenting the potential adverse environmental effects of the Project on the environment. Where adverse environmental effects have been identified, mitigation and monitoring measures have been recommended to reduce or eliminate the effects.

Table 2.1 Steps in the Environmental Screening Process

Step 1	Publish Notice of Commencement and Public Open House
Step 2	Identify Problems or Opportunities and Project Description
Step 3	Apply Screening Criteria
Step 4	Describe Potential Environmental Effects, Concerns & Issues
Step 5	Consultation and Public Open House #1
Step 6	Conduct Studies and Assessment of Potential Environmental Effects
Step 7	Develop Impact Management / Mitigation Measures
Step 8	Consultation and Public Open House #2
Step 9	Identify Significant Net Effects and Resolve Concerns (if required)
Step 10	Conduct Additional Studies and Assessments (if required)

Step 11	Prepare Environmental Screening Report
Step 12	Publish Notice of Completion
Step 13	Resolve Elevation Requests (if required)
Step 14	Submit Statement of Completion to MECP

2.1 Amendment to Waste Management Project Regulation

O. Reg. 101/07 came into place in 2007, to ensure that the environmental effects of waste management projects are appropriately reviewed, given their potential significance. On August 8, 2023, the MECP amended the Waste Management Projects regulations (O. Reg. 101/07) in an effort to modernize the almost 50-year-old EA process that is not reflective of best practices, and that places undue burden on proponents that may not lead to environmental benefits and results in unnecessary cost from critical infrastructure projects. As part of modernizing the EA process, the MECP brought in regulatory changes that allow more projects to follow a streamlined EA process (i.e., Screening). The MECP proposed and approved updates to the thresholds for determining EA requirements for certain landfill expansions such that the following projects will be able to use the streamlined EA process for waste management projects:

– Changing a landfill to increase the total waste disposal volume by more than 100,000 m^3 and less than or equal to 375,000 m^3 if the change will increase the total waste disposal volume by less than or equal to 25%

– The Minister is the decision maker for elevation requests.

The approved revisions also state that proponents are not able to use the streamlined EA process to do a series of expansions over a defined period of time in order to avoid undertaking a Comprehensive (previously known as an Individual) EA. These amendments are captured in O. Reg. 101/07 made under the *EA Act* as well as the Guide.

Based on the approved legislative changes, BRE elected to revise the initially proposed expansion volume from 100,000 m^3 (as reported in the June 2022 Notice of Commencement) to approximately 219,400 m^3.

2.2 Screening Criteria Checklist

At the beginning of the Environmental Screening Process, the Screening Criteria Checklist (provided as Schedule I, pp 62 – 64, to the Guide) is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of “environment” contained in the *EA Act.*

As noted in the Guide:

“The Screening Criteria are presented in the form of a checklist with the option of a “Yes” or “No” response. Mitigation measures are not to be considered in concluding whether there is “No” potential environmental effect. That is, the proponent is required to answer “Yes” even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a “Yes” is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required. Where a “Yes” has been identified, the proponent is to provide additional information in the ESR, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that “No” environmental effects are anticipated, it is recommended that additional information be provided in the ESR in order to support the “no effects” conclusion”.

Each criterion is based on a question which is prefaced with the phrase, “Might the Project…”. The result of the screening level analysis is provided in Table 2.2.

Table 2.2 Screening Criteria Checklist

	Criterion	YES	NO	Additional Information
	Might the project…			
Surface and Groundwater				
1.1	Cause negative effects on surface water quality, quantities, or flow?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause potential negative effects on surface water quality, quantities, or flows.
1.2	Cause negative effects on groundwater quality, quantity, or movement?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause negative effects on groundwater quality, quantity, or movement.
1.3	Cause significant sedimentation or soil erosion or shoreline or riverbank erosion on or off site?		X	The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause some sedimentation on- or off-Site; however, it is not anticipated to be significant.
1.4	Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment.
Land				
2.1	Cause negative effects on residential, commercial, institutional, or other sensitive land uses within 500 metres from the site boundary?		X	The proposed undertaking is a continuation of the existing operation through an expansion within the existing site. No change to land use is being proposed. As such, no negative effects are anticipated on the lands or land uses within 500m the Site as a result of the Project.
2.2	Not be consistent with the Provincial Policy Statement, provincial land use or resource management plans?		X	The proposed landfill expansion will continue to be consistent with the Provincial Policy Statement, provincial land use and/or resource management plans.
2.3	Be inconsistent with municipal land use policies, plans and zoning bylaws (including municipal setbacks)?		X	The proposed landfill expansion will continue to be consistent with municipal land use policies, plans and zoning bylaws (including municipal setbacks). No new lands are required and no changes to existing zoning are required.
2.4	Use lands not zoned as industrial, heavy industrial or waste disposal?		X	The proposed landfill expansion will not require new lands or changes to existing zoning.
2.5	Use hazard lands or unstable lands subject to erosion?	X		The proposed landfill expansion may require the use of hazard lands or GRCA regulated lands.
2.6	Cause negative effects related to the remediation of contaminated land?		X	The proposed landfill expansion will not cause negative effects related to the remediation of contaminated land.
Air and Noise				
3.1	Cause negative effects on air quality due to emissions (for parameters such	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final

	Criterion	YES	NO	Additional Information
	Might the project…			
	as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other contaminants)?			contours, and on-Site operations and may cause negative effects on air quality due to emissions.
3.2	Cause negative effects from the emission of greenhouse gases (e.g., carbon dioxide, carbon monoxide, methane)?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may result in a potential increase in emission of greenhouse gases associated with continued operation of the Site.
3.3	Cause negative effects from the emission of dust or odour?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may result in a potential increase in dust and odour emissions associated with continued operation of the Site.
3.4	Cause negative effects from the emission of noise?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may result in a potential increase in noise emissions associated with continued operation of the Site.
3.5	Cause light pollution from trucks or other operational activities at the site?		X	The proposed landfill expansion will not cause negative effects from light pollution.
Natural Environment				
4.1	Cause negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat?	X		The provincial Species at Risk Ontario (SARO) and federal *Species at Risk Act* (SARA) list numerous endangered, threatened, and special concern species of flora or fauna within the Study Areas. Some of these species (e.g., barn swallow [*Hirundo rustica*]) have been observed within the Site.
4.2	Cause negative effects on protected natural areas such as, ANSIs, ESAs, or other significant natural areas?		X	As there are no ANSIs, Environmentally Sensitive Areas, or other significant natural areas within the Site, the proposed expansion is not expected to cause a negative effect.
4.3	Cause negative effects on designated wetlands?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause negative effects on designated wetlands. PSWs are present within the southern boundary of the Site and throughout the adjacent lands.
4.4	Cause negative effects on wildlife habitat, populations, corridors, or movement?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause negative effects on wildlife habitats, populations, corridors, or movements. It should be noted Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) have identified Wildlife Activity Area (white-tailed deer wintering area) as being present within the Study Areas.

	Criterion	YES	NO	Additional Information
	Might the project…			
4.5	Cause negative effects on fish or their habitat, spawning, movement, or environmental conditions (e.g., water temperature, turbidity, etc.)?		X	The proposed landfill expansion will not result in negative effects on fish or their habitat, spawning, movement, or environmental conditions (e.g., water temperature, turbidity, etc.) due to lack of presence within the Site.
4.6	Cause negative effects on locally important or valued ecosystems or vegetation?		X	The proposed landfill expansion will not result in negative effects on locally important or valued ecosystems or vegetation.
4.7	Increase bird hazards within the area that could impact surrounding land uses (e.g., airports)?		X	The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations. This is unlikely to cause an increase in bird hazards.
Resources				
5.1	Result in practices inconsistent with waste studies and/or waste diversion targets (e.g., result in final disposal of materials subject to diversion programs)?		X	The proposed landfill expansion will be consistent with diversion targets.
5.2	Result in generation of energy that cannot be captured and utilized?		X	No energy recovery/ utilization is proposed.
5.3	Be located a distance from required infrastructure (such as availability to customers, markets, and other factors)?		X	The proposed landfill expansion will not change the existing landfill location.
5.4	Cause negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural lands?		X	According to the Canada Land Inventory,[5] lands within the Local Study Area (LSA) are comprised of Class 2 soils (generally north and west of the Site) and Class 3 soils (generally east and south of the Site). The proposed landfill expansion will not result in any loss of soil with agricultural capability, nor would the current expansion cause negative effects on Canada Land Inventory Class 2-3 soils within the LSA. All lands on the Site are considered to be disturbed and are not rated under the Canada Land Inventory.
5.5	Cause negative effects on existing agricultural production?		X	The proposed landfill expansion will not cause negative effects on agricultural production.
Socio-Economic				
6.1	Cause negative effects on neighbourhood or community character?		X	The proposed undertaking is an expansion to an already approved and existing landfill within the existing site. As such, no negative effects on the neighbourhood or community character are anticipated on as a result of the Project.
6.2	Result in aesthetics impacts (e.g., visual and litter impacts)?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause aesthetic impacts due the increase in landfill height
6.3	Cause negative effects on local businesses, institutions, or public facilities?		X	The proposed undertaking is a continuation of the existing operation through an expansion within the existing site. No change to land use is being

5

	Criterion	YES	NO	Additional Information
	Might the project…			
				proposed. As such, no negative effects are anticipated to local businesses, institutions, or public facilities.
6.4	Cause negative effects on recreation, cottaging or tourism?		X	The proposed landfill expansion will not result in negative effects on recreation, cottaging or tourism as none of the above-mentioned uses have been identified within the Study Areas..
6.5	Cause negative effects related to increases in the demands on community services and infrastructure?		X	The proposed landfill expansion will not cause negative effects related to increases in the demands on community services and infrastructure.
6.6	Cause negative effects on the economic base of a municipality or community?		X	The proposed landfill expansion will not cause negative effects on the economic base of a municipality or community.
6.7	Cause negative effects on local employment and labour supply?		X	The proposed landfill expansion will not cause negative effects on local employment and labour supply. The continued use of the landfill will provide economic benefits to the local community in the form of new employment opportunities in both the construction and day-to-day operation. There is also the potential for increased employment opportunities in local firms.
6.8	Cause negative effects related to traffic?	X		The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause negative effects related to traffic through prolonging the life of the Site.
6.9	Be located within 8 km of an aerodrome/airport reference point?	X		Three aerodromes have been identified within 8km of the Site: Cayuga (Bruce Field), approximately 1.3 km south of the Site Cayuga East, approximately 3 km southeast of the Site Grand River Executive, approximately 7.5 km north of the Site
6.10	Interfere with flight paths due to the construction of facilities with height (i.e., stacks)?		X	The proposed landfill expansion will not interfere with flight paths.
6.11	Cause negative effects on public health and safety?		X	The proposed landfill expansion would not cause any negative effects on public health and safety.
Heritage and Culture				
7.1	Cause negative effects on heritage buildings, structures or sites, archaeological sites or areas of archaeological importance, or cultural heritage landscapes?		X	The entire Site has been subjected to recent, extensive and intensive disturbance and it is therefore considered that the Site does not have any heritage, cultural and archaeological potential that will be negatively affected by the expansion. While there are areas within the Local Study Area (LSA) that may have heritage, cultural archaeological potential, these areas will not be disturbed by the proposed expansion.

	Criterion	YES	NO	Additional Information
	Might the project…			
7.2	Cause negative effects on scenic or aesthetically pleasing landscapes or views?	X		The proposed vertical and horizontal landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause negative effects on scenic or aesthetically pleasing landscapes or views.
Aboriginal				
8.1	Cause negative effects on land, resources, traditional activities, or other interests of Aboriginal communities?		X	Consultation with Indigenous communities will take place throughout the Environmental Screening Process.
Other				
9.1	Result in the creation of non-hazardous waste materials requiring disposal?		X	The proposed landfill expansion will not change the types of wastes the facility is permitted to receive and will not result in the creation of non-hazardous waste materials requiring disposal (the landfill currently receives non-hazardous wastes as permitted by the existing Environmental Compliance Approval).
9.2	Result in the creation of hazardous waste materials requiring disposal?		X	The proposed landfill expansion will not change the types of wastes the facility is permitted to receive and will would not result in the creation of hazardous waste materials requiring disposal (the landfill currently receives non-hazardous wastes as permitted by the existing Environmental Compliance Approval).
9.3	Cause any other negative environmental effects not covered by the criteria outlined above?		X	The proposed landfill expansion will not cause any other negative environmental effects not covered by the criteria outlined above.

3. Description of the Existing Environment

This section documents the existing conditions (i.e., what exists in absence of the proposed Project) in the context of the discipline-specific criteria included in the Screening Criteria Checklist (see Table 2.2, above) within the Study Areas defined for each discipline.

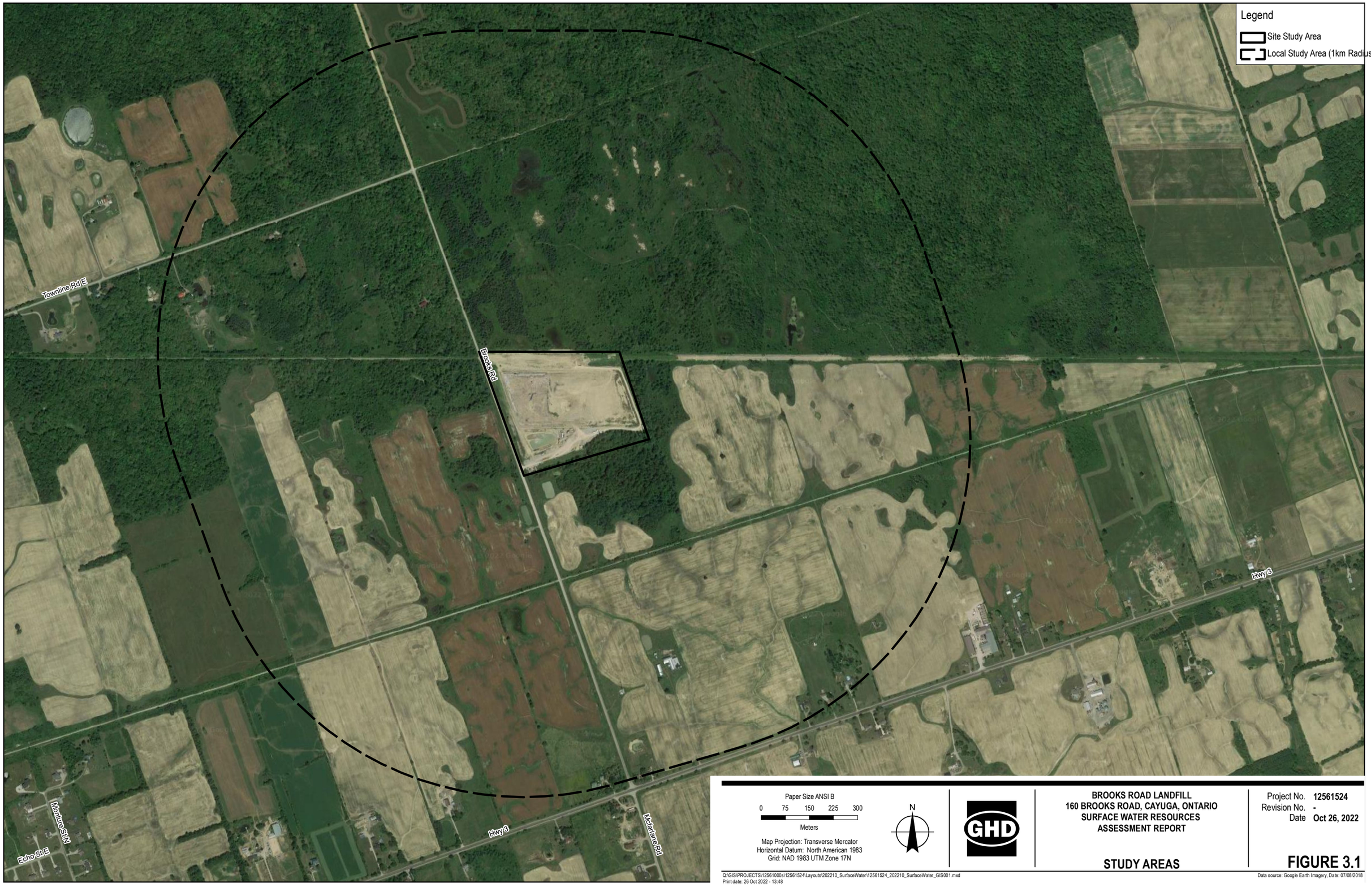
3.1 Surface Water Existing Conditions

3.1.1 Study Area

The Surface Water Study Areas to be discussed in relation to the preparation of this ESR are as follows:

– **Site Study Area (SSA)**: Including all lands (i.e., 14.3 ha)) within the existing, approved boundaries of the Site as defined by ECA No. A110302, as amended

– **Local Study Area (LSA)**: Including all lands and waters within a 1 kilometre (km) radius of the SSA boundaries including agricultural, residential, and municipal properties



Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
SURFACE WATER RESOURCES ASSESSMENT REPORT

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 26, 2022**

FIGURE 3.1

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Print date: 26 Oct 2022 - 13:48

Data source: Google Earth Imagery, Date: 07/08/2018

3.1.2 Methodology

3.1.2.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Surface Water Study Team to determine existing surface water conditions within the Study Areas. The following sources of secondary information were collected and reviewed:

- MECP Stormwater Management Planning and Design Manual (MECP, March 2003)
- Stormwater Management (SWM) Plan (Conestoga-Rovers & Associates (CRA), September 2013)
- Surface Water (SW) Resources Assessment Report for the Brooks Road Landfill Site, Vertical Capacity Expansion Environmental Assessment (GHD, July 2016)
- Design and Operation (D & O) Report Landfill Expansion Report 81 Revision 1 (GHD, June 2021)
- 2021 Operations and Monitoring (O & M) Report, Brooks Road Landfill Site (GHD, March 2022)

3.1.3 Process Undertaken

The process undertaken for the Surface Water Assessment on the Site includes the following:

- Background Review
- Existing Site Conditions Review
- Field Investigation Review (based on the current surface water monitoring program)
- Proposed Expansion Assessment
- Potential effects, mitigation measures and net effect analysis

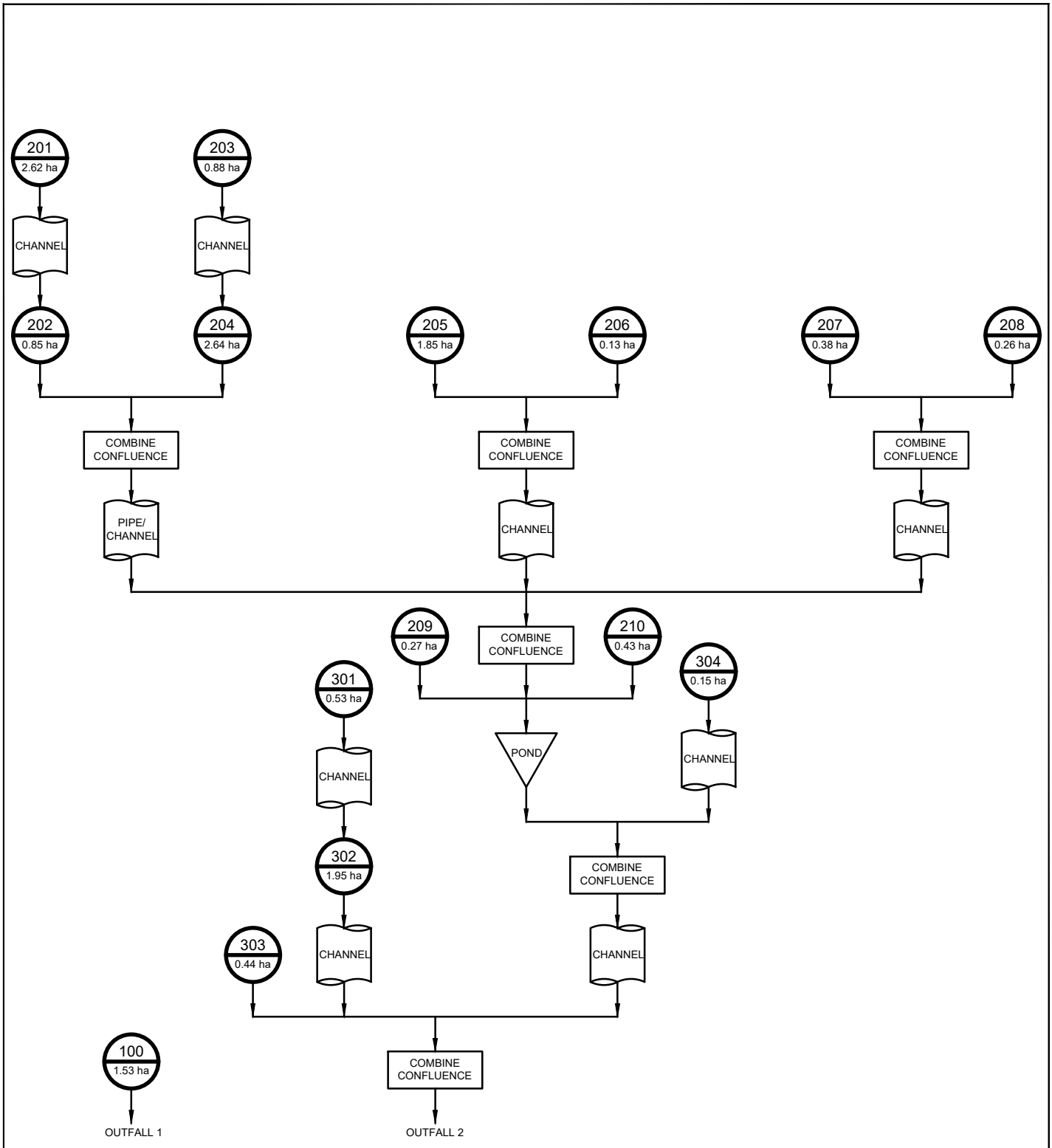
3.1.4 Description of Surface Water Existing Conditions

The on-Site drainage patterns are similar to those described in the SWM Plan (2013) and SW Resources Assessment Report (2016). The Site stormwater management practices currently operate under Amended ECA Nos. 1122- BKUPSM, issued in February 2020. The Site drainage network is being configured to the Post Closure Condition, illustrated on Figure 5 of the 2013 SWM Plan. The SWM Plan and SW Resources Assessment are provided in the Surface Water Assessment Report (see **Appendix A**).

The LSA includes slough forest, woodlot, agricultural, residential, and municipal properties. The on-Site topography is very flat with a slight 0.003 metre/metre (m/m) horizontal gradient to the south. The topography across the LSA from north to south ranges from approximately 202 m above mean seal level (AMSL) to approximately 196 m AMSL.

The existing SWM measures within the Site, as described in the SWM Plan and D&O report, include the following:

- Site stormwater runoff is discharged from two outfalls. Runoff from the undeveloped area of land located at the south-east corner of the Site (catchment 100) discharges through Outfall 1. The remainder of the Site discharges through Outfall 2. The existing flow schematic is presented on **Figure 3.2.**
- The majority of the Site areas discharge to the existing SWM pond through perimeter ditches including final cover areas (Catchments 201-204), areas between the landfill perimeter access road and the visual screening berms to the north and west (Catchments 205-206), segregated recyclable material storage areas, Site trailers, scales (Catchments 207-208) and areas that encompass the pond (Catchments 209-210).
- The rest of the Site areas, which are largely undeveloped (Catchments 301-303), discharge towards Outfall 2.



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160 BROOKS ROAD, CAYUGA ONTARIO
SURFACE WATER RESOURCES ASSESSMENT REPORT

POST CLOSURE CONDITIONS FLOW SCHEMATIC

Project No. **12561524**
Date **October 2022**

FIGURE 3.2

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A summary of the existing subcatchment parameters for contributing drainage areas to the SWM pond is presented in **Table 3.1.**

Table 3.1 Existing Subcatchment Parameters for Contributing Drainage Areas to SWM Pond

Catchment ID*	Area (ha)	Slope (%)	Imperviousness Area (%)	Imperviousness Area (ha)	SCS Curve Number
201	2.62	25	5	0.13	73
202	0.85	25	7	0.06	73
203	0.88	25	5	0.04	72
204	2.64	25	8	0.21	73
205	1.85	50	0	0.00	74
206	0.13	2	5	0.01	72
207	0.38	2	95	0.36	98
208	0.26	2	95	0.25	98
209	0.27	2	5	0.01	72
210	0.43	10	100	0.43	98
Total	10.31				

Source*: Stormwater Management Plan 2013 (Table 3)

The existing stormwater controls on Site include drainage ditches and the SWM Pond, which are summarized in subsequent sections.

Although the Site is on the boundary of two watersheds and the conditions are primarily ephemeral, the surface water drainage pattern meanders through road-side ditches, farmland, and Norton's Creek to the Grand River, located approximately 7 km from the Site.

3.1.4.1 Monitoring Program

As specified in the Landfill ECA, a surface water monitoring program was developed to assess the surface water quality within the Site and downstream of the Site to ensure compliance with the ECA requirements, Water Management Policies, Guidelines, Provincial Water Quality Objectives (PWQO), published by the MECP in July 1994, and reprinted February 1999. The current surface water monitoring program includes monitoring of surface water quality and quantity, through water sampling and flow rate measurements, respectively.

The surface water monitoring network is currently comprised of nine monitoring locations (see **Figure 3.3**) which includes the following:

– Three off-Site background locations: SW1, SW8, and SW9. All three have been established to document the background water quality in the local ditches and ponds. SW9 is located immediately north of the Site, north of OW3A/B-13 monitoring well.
– Two on-Site surface water monitoring locations: include one pond (SW5) located in the southern portion of the Site and one on-Site surface water ditch (SW2) located at the discharge from the surface water management system (SWMS).
– Four off-Site surface water monitoring locations: include two ponds (SW6 and SW7) located to the south of the Site; one drainage ditch located immediately downstream of the Site discharge point (SW3), and one drainage ditch (SW4) situated approximately 1 km south and downstream of the Site along Highway No. 3.

Water quality monitoring and surface water flow measurements at all surface water stations is scheduled to take place on a quarterly basis in March, May, August, and November. An attempt is made to correlate the surface water

monitoring with rainfall events. As such, the John C. Munro Hamilton International Airport in Mount Hope, ON Hamilton Airport), located approximately 24 km to the north, is often used to schedule surface water monitoring events.

The comprehensive list of specific surface water parameters analyzed during the monitoring program includes:

– General parameters: Alkalinity, conductivity, chloride, ammonia, nitrate, nitrite, TKN, total phosphorus, TDS, pH, TSS, sulphate, BOD5, COD, phenol, pH
– Metals: arsenic, barium, boron, cadmium, chromium, iron, lead, mercury, copper, zinc
– Organics: ethylbenzene, benzo(a)pyrene, naphthalene
– Field parameters: conductivity, pH, temperature, and dissolved oxygen

The parameter list for the current monitoring period (2021) is provided in Table 5.7 of the 2021 O&M report.

SOURCE: MICROSOFT PRODUCT SCREEN SHOT REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION, ACQUISITION DATE 2020, ACCESSED MARCH, 2020

LEGEND

- PROPERTY LINE
- SW5 — SURFACE WATER MONITORING LOCATION
- TEMPORARY DEWATERING SEDIMENTATION POND

BROOKS ROAD LANDFILL SITE
SURFACE WATER RESOURCES ASSESSMENT REPORT

SURFACE WATER MONITORING LOCATIONS

Project No. 12561524
Date October, 2022

Figure 3.3

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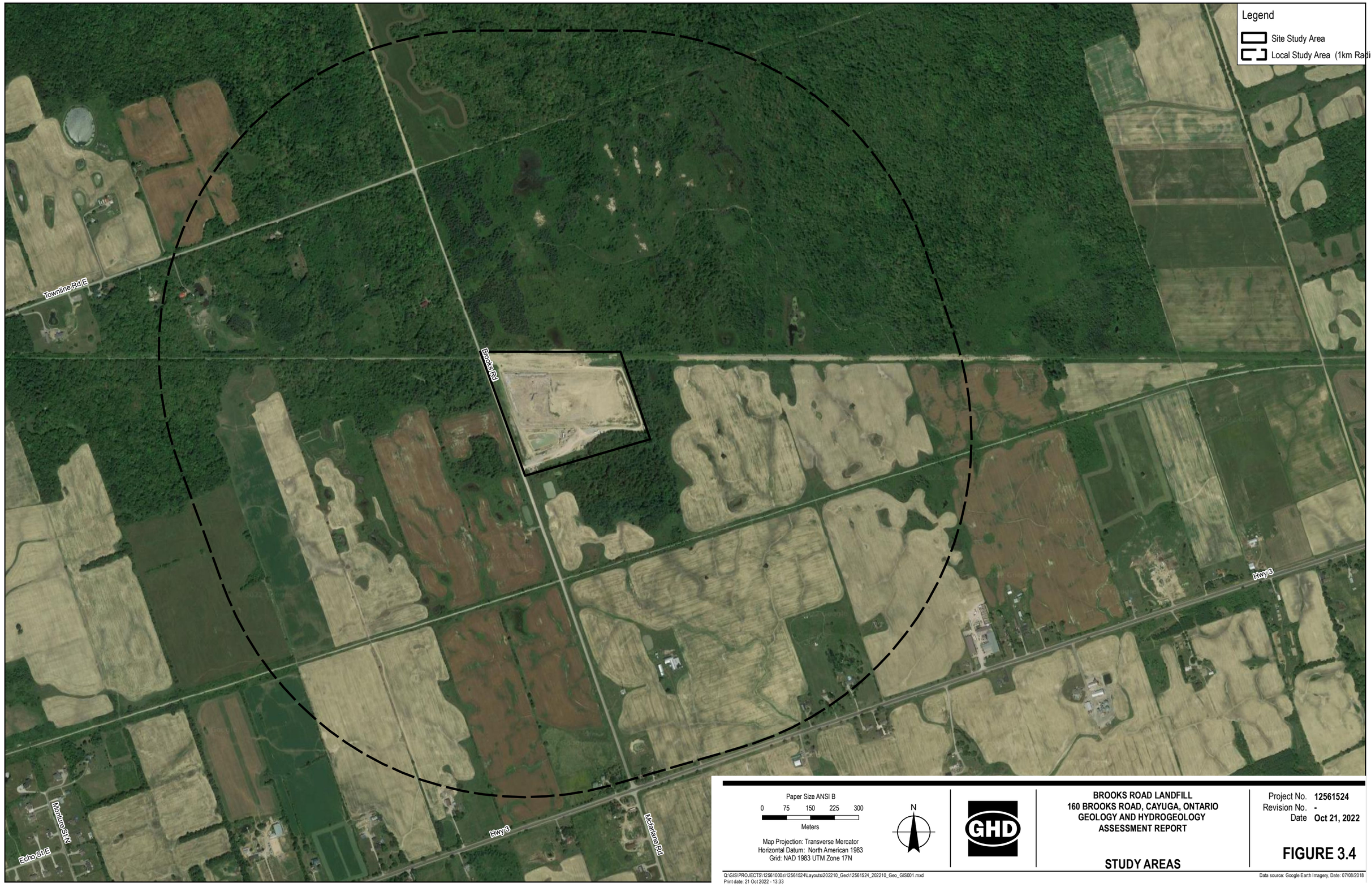
3.2 Geology & Hydrogeology Existing Conditions

3.2.1 Study Area

The Geology and Hydrogeology Study Areas to be discussed in relation to the preparation of this ESR are as follows:

– **SSA**: Including all lands (i.e., 14.3 ha) within the existing, approved boundaries of the Site as defined by ECA No. A110302, as amended
– **LSA**: Including all lands and waters within a 1 km radius of the SSA boundaries including agricultural, residential, and municipal properties



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0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
GEOLOGY AND HYDROGEOLOGY ASSESSMENT REPORT

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 21, 2022**

FIGURE 3.4

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3.2.2 Methodology

3.2.2.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Geology and Hydrogeology Study Team to determine existing geology and hydrogeology conditions within the Study Areas. The following sources of secondary information were collected and reviewed:

Site-Specific Reports

- GHD Limited. (April 2022). 2021 Annual Operations and Monitoring Report, Brooks Road Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (October 2002, Amended November 2003). Design and Operations Report, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (October 2002). Hydrogeologic Performance Assessment - Updated Design, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (July 2010). Updated Site Decommissioning Plan, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (July 2004). Well Survey and Limited Hydrogeological Assessment, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (January 2014). Site Decommissioning Report, Brooks Road Landfill Site, Haldimand County, Ontario.
- GHD Ltd. (May 2016). Gypsum Mine Investigation Report, Haldimand County, Ontario.

Government Information Available in the Public Domain

- Physiography mapping (classified as the Haldimand Clay Plain)
  - Chapman, L.S. and Putnam, D.F, 1984: The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2, Ontario Ministry of Natural Resources, Third addition
- Topography Mapping (regional topography and slope, and approximate site topography of 200 m above mean sea level (AMSL))
  - National Topographic System, 1983: Dunnville, Ontario; Canada Centre for Mapping, Department of Energy, Mines & Resources, Information Current as of 1980, Map Sheet 30 L/13, Edition 6, scale 1:50,000
- Soils mapping (classified as lacustrine silty clay)
  - Ontario Institute of Pedology, 1983: Soils of Haldimand-Norfolk Regional Municipality; Cartography Section, Land Resource Research Institute, Research Branch, Agriculture Canada, Soil Survey Report No. 57, Sheet 6, scale 1:25,000
- Quaternary geology mapping (classified as glaciolacustrine clay and silt)
  - Feenstra, B.H., 1974: Quaternary Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.981, Geological Series, scale 1:50,000. Geology 1973
- Bedrock topography mapping (bedrock topography approx. 182.5 m AMSL)
  - Feenstra, B.H., 1981: Bedrock Topography of the Dunnvile Area, Southern Ontario; Ontario Geological Survey, Preliminary Map P.2412, scale 1:50,000
- Bedrock geology mapping (bedrock geology is comprised of argillaceous dolostone and evaporites of the Salina Formation)
  - Telford, P.G., and Tarrant, G.A., 1975: Paleozoic Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.988, Geological Series, scale 1:50,000. Geology 1974

– Karst geology report/mapping
  - Brunton, F.R. and Dodge, J.E.P. 2008: Karst of Southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5. ISBN 978-1-4249-8376-6 (ZIP FILE)
– Active and abandoned gas wells in proximity to the Site were also reviewed (source: Oil, Gas & Salt Resources Library, London, ON

3.2.3 Description of Geology & Hydrogeology Existing Conditions

The Site is situated on the Haldimand Clay Plain[6] approximately 2 km northeast of the Town of Cayuga. The Site is relatively flat. The regional topography is generally flat with a gentle slope to the south towards Lake Erie. The elevation of the Site is approximately 200 m AMSL[7]. A Site location map, which includes regional elevations, is included as **Figure 3.5**.

A review of soil surveys indicates that the surficial soils in the LSA are classified as mainly lacustrine silty clay[8]. A review of the quaternary geology in the LSA indicates that the area is generally underlain by glaciolacustrine clay and silt[9]. Published bedrock topography mapping indicates a bedrock elevation of approximately 182.5 m AMSL in the vicinity of the Site[10]. The bedrock geology in the LSA and underlying the Site is comprised of argillaceous dolostone, shale, and evaporites of the Salina Formation[11].

[6] Chapman, L.S. and Putnam, D.F, 1984: The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2, Ontario Ministry of Natural Resources., Third addition.

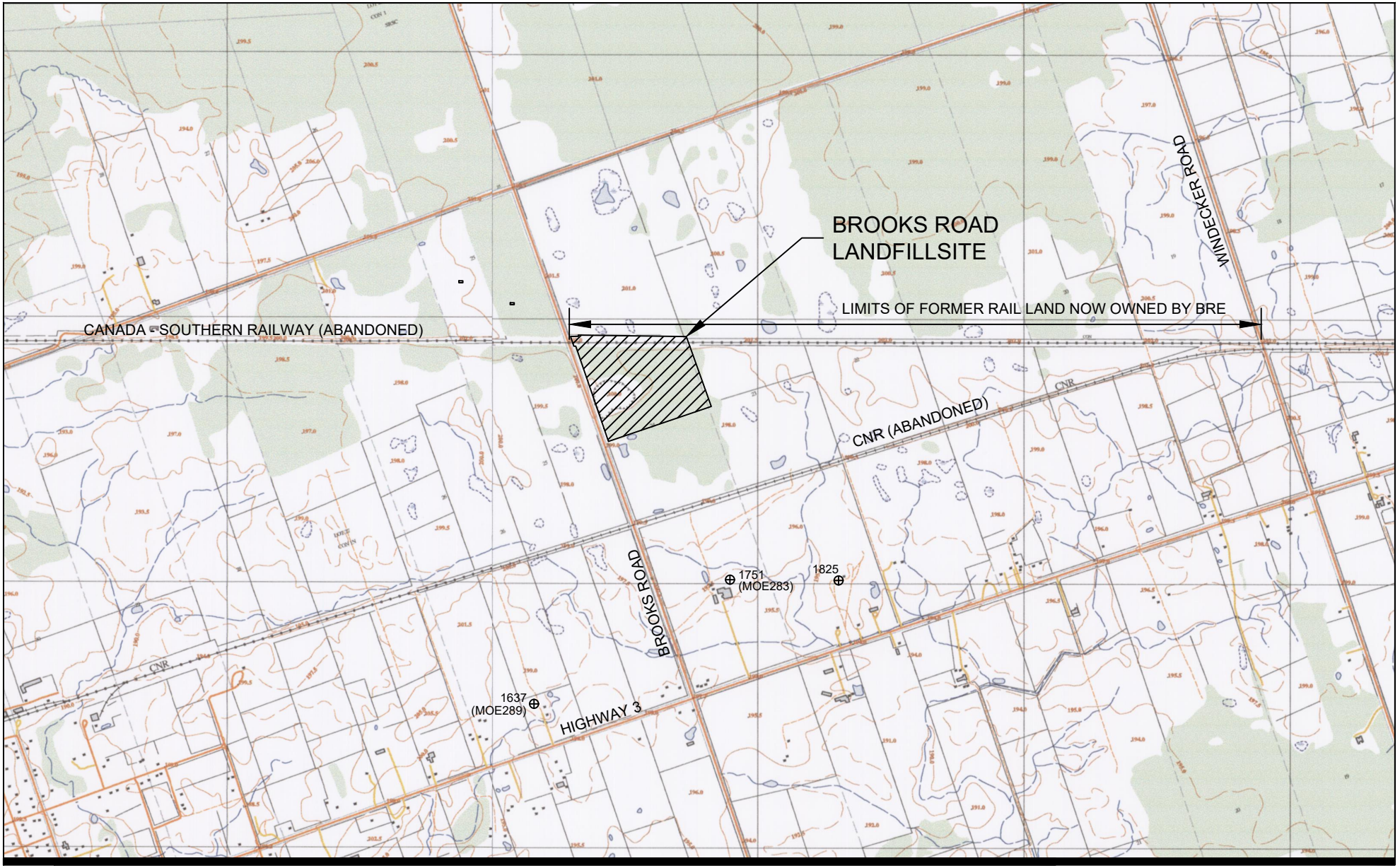
[7] National Topographic System, 1983: Dunnville, Ontario; Canada Centre for Mapping, Department of Energy, Mines & Resources, Information Current as of 1980, Map Sheet 30 L/13, Edition 6, scale 1:50,000.

[8] Ontario Institute of Pedology, 1983: Soils of Haldimand-Norfolk Regional Municipality; Cartography Section, Land Resource Research Institute, Research Branch, Agriculture Canada, Soil Survey Report No. 57, Sheet 6, scale 1:25,000.

[9] Feenstra, B.H., 1974: Quaternary Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.981, Geological Series, scale 1:50,000. Geology 1973.

[10] Feenstra, B.H., 1981: Bedrock Topography of the Dunnvile Area, Southern Ontario; Ontario Geological Survey, Preliminary Map P.2412, scale 1:50,000.

[11] Telford, P.G., and Tarrant, G.A., 1975: Paleozoic Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.988, Geological Series, scale 1:50,000. Geology 1974.



LEGEND

1637 (MOE289) RESIDENTIAL WELL LOCATION

0 200 400 600m

1:20000

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GHD

BROOKS ROAD LANDFILL SITE HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

SITE LOCATION MAP WITH REGIONAL ELEVATION

Project No. **12561524**
Date **June 2022**

FIGURE 3.5

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Figures\RPT001\12561524-GHD-00-00-RPT-EN-D102_WA-001.dwg
Plot Date: 09 June 2022 8:21 AM

Data Source: MINISTRY OF NATURAL RESOURCES SHEETS: 10 17 5900 47550 & 10 17 5950 47550

3.2.3.1 Site Geology

The overburden geology is relatively uniform beneath the Site. In general, the Site is characterized by a thick (14 to 18 m) glaciolacustrine layer of stratified silty clay, silty clay till and varved clays, underlain by a thin (1 to 3 m) discontinuous layer of silty sand till with varying proportions of gravel and clay. The bedrock has been encountered at depths varying from 15.2 to 20.2 m below ground surface (BGS). A thin surficial deposit of topsoil is generally observed at the surface of the Site, with the exception of the southwestern portion.

The silty clay deposits are described as being locally fractured (weathered) from the surface down to depths varying from 3 to 5 m BGS and are characterized as a very stiff to hard with low plasticity. At depths more than 5 m, the silty clay deposits have little to no fracturing and the consistency of the units increase from stiff to very stiff.

Underlying the silty clay deposits, a thin discontinuous silty sand till with varying proportions of clay and gravel is encountered across the Site. The silty sand till ranges in thickness from 1 to 3 m and often contains cobbles and/or broken angular bedrock fragments. This deposit is usually well graded with fine to medium grained sand, minor silt and trace clay, and is described as dense to compact, grey, and saturated. The silty sand till rests directly over the bedrock.

Bedrock underlying the Site has been described as a fractured shale, dolostone and gypsum of the Salina Formation. The top of bedrock elevation ranges from 180.8 to 187.0 m AMSL and forms a small bedrock valley from northwest to southeast across the Site. The valley is characterized by a thicker silty sand till deposit. Regionally, the bedrock topography dips to the south.

3.2.3.2 Site Hydrogeology

In general, the geologic units identified at the Site may be grouped into two main hydrogeologic units separated by the thick silty clay aquitard unit, as follows:

i) An unconfined water table (shallow overburden) unit within shallow fractured silty clay (weathered) unit

ii) Silty clay aquitard

iii) A confined basal till overburden/shallow bedrock aquifer

These two hydrogeological units are separated by a thick (between 9 and 12 m) layer of stratified silty clay, silty clay till, and varved clays which form a continuous aquitard of very low hydraulic conductivity. Groundwater level data historically gathered from the shallow overburden unit and basal overburden/shallow bedrock aquifer indicate that the clay aquitard provides hydraulic separation between the two units. Differences in hydraulic head between the two units have varied between 9.5 to 15 m as historically measured at the location of nested wells. The vertical hydraulic gradient between the two hydrogeologic units is downward.

Based on historical groundwater level data, the shallow overburden unit is generally encountered at depths varying from 0.5 to 4 m BGS across the Site. The shallow overburden unit is an unconfined water table unit, which overlies the impermeable un-weathered silty clay unit. Based on the shallow overburden monitoring wells monitored in 2021, groundwater flow in this unit is generally towards the south towards Lake Erie.

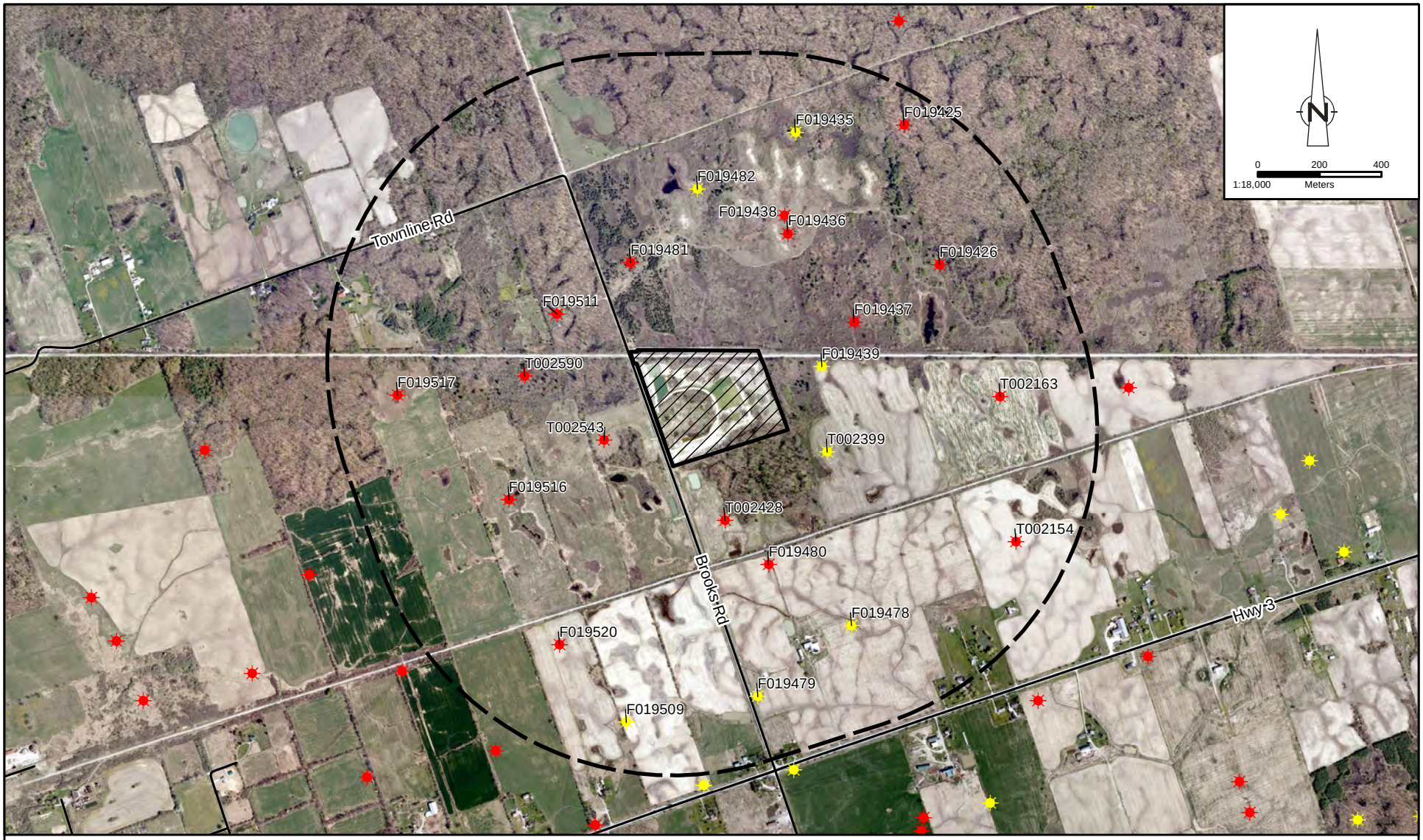
Underlying the silty clay aquitard, a confined basal overburden/shallow bedrock aquifer has been observed within the lower portion of the silty sand till unit and the shallow fractured bedrock. Groundwater quality and water level data indicate that the lower silty sand till unit and the shallow fractured portion of the bedrock are hydraulically connected and geochemically similar. Therefore, these two geological units have been considered to form one aquifer.

Based on the groundwater data obtained to date, the basal overburden/shallow bedrock aquifer is generally encountered at depths varying from 14 to 17 m BGS. The groundwater flow pattern in this aquifer is in a south to southwest direction with a relatively flat horizontal hydraulic gradient.

3.2.3.3 Natural Gas Deposits and Natural Gas Wells

A review of oil, gas and salt resource mapping in Ontario indicates that several active and plugged gas wells are located within the LSA. No active/plugged gas wells were identified on the Site, however, research indicates that 23 current and former gas wells are located within the LSA. A total of 16 gas wells have been identified as abandoned, of which 15 have been identified as plugged, and a total of seven gas wells that may be active, suspended, or abandoned are found within the LSA. The gas wells all targeted the Haldimand Pool within the Clinton Group and were drilled to a total depth (true vertical depth) ranging from 207.6 to 229.5 m BGS at approximately the top of the Queenston Formation. A natural gas pipeline is also located approximately 400 m south of the Site. A list of the Ontario Oil and Gas Wells located within the LSA is itemized in Table 3.1 of the Geology and Hydrogeology Assessment Report (see **Appendix B**) and a reference Figure is attached as **Figure 3.6**.

Due to the depths of the natural gas wells, it is not anticipated that there will be any influence from the landfill on the natural gas wells.



Source: MNRF NRVIS, 2014. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016; Haldimand County Official Plan
Aerial: 2006 Grand River Conservation Authority
Coordinate System: NAD 1983 UTM Zone 17N

Legend

- Site Location
- Local Study Area (1km Radius)
- Abandoned Gas Well
- Status Unknown

Figure 3.6

OIL AND GAS WELL LOCATIONS
GEOLOGY & HYDROGEOLOGY ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

018235-20(064)GIS-WA001 Jul 08/2016

3.2.3.4 Mining Claims and Abandoned Mines

A review of the Ministry of Northern Development, Mines, Natural Resources and Forestry information for abandoned mines and mining claims was completed. No mining claims were identified within the SSA, however one abandoned mine was identified within the LSA to the northwest of the Site (AMIS File # 04888 / MDI # MDI30L13NW00003). The mine was reviewed in a CRA report entitled Well Survey and Limited Hydrogeological Assessment, dated July 2004 (2004 Report). The 2004 Report indicates two documents were reviewed: Gypsum in Ontario, C.R.Guillet, dated 1964, and Abandoned Mines Hazard Abatement Program, London District Site Examinations, prepared by Patrick Chance & Associates Consulting Geologists, dated 1994 (1994 Inspection). The information presented below was gathered from the above-referenced reports and has been revised with the most current information available including information from the Gypsum Mine Investigation Report prepared by GHD that provides an assessment of potential influences of the former Cayuga Gypsum Mine on groundwater at the landfill Site.

The former gypsum mine was operated by the Cayuga Gypsum Company Limited between 1942 and 1949. Gypsum was mined from a 0.9 m thick bed at a depth of 25.9 m BGS.

Mining operations were accomplished via two mine shafts. The first shaft was located approximately 112 m south of Townline Road and 350 m west of Brooks Road. The former shaft can reportedly be located by a 2.4 m deep depression, with a footprint of 3 by 4.6 m. The shaft was a vertical prospect shaft of unknown support and was back-filled with unknown materials. The 1994 Inspection did not document any evidence of subsidence, however the report recommended that a 50 m radius area of caution be observed in the vicinity of this shaft.

Based on the available historical documentation, approximately 10,300 tonnes of gypsum were reportedly removed from this prospect shaft during the operation of the mine. With a density of 2.3 tonnes/m^3 and a thickness of 1 m, this would correspond to lateral workings with an aerial footprint of approximately 4,356 square metres (m^2). In order to access the gypsum in the 1 m seam, it is likely that approximately 1 to 2 m of the overlying shale bedrock would also have been removed.

The second shaft was located approximately 305 m south of the first shaft. The 1994 inspection was reportedly unable to locate the second shaft. The second shaft was also a vertical prospect shaft of unknown support and it is unknown if the shaft has been back-filled. It is not known how much gypsum was removed from this shaft.

Due to property access restrictions, an inspection of the former Cayuga Gypsum Mine could not be conducted.

During the operation of the mine from 1942 to 1949, dewatering operations would likely have been conducted to keep the mine shafts and associated galleries dry. As such, during the operation of the mine the local groundwater flow would have been influenced by mine dewatering activities. Active removal of large quantities of groundwater from the bedrock would have resulted in inward hydraulic gradients. As such, the bedrock groundwater flow in the vicinity of the former mine would have been directed towards the active galleries during operation of the mine.

Upon closure of the mine in 1949, the dewatering activities at the mine would have ceased and the associated mine shafts and galleries would have flooded within the first year of closure. The mine has now been abandoned for 67 years. Since the former galleries and shafts are flooded, no water deficit should be present between these former underground structures and the surrounding bedrock. Thus, essentially steady state conditions should exist and the former underground structures will no longer have a hydraulic influence on the local bedrock aquifer.

In the unlikely event that the former mine shafts would not have been properly sealed following closure of the mine, there could exist the potential for surface water and groundwater in the shallow overburden to enter the mine shafts and migrate to the underlying bedrock aquifer. If infiltration were occurring, the shafts would be acting as a sink to the overburden groundwater and a source of recharge to the local bedrock groundwater. This would result in a cone of depression in the overburden groundwater towards the former mine shafts and radial flow from the galleries in the bedrock groundwater. Under this scenario there could be a potential for bedrock groundwater flow being diverted away from the former galleries. However, based on the relatively small dimension of the former galleries (areal extent of approximately 4,356 m^2) it is expected that any influence of these galleries on the bedrock aquifer would be localized to the immediate vicinity of the former galleries. Bedrock aquifer influence beyond the limits of the former Cayuga Gypsum Mine property is anticipated to be negligible.

The Gypsum Mine Investigation Report reviewed information related to historical mining operations including location and extent of mining activities, review of physical Site conditions for evidence of historical mining operations, and an evaluation of hydraulic gradients within the available monitoring network to identify potential evidence of a hydraulic influence on horizontal or vertical gradients in the vicinity of the Site. The report concluded that there is no evidence of an influence related to the former Cayuga Gypsum Mine on the bedrock aquifer at the Landfill Site.

3.2.3.5 Other Data Sources

A review of the Ontario Geological Survey Karst of Southern Ontario and Manitoulin Island report indicates that no potentially karst, inferred karst, or known karst bedrock has been identified within the Study Areas[12]. Furthermore, the groundwater conditions are unfavourable for the dissolution of the bedrock and the Upper Silurian bedrock consists of generally argillaceous dolostone, shale, and evaporites (primarily gypsum), the latter of which precludes the formation of large-scale karst features. Furthermore, no sink holes or caving features have been identified in the study area.

3.3 Land Use & Socio-Economic Existing Conditions

3.3.1 Study Area

The Land Use and Socio-Economic Study Areas to be discussed in relation to the preparation of this ESR are as follows:

- **SSA** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
- **Site-Vicinity Study Area** – the area within the vicinity of the Site extending approximately 500 m in all directions
- **LSA** – the area within the vicinity of the Site extending approximately 1 km in all directions from the SSA boundaries

3.3.2 Methodology

3.3.2.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Land Use Study Team to determine existing Land Use conditions within the study area(s). The following sources of secondary information were collected and reviewed:

- Review of current zoning plans, definitions, and land use designations
- Ontario Planning Act
- Provincial Policy Statement (2020)
- Provincial Guidelines D-1: Land Use Compatibility
- Haldimand County Official Plan (2019)
- Haldimand County Zoning By-Law HC 1-2020
- Grand River Conservation Authority
- Statistics Canada (2021 Census Data)
- Land Use Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment report prepared by GHD in December 2016

[12] Brunton, F.R. and Dodge, J.E.P. 2008: Karst of Southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5. ISBN 978-1-4249-8376-6 (ZIP FILE).

Paper Size ANSI B

0 80 160 240 320

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

Land Use & Socio-Economic

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Sep 14, 2023**

FIGURE 3.7

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Data source: Google Eart Imagery, Date: 07/08/2018

3.3.3 Description of Land Use & Socio-Economic Existing Conditions

The existing land uses around the Site are primarily agricultural and wetlands. The Site is bordered by Brooks Road to the west, and agricultural and wetland areas to the other three sides. There is an abandoned railway corridor that runs east-west to the north of the Site.

3.3.3.1 Sensitive Uses Within 500 Metres

Sensitive land uses are defined in the Provincial Policy Statement (PPS), 2020 as "*buildings, amenity areas, or outdoor spaces where routine or normal activities occurring at reasonably expected times would experience one or more adverse effects from contaminant discharges generated by a nearby major facility. Sensitive land uses may be a part of the natural or built environment. Examples may include, but are not limited to residences, day care centers, and educational and health facilities.*"

The existing Site is located at 160 Brooks Road, in Cayuga, Haldimand County, Ontario. The proposed expansion will take place within the Site boundaries and will not require use of any new lands. There are two identified residential properties located within the Site Vicinity Study Area, the closest is approximately 223 m northwest of the site. There are no identified institutional or recreational land uses in a 500 meters radius of the Site boundary.

3.3.3.2 Provincial Policy Statement

The PPS, 2020[13] provides clear policy direction on land use planning to promote strong communities, a strong economy, and a clean and healthy environment[14]. In terms of land use compatibility, the PPS 2020 (Section 1.2.6.1) states that "*Major facilities and sensitive land uses shall be planned and developed to avoid, or if avoidance is not possible, minimize and mitigate any potential adverse effects from odour, noise and other contaminants, minimize risk to public health and safety, and to ensure the long-term operational and economic viability of major facilities in accordance with provincial guidelines, standards and procedures*".

The PPS 2020 defines 'major facilities' as facilities which may require separation from sensitive land uses (as defined in Section 3.1.2.1, above), including but not limited to airports, manufacturing uses, transportation infrastructure and corridors, rail facilities, marine facilities, sewage treatment facilities, waste management systems, oil and gas pipelines, industries, energy generation facilities and transmission systems, and resource extraction activities.

Section 1.6.10.1 of the PPS 2020 notes that "*waste management systems need to be provided that are of an appropriate size and type to accommodate present and future requirements, and facilitate, encourage and promote reduction, reuse and recycling objectives… [and that] waste management systems shall be located and designed in accordance with provincial legislation and standards.*"

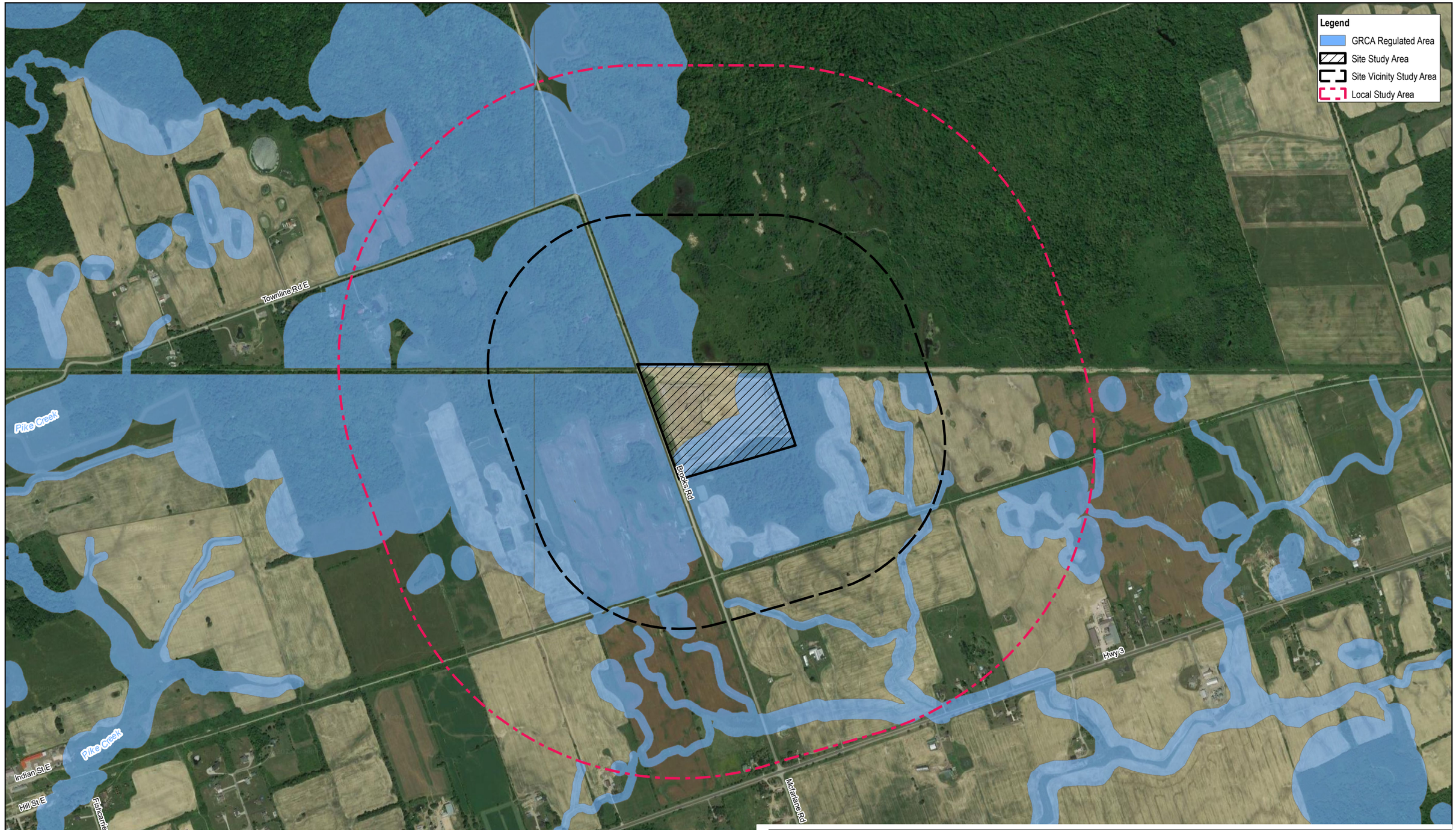
The on-Site, Site-Vicinity, and Local Study Areas are currently in compliance with the policies contained in the PPS 2020.

3.3.3.3 Grand River Conservation Authority (GRCA) Regulation

In accordance with O. Reg. 150/06, GRCA regulates areas where development could be subject to flooding, erosion or dynamic beaches, and where interference with wetlands and alterations to shorelines and watercourses might adversely affect those environmental features. Any of these activities within the Regulated Area may require a permit from the GRCA[15].

A portion of the Site area falls within the GRCA regulated area (**Figure 3.8**) and may require a permit.

[13] **Provincial Policy Statement, 2020 - Under the Planning Act (ontario.ca)**
[14] It should be noted that the PPS was recently updated, and the proposed changes (PPS, 2023) were out for public consultation until August 4, 2023. The proposed changes do not impact the PPS analysis.
[15] **Map Your Property - Grand River Conservation Authority**



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Map Projection: Transverse Mercator
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Grid: NAD 1983 UTM Zone 17N

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GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

GRCA REGULATED AREA

Project No. **12561524**
Revision No. **-**
Date **Sep 14, 2023**

FIGURE 3.8

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3.3.3.4 Planned Developments

There are currently no planned or proposed developments surrounding the Site[16].

3.3.3.5 Municipal Land Use Policies, Plans, Zoning Bylaws

The Study Areas are situated within the unincorporated community of Cayuga in Haldimand County. The County's Official Plan and Zoning By-Laws were reviewed to determine how the land in the Study Areas may be used in the future based on municipal planning policy.

The predominance of agriculture as the primary designated land use in the Study Areas is expected to remain for the foreseeable future with very little change based on the current municipal planning policy espoused by the County of Haldimand.

Haldimand County Official Plan (HCOP)

The SSA is designated as Active Waste Landfill Site and surrounding is PSWs and Agriculture.

Provincially Significant Wetlands – There are delineated PSWs within the SSA, Site-Vicinity Study Area, and LSA. As per Section 2. A. 1) of the HCOP, certain compatible uses may be permitted through an appropriately scoped Environmental Impact Study resulting in no negative impact on the natural features or ecological functions of wetland or wetland complex.

Agriculture – Majority of the Site-Vicinity Study Area is designated agricultural. As per Section 3. A. 1) of the HCOP, the predominant use of lands within the agriculture designation shall be agriculture. Other uses compatible with agriculture such as animal kennels, forestry uses, and conservation related uses may be permitted.

HCOP 34 (Specific policies in Haldimand County) – The abandoned railway, located north of the existing landfill is under the HCOP 34 policy area. A waste disposal site is permitted in addition to the uses permitted in the agricultural designation. The permitted uses under waste disposal site are limited to stockpiling of clean clay, location of ground waste monitoring wells, and a general naturalized buffer area. Waste disposal or landfilling is not permitted in this designation.

Hal 36 (Policies in the former town of Haldimand) – As per Hal 36, policies in the Official Plan relating to PSWs (Section 2. A. 1)), and Natural Environment Areas (Section 2. A. 3)) will not apply to the Brooks Road Landfill (formerly known as Edwards Landfill Site).

Haldimand County Zoning By-Law HC 1-2020

Haldimand County zones the subject site as Disposal Industrial (MD) and Wetland (W). The land in the LSA is zoned as Agricultural (A) and Wetland (W). (see **Figure 3.9**).

Disposal Industrial

The SSA is zoned as Disposal Industrial. The permitted uses include waste disposal site, waste transfer site, and waste processing facility along with other compatible uses.

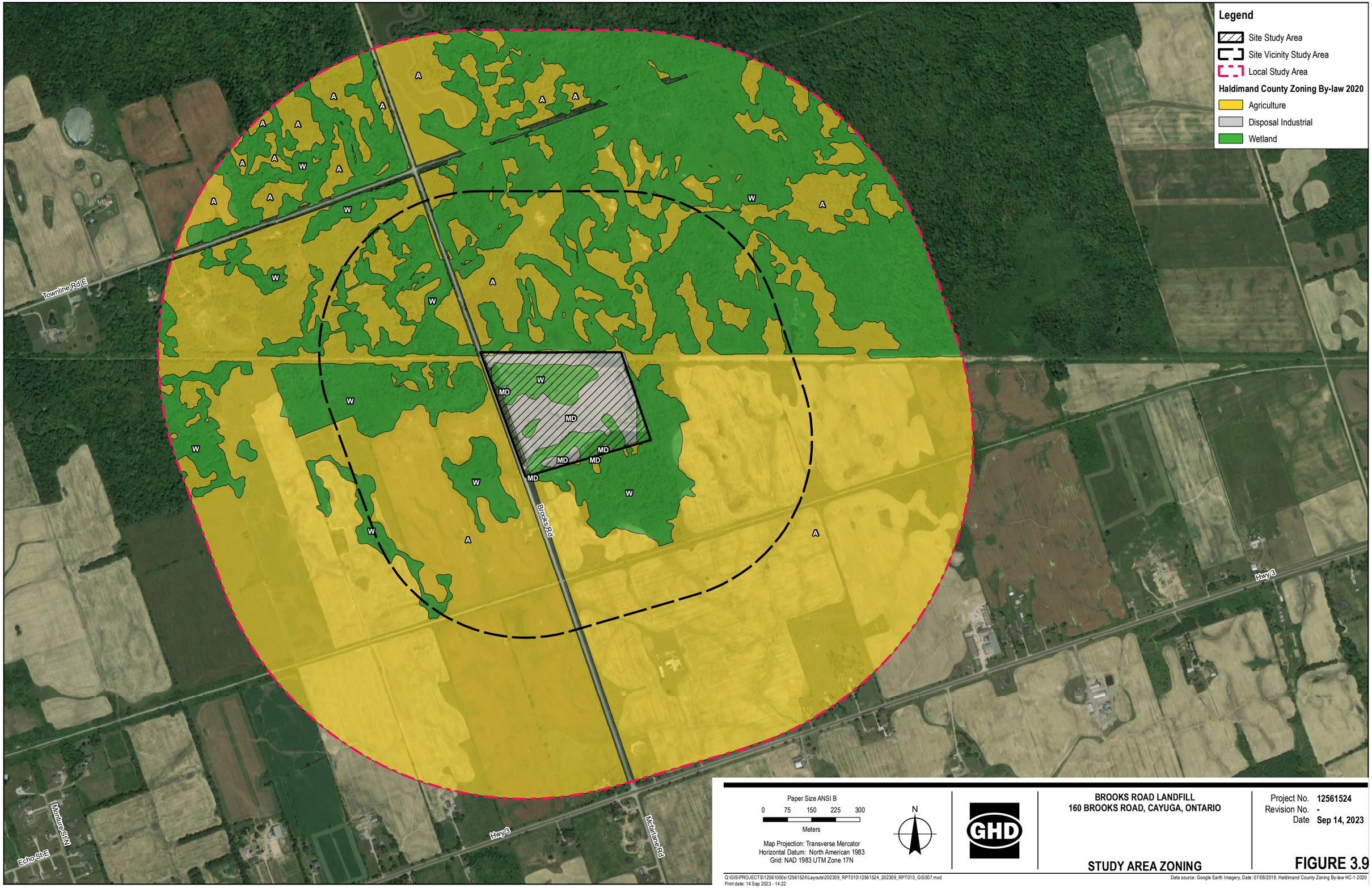
Wetland

A portion of the SSA and majority of the Site-Vicinity Study Area and LSA is zoned as Wetland (W). The permitted uses include parks, woodlot management, conservation area, and tent and trailer park. Under section 12.2, Hal 36.325 (Zone Exceptions) of the zoning by-law, the minimum setbacks form the wetland Zone shall not apply to the commercial buildings existing on the date of passing of the by-law.

[16] Haldimand County Planning Applications. Available at: **https://haldimand.maps.arcgis.com/apps/dashboards/945e90b55d484fd0a01253953129dc0f**

Agricultural

A larger portion of the Site-Vicinity Study Area and the LSA is zoned as agricultural. Permitted uses in the Agricultural Zone include residential (bed and breakfast establishments, single detached dwellings, and several accessory uses), agricultural, and commercial (animal hospital, animal kennel, commercial greenhouse) uses.



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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

Project No. **12561524**
Revision No. **-**
Date **Sep 14, 2023**

STUDY AREA ZONING

FIGURE 3.9

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Data source: Google Earth Imagery, Date: 07/08/2018. Haldimand County Zoning By-law HC-1-2020

3.3.3.6 Neighbourhood & Community Character

The Site is located within the community of Cayuga in Haldimand County and is designated as an Active Waste Disposal Site within the Haldimand County Official Plan and zoned Disposal Industrial (MD) and Wetlands (W) in the Haldimand County Zoning By-law.

Haldimand County is situated within the Golden Horseshoe region of Ontario. The community is comprised of 1,251 km² of rural landscape, including 83 km of shoreline along Lake Erie.

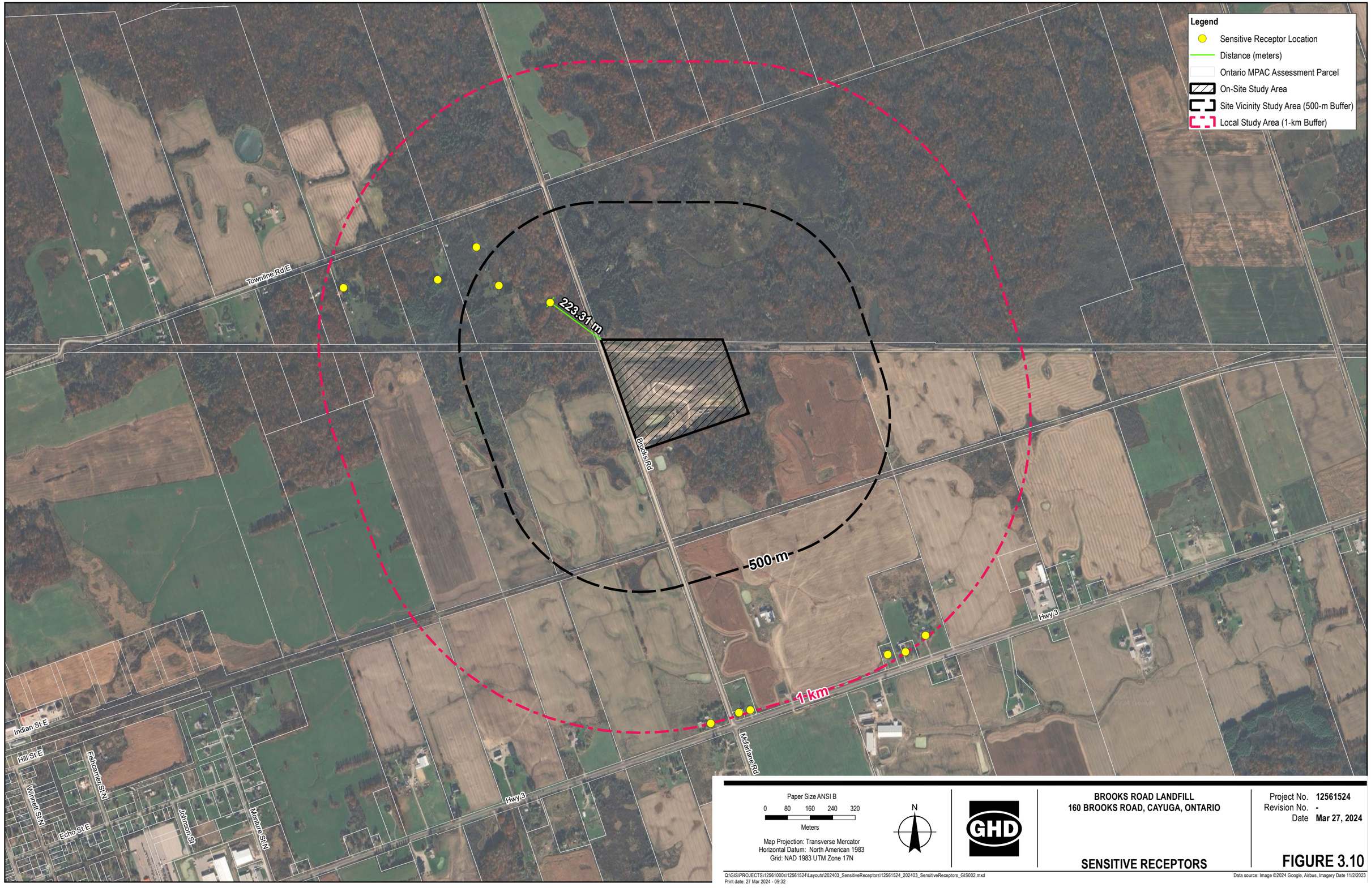
According to the 2021 Census[17], the County recorded a population of 49,216 in 2021, which is projected to increase to between 67,000 and 68,000 by 2041[18]. The age groups with the largest representation are the 55-59 and 60-64 cohorts. There is an equal distribution of males and females throughout the age groups and a greater part of the households fall within the income bracket of $150kand above. About 4% of total population is Indigenous, largely First Nations and Métis, and 3% are visible minorities, with South Asian and Black visible minority groups more represented than other groups.

Almost half of the total population has completed high school and college education. Common fields of study include engineering, business management, and health related fields. A major portion of the labour force is in the manufacturing, health care, and construction industries. The employment rate was about 56% in 2021 with an unemployment rate of 8.3% in the same year.

Eighty-five percent of residents own their home and 15% are renters. The new housing construction projects has increased from 2020[19]. Forty-nine projects under construction and 101 completed projects were reported in the fourth quarter of 2022.

The closest residential dwelling is located approximately 223 m northwest of the Site (see Figure 3.10).

[17] **Community Profile - Haldimand County**
[18] Haldimand County Revised Growth Analysis to 2051 Memo prepared by Watson & Associates Economists Ltd. Available at: **https://www.haldimandcounty.ca/wp-content/uploads/2021/01/Revised-Watson-forecasts-2020-VERSION-2.pdf**
[19] Canada Mortgage and Housing Corporation Website. Last accessed November 12, 2023. Available here: **https://www03.cmhc-schl.gc.ca/hmip-pimh/en/TableMapChart/#Profile/6175/3/Haldimand%20County%20CY%20**



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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

SENSITIVE RECEPTORS

Project No. **12561524**
Revision No. **-**
Date **Mar 27, 2024**

FIGURE 3.10

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Data source: Image ©2024 Google, Airbus, Imagery Date 11/2/2023

3.3.3.7 Visual

The existing visual landscape within the SSA, Site-Vicinity Study Area, and LSA can be described as rural, agricultural, and includes regional roads. There is a wire fence around the perimeter of the site The western part of the existing Site located on Books Road has a visual berm which includes a chain link fence with visual screen as mitigation to visual impact, providing a visual barrier to passersby.

3.3.3.8 Local Businesses, Institutions or Public Facilities

In addition to farming, the only other business operating within the LSA is the Brooks Road Landfill Site, which employs six full-time and one part-time staff. The are no other businesses, institutions or public facilities located within the LSA.

3.3.3.9 Local Employment & Labor Supply

According to the 2021 Census[20], there are total 24,335 residents in the labour force, of which 20,645 are employees and 3,675 are self-employed. Majority of the employed are in trade and transport occupations (26%); sales and services (22%); business and finance (14%); education, law, and government (10%); and healthcare (8%). The employment rate in 2021 was 56.6% and the participation rate was 61.8%. The unemployment rate was recorded to be 8.3% in the same year.

A major part of the labour force is into manufacturing, health care, and construction industry. The employment rate was about 56% in 2021 with 8.3% of unemployment rate in the same year.

The Brooks Road Landfill Site employs six full-time and one part-time staff.

3.3.3.10 Traffic

Highway 3 and Brooks Road are the two major roads providing access to the existing Brooks Landfill. Traffic on Brooks Road is predominantly truck traffic specific to the landfill operation. Traffic on Highway 3 is a mix of both commuter and truck traffic. The capacity analysis under peak operations confirms no current capacity constraints in the LSA road network. Further details on traffic (existing conditions and potential effects) are included in the Transportation Assessment Report, prepared concurrently with this report by GHD (see **Appendix H**).

3.3.3.11 Social

The LSA is located within the boundaries of Haldimand County, Ontario, approximately 2 km northeast the Village of Cayuga. There are 39 property parcels within the LSA (not including the Site) and 11 residential dwellings. Of these 39 properties, 19 were Farm Tax Rated for the 2022 tax year[21]. The closest residential dwelling is located approximately 223 m northwest of the Site.

No static recreational resources (e.g., picnic areas, trailer parks), churches, or cemeteries are located within the LSA; however, Brooks Road as well as the abandoned railway to south of the Site (parallel to Highway 3) are identified in the Official Plan as trail locations and in the Haldimand County Trails Master Plan 2009 as “Proposed Special Use Routes” (Brooks Road as a “Proposed Signed Route” and the abandoned railway as a Proposed Multi-Use Trail”) for implementation in the short-term (0 to 5 years from the publication date). There is presently no indication of the implementation of the proposed trails along either of these routes.

The topography across the LSA from north to south ranges from approximately 202 m AMSL to approximately 196 m AMSL. As such, the land within the LSA can be considered to be relatively flat. The majority of the lands within the LSA immediately adjacent to the Site are forested, thus obscuring the view of the Site. The exception is the parcel of land immediately west of the Site, which includes an open field, from which the Site is visible; however, the existing berm along the western perimeter of the Site obscures most views of the landfilling operations from this parcel. The

[20] **Census of Population (statcan.gc.ca)**
[21] Government of Ontario. (2022). *AgMaps – Agricultural Information Atlas*. Source: **AgMaps (gov.on.ca)**

existing visual berm includes a chain link fence with visual screen as mitigation to visual impact, providing a visual barrier to passersby from Brooks Road.

3.3.3.12 Airport

There are three private airfields within the 8 km radius of the Site: the Cayuga (Bruce Field) Airport, approximately 1.5 km south; the Cayuga East Airport, approximately 3 km southeast; and the Grand River Executive Airport (also referred to as the York Airport) approximately 7.5 km north of the Site.

See **Appendix C** for a detailed Land Use and Socio-Economic Assessment Report.

3.4 Air Quality Existing Conditions

3.4.1 Study Area

The Air Quality Study Areas to be discussed in relation to the preparation of this ESR are as follows:

– **SSA** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
– **LSA** – the area within the vicinity of the Site extending approximately 1 km in all directions from the SSA boundaries

Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
Air Quality

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 21, 2022**

FIGURE 3.11

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Print date: 21 Oct 2022 - 13:33

Data source: Google Earth Imagery, Date: 07/08/2018

3.4.2 Methodology

3.4.2.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Air Quality and Odour Study Team to determine existing Air Quality and Odour conditions within the Study Areas. The following sources of secondary information were collected and reviewed:

- Environment Canada Climate data (2017 to 2021).
- Ambient air quality data obtained from the Hamilton Air Monitoring Network (HAMN) (2019 to 2021). Note that the $PM_{2.5}$ data available from the closest monitoring station #29102 at Hamilton was used in the net effects assessment for a cumulative particulate evaluation.
- Existing Facility Emission Summary and Dispersion Modelling Report, prepared for BRE by CRA (September 14, 2015 and updated September 2022).
- Odour Monitoring Program, prepared for BRE by CRA (July 28, 2014).
- Odour Monitoring Program, prepared for BRE by CRA (November 3, 2014).
- Odour Monitoring Program, prepared for BRE by GHD (2016,2017, 2019 and 2022).

3.4.2.2 Process Undertaken

On-Site and off-Site odour investigations were completed by GHD in 2014, 2016, 2017, 2019 and 2022. These studies indicated that there was no measurable odour off-Site. GHD completed odour measurements during daytime and night-time periods to try and observe odours in the surrounding community. During all the odour monitoring events, no odours that could be attributed to the Site were detected off-site.

The GHD Team completed a walk-through of the Site, with focused observations at the location of the proposed horizontal expansion to the north and the leachate system. GHD did not identify any fugitive emissions during the walkthrough other than minor particulate emissions generated by small vehicles moving throughout the landfill. The GHD Team also observed the area surrounding the Site to confirm the locations of the nearest sensitive receptors to the Brooks Road Landfill.

3.4.3 Description of Air Quality Existing Conditions

The following conditions are currently present at the Site, as described in **Table 3.2**.

Table 3.2 Existing Conditions Relevant to Air Quality and Odour

Attribute	Existing Landfill
General Description	Expanding the current capacity by 219,400 m^3
Footprint Area (ha)	6.07
Peak Elevation – top of waste (mAMSL)	220.75
Maximum Daily Truck Traffic	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day

3.4.4 Hamilton Climate Station

The Hamilton Climate Station is a weather station located at Hamilton's John C. Munro International Airport (43.1N, 79.5W, elevation 237.7 m). The station has been operating since January 15, 1970 under World Meteorological Organization (WMO) ID 71263. The Hamilton Climate Station was selected as it is the closest representative station to the Site that has hourly documented climate data since 2010. Data from this station is published online at Environment

and Climate Change Canada's National Climate Data and Information Archive. Hourly data from the station was analyzed to determine prevalent atmospheric conditions that are considered representative of the Site.

Figure 3.12 presents a five-year wind rose for the Hamilton Climate Station for the period between 2017 and 2021 and **Figure 3.13** presents the wind class frequency distribution. The dominant wind directions, as shown on **Figure 3.12**, are from the southwest, and northeast.

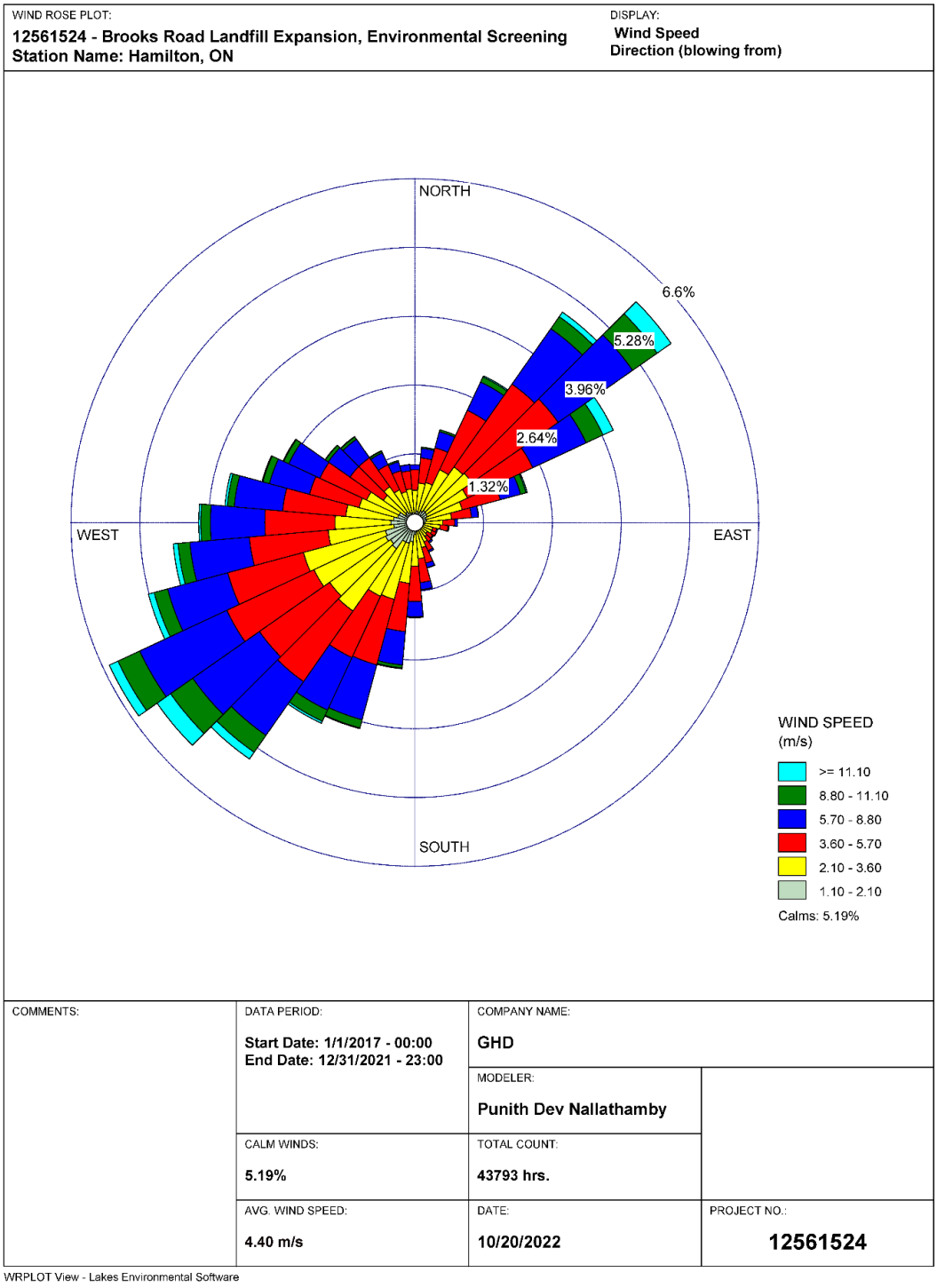


Figure 3.12 Wind Rose, Hamilton AP (2017 – 2021)

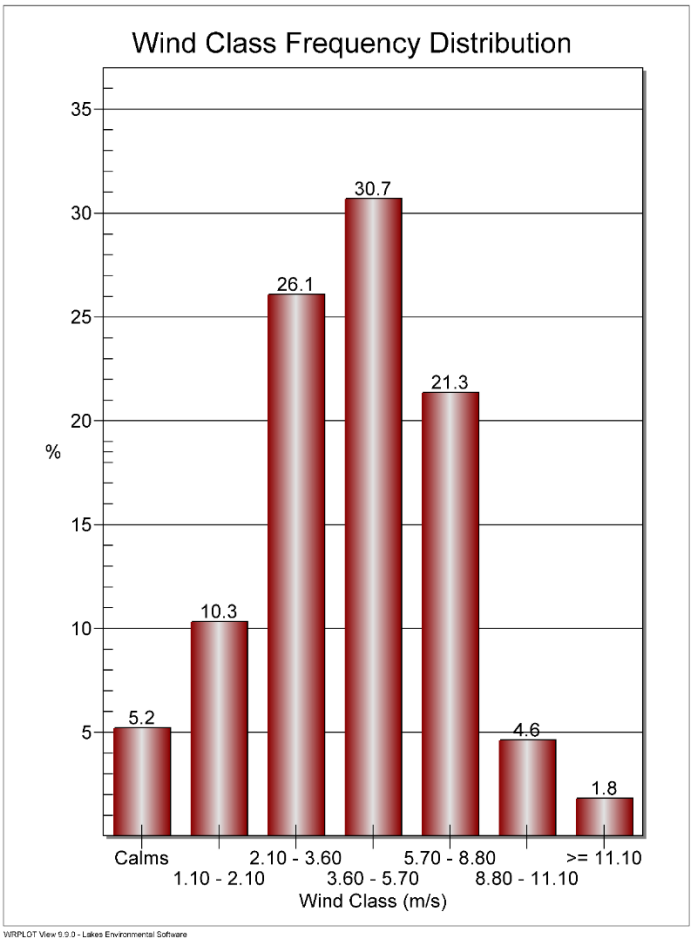


Figure 3.13 Wind Class Frequency Distribution

3.4.4.1 Air Quality

The Site is located approximately 2.8 km northeast of Cayuga and 25 km south of Hamilton and is surrounded by agricultural land. The closest receptor (as per the August 2022 Odour Management Plan) is approximately 223 m from the Site and there are no major industrial sources within the Study Areas. The Site has a berm that runs along the west side of the Site and a clay stockpile located along the north side that reduces the line of sight and fugitive particulate matter emissions when the Site is in operation.

3.4.4.2 Vehicle Emissions

Particulate emissions related to vehicles operating at the landfill are the primary emissions of concern at the Site. Particulate may be defined in various particle size categories; including total suspended particulate (TSP), particulate less than 10 microns (PM_{10}) and particulate less than 2.5 microns ($PM_{2.5}$). All fractions of particulate were previously assessed for the potential landfill emissions. There is no change in the TSP, PM_{10}, or $PM_{2.5}$ emissions from the previous assessment as the proposed operations were assessed and fugitive dust management plans implemented.

3.4.4.3 Indicator Compounds

As identified above, TSP, PM_{10}, and $PM_{2.5}$ were previously included in the assessment as they are the primary emissions of concern at the landfill. Potential TSP, PM_{10}, and $PM_{2.5}$ emissions from vehicle exhaust and break and tire wear for the on-Site vehicles was concluded to be insignificant based on results from previous assessments and were not included in this assessment.

Other tailpipe/combustion emissions, such as nitrogen oxides (NO_x) and carbon monoxide (CO), can also be concluded to be insignificant based on the small volume of daily traffic at the landfill, and the significant distances to sensitive receptors. The potential concentrations of NOx and CO that a person might be expected to be exposed to near a municipal road will far exceed the concentrations of these compounds at the landfill boundary. Therefore, it may be concluded that NO_x and CO emissions from the vehicles at the landfill continue to be insignificant contributors to the background concentrations of these compounds as the traffic volumes have remained the same.

Landfill gases, such as hydrogen sulfide (H2S) and vinyl chloride, can also be concluded to be insignificant based on the operations at the landfill. GHD completed a theoretical landfill gas generation rate for the Site. Based on the existing and proposed waste to be disposed at the Site, it is estimated that the maximum amount of landfill gas that will be generated is less than approximately 175 cubic feet (ft^3)/minute (in 2025). This will be distributed over an area of approximately 7.09 ha or 70,900 m^2, resulting in a landfill gas exit velocity of only 0.00007 m/second. This amount of landfill gas generation is anticipated to be insignificant from an overall Site profile and therefore landfill gases are not included in any further assessment.

Odours from the operations have not been further assessed. Due to the nature of the material being landfilled and the previous assessment that evaluated the proposed conditions there is no change in the odour profile for the Site.

3.4.4.4 MECP Air Monitoring Data

The MECP has ambient air monitoring stations across Ontario that measure a variety of pollutant concentrations. Typically, the stations monitor criteria air contaminants, such as nitrogen oxides, carbon monoxide, sulphur dioxide, and particulate matter, with the exception of some specialized monitors that measure speciated volatile organic compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAH). There are no active monitoring stations within the Study Area, therefore, the monitor located in Hamilton (29102), Ontario was chosen as the closest monitor to the Site.

The Hamilton station monitors nitrogen oxides, ground-level ozone, and $PM_{2.5}$. The Hamilton station is located towards the north in Hamilton and is expected to be influenced by the industry within the City of Hamilton. The focus of this assessment is on the various size fractions of particulate matter. Although the Hamilton Station is not representative of the Site, the data from this location has been included for completeness. The focus of this assessment is on the TSP, PM_{10}, and $PM_{2.5}$. These fractions of particulate matter are the main containments that will be released at the Site.

Hourly readings and 24-hour average values are provided as part of the Hamilton air monitoring data set for $PM_{2.5}$. The Hamilton monitor is located in a predominantly urban area. Therefore, the $PM_{2.5}$ concentrations around the Site are expected to be much lower compared to the monitoring station.

As shown in **Table 3.3**, the concentration for $PM_{2.5}$ for the 24-hour averaging period is below its respective Canada Ambient Air Quality Standard (CAAQS). The Annual average of the monitoring data indicates $PM_{2.5}$ levels are slowly increasing over time. However, this is a result of an increase in industry in the vicinity of the Hamilton monitoring station and is not expected to be the trend for the Site and its surrounding area. Based on the monitored data, the $PM_{2.5}$ background concentrations in the vicinity of the Site are expected to be well below the CAAQS. It is expected that the levels at the Site are significantly lower as they are not influenced by the industrial and populated areas of Hamilton.

As part of BRE's continuing commitment to ensuring that particulate matter emissions from the Site are minimized from amended operations the standard operating procedure (SOP) will continue to be deployed. The purpose of the SOP is to ensure Best Management Practices (BPMs) are implemented at the Site to reduce the potential generation of particulate matter results. This includes, but is not limited to, the watering and sweeping of roads that equipment uses to travel the Site.

Table 3.3 $PM_{2.5}$ Concentration (µg/m³) reported from the Hamilton Monitoring Station (STN29102)

	Monitoring Period					
Averaging Time	**2019**	**2020**	**2021**	**Average**	**CAAQS**	**Statistical Form**
24 hour	22.0	22.4	27.5	23.9	27	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
Annual	9.1	10.1	10.7	10.0	8.8	The 3-year average of the annual average of the daily 24-hour average concentrations

3.4.4.5 Odour Quality

The Site has a functional leachate treatment facility to minimize the generation of odours at the Site. The most recent odour monitoring completed by GHD at the Site in 2022, also confirmed that the leachate treatment system has reduced the potential for odour impacts. Faint odours were detected throughout the Site during the most recent odour monitoring, however, no odour that would be attributed to the Site was detected at any off-Site monitoring locations.

In addition to the on-Site and off-Site odour monitoring that was completed by BRE, GHD completed a theoretical landfill gas generation rate for the Site. Based on the existing and proposed waste to be disposed at the Site, it was determined that the maximum amount of landfill gas that will be generated is less than 297 m^3/hours) [175 cubic feet per minute (cfm)] (in 2025). This will be distributed over an area of approximately 7.09 ha or 70,900 m^2, resulting in a landfill gas exit velocity of only 0.00007 m/second. This amount of landfill gas generation is anticipated to be insignificant from an overall odour Site profile.

As part of BRE's commitment to ensuring that odour complaints are minimized from the existing and proposed operations a SOP was developed. The purpose of the SOP is to include odour mitigation measures that would be implemented to ensure that odour complaints are investigated and the condition that resulted in the odour complaint is mitigated.

See **Appendix D** for a detailed Air Quality Assessment Report.

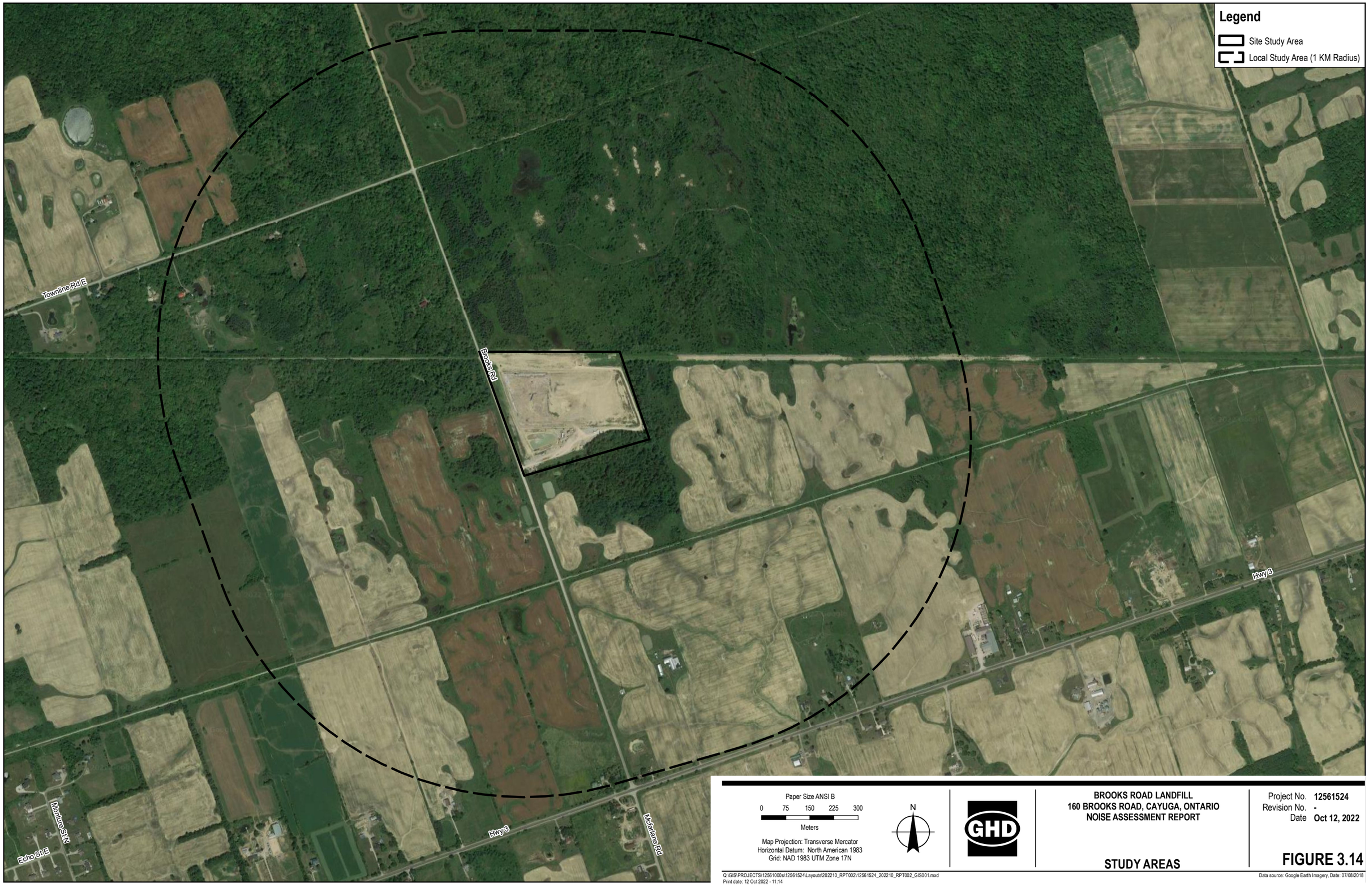
3.5 Noise Existing Conditions

3.5.1 Study Area

The Noise Study Areas to be discussed in relation to the preparation of this ESR are as follows:

– **SSA** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended

– **LSA** – the area within the vicinity of the Site extending approximately 1 km in all directions from the SSA boundaries



Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NOISE ASSESSMENT REPORT

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 12, 2022**

FIGURE 3.14

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Print date: 12 Oct 2022 - 11:14

Data source: Google Earth Imagery, Date: 07/08/2018

3.5.2 Methodology

3.5.2.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Noise Study Team to determine existing Noise conditions within the Study Areas. The following sources of secondary information were collected and reviewed:

- Historic Noise Complaints
- Current zoning plans, definitions and land use designations
- Field Observations and Investigations
- Local traffic data
- MECP technical guidelines and standards
- March 27, 2020 Amended ECA #A110302
- D&O Report Vertical Expansion – Rev. 1, Brooks Road Landfill Site, 2270386 Ontario Inc., Prepared by GHD, June 15, 2021
- Noise Assessment Report (AAR) and BMP Plan for the Brooks Road Landfill Site Vertical Capacity Expansion EA, Prepared by GHD, June 14, 2021

3.5.3 Process Undertaken

GHD has describe the processes and steps taken in chronological order as required to best describe the methodology used for this assessment.

3.5.3.1 Historic Noise Complaints

Brooks Road Landfill has not received any formal noise complaints for the previous operations on-Site after a review of all formal complaint records provided since September 2015 which is based on the records provided by BRE Site operators. During a recent open house event in June of 2022 one written comment from a local resident was received indicating that there was a concern with the noise from tracked vehicles.

3.5.3.2 Review of Zoning

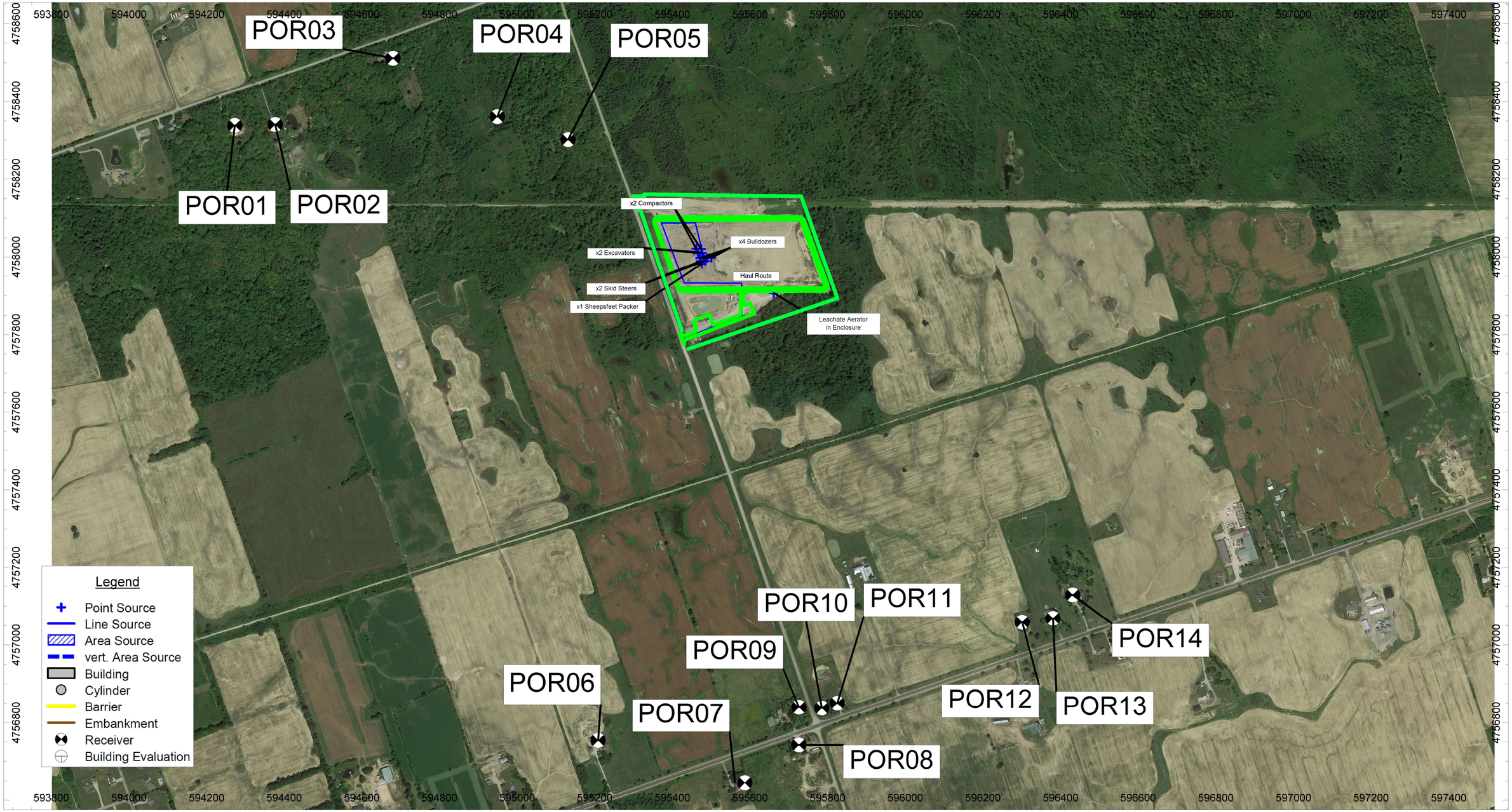
The Comprehensive Zoning By-Law for Haldimand County identifies the Site as “MD – Disposal Industrial Zone,” which is suitable for a municipal sanitary landfill site. The surrounding land uses are zoned Agricultural use.

3.5.3.3 Site Review

Previous data collected during the 2021 Environmental Screening was reviewed. The SSA is rural in character and surrounded by agricultural fields. There are no existing industries within the Study Areas other than the Facility that may contribute to the background noise levels.

During the Vertical Capacity Expansion EA, a Site visit was conducted for the purpose of determining noise impact exposure off-Site. Off-Site residential dwelling locations were reviewed and the height of structures for noise impact exposure analysis was determined.

The nearest residential dwelling is approximately 232 m northwest of the existing property boundary. There are approximately 14 existing one-storey (1.5 m above grade) and two-storey (4.5 m above grade) residential dwellings within the LSA as identified on **Figure 3.15**.



Source: Google Satellite

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GHD

ACOUSTIC ASSESSMENT REPORT
BROOKS ROAD ENVIRONMENTAL
160 BROOKS ROAD, CAGUYA, ONTARIO

12561524
12.10.2022

POINT OF RECEPTION LOCATION PLAN

FIGURE 3.15

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Workshare\Noise\Model\12561524-Model.cna

3.5.4 Description of Noise Existing Conditions

3.5.4.1 Local Traffic Data

There are three roads located within the Study Areas including:

1. Townline Road – is a two-lane dirt rural road with minimal local traffic only
2. Brooks Road – is a two-lane road with minimal local traffic and primarily used by Brooks Road Landfill
3. Highway 3 – is a two-lane road with significant 24-hour road traffic

Traffic data was obtained from the local traffic authority and the Ministry of Transportation (MTO). Townline Road and Brooks Road experience low traffic volumes based on Site observations and also confirmed by the traffic authority. Highway 3 traffic volumes are elevated and subject of analysis.

MECP's Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) software is the approved road traffic model that is currently used in the province of Ontario to evaluate noise generated from road traffic. However, the model does not graphically generate contours and cannot be used to evaluate large areas and multiple road corridors simultaneously. ORNAMENT modeling predictions are also limited to noise predictions less than 500 m from the source and a minimum traffic volume of 40 vehicles per hour is required to evaluate an individual roadway.

Due to these model limitations, Computer Aided Noise Abatement Acoustical Modeling Software (CADNA A) was selected for the purposes of this Study as the preferred modeling software for analysis of road traffic generated background noise existing conditions. In addition, the CADNA A modeling software is better suited to handle multiple noise sources and can generate contour plots with imported base maps.

Annual Average Daily Traffic (AADT) values are the only reported data for less travelled roads, which presents a problem when estimating daytime and nighttime background noise levels as the values do not provide a distribution for the two time periods. GHD used recommendations for traffic breakdown for provincial highways and regional roads as outlined in the ORNAMENT guidance document to address this issue. The most current road traffic volumes were obtained from Haldimand County and the MTO. The following AADT values were available for road segments within the Study Area:

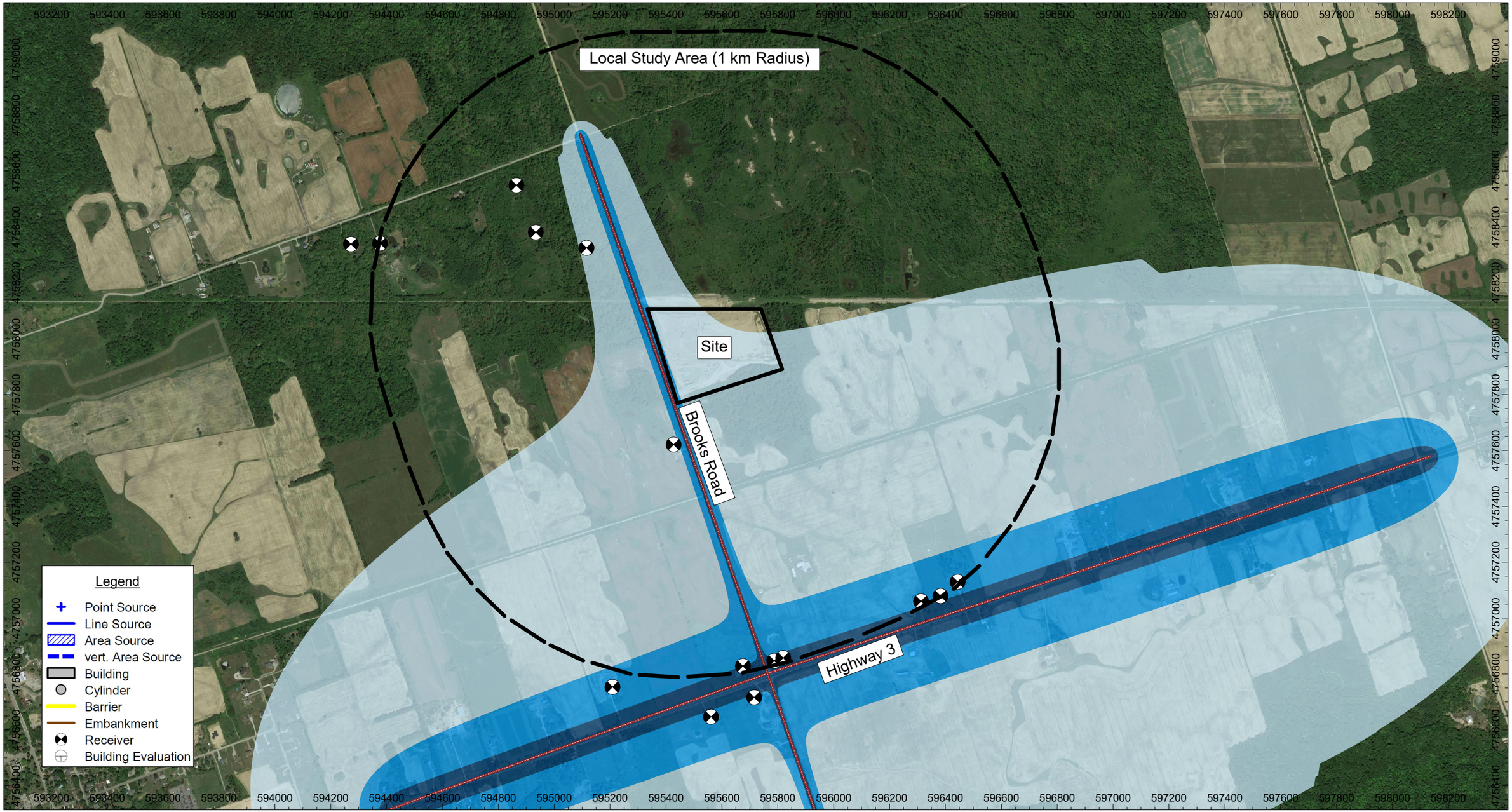
– Highway 3 (MTO, 2016) – 3,250 vehicles / day
– Brooks Road (Haldimand County, 2019) – 131 vehicles / day

The existing noise conditions within the Study Areas were quantified using the industry standard CADNA A software and the road traffic data provided by the regulatory authorities. The US Department of Transportation Federal Highway Administration Traffic Noise Model (TNM) calculation standard was used in CADNA A to quantify the noise levels.

Vehicular road traffic generates noise that consists of mechanical noise from the engine and brakes, friction noise created from wheel contacting the road surface, and aerodynamic wind noise. Traffic volume, speed, road composition, gradient and surface type will affect the overall traffic noise that can be generated. Proximity and line-of-sight to the road corridor are most consequential for quantifying the off-Site noise exposure conditions.

The model calculates the predicted equivalent sound level (Leq) respective of the defined daytime (7 a.m. to 11 p.m.) and nighttime (11 p.m. to 7 a.m.) periods.

Figure 3.16 and **Figure 3.17** present the road traffic sound level contours within the Study Areas for the daytime and nighttime periods, respectively.



Source: Google Satellite

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Legend

- > 30.0 dB dBA
- > 40.0 dB dBA
- > 50.0 dB dBA

Notes:
Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

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NOISE ASSESSMENT REPORT
BROOKS ROAD ENVIRONMENTAL
BRIOOKS ROAD LANDFILL- 160 BROOKS ROAD, CAYUGA, ONTARIO

12561524
17.10.2022

ROAD TRAFFIC SOUND LEVEL CONTOURS - DAY

FIGURE 3.16

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Tech\Traffic 2022\2022 Road Traffic Model V01.cna

Local Study Area (1 km Radius)

Site

Brooks Road

Highway 3

Legend

- Point Source
- Line Source
- Area Source
- vert. Area Source
- Building
- Cylinder
- Barrier
- Embankment
- Receiver
- Building Evaluation

Source: Google Satellite

N

Legend

- > 30.0 dB dBA
- > 40.0 dB dBA
- > 50.0 dB dBA

Notes:
Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

GHD

NOISE ASSESSMENT REPORT
BROOKS ROAD ENVIRONMENTAL
BRIOOKS ROAD LANDFILL- 160 BROOKS ROAD, CAYUGA, ONTARIO

12561524
17.10.2022

ROAD TRAFFIC SOUND LEVEL CONTOURS - NIGHT

FIGURE 3.17

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Tech\Traffic 2022\2022 Road Traffic Model V01.cna

3.5.4.2 Off-Site Haul Routes

Highway 54 to Highway 3 is primarily used to reach Brooks Road and the off-Site haul route will not change regardless of the capacity modification. Any potential traffic increase to support the proposed increased landfill capacity will be evaluated using the noise model based on the future road traffic data.

3.5.4.3 MECP Technical Guidelines and Standards

The Noise character of the Study Area was defined in accordance with the MECP guidelines NPC-300 “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning,” October 2013.

As stated in the guideline:

A “Class 1 Area” means an area with an acoustical environment typical of a major population centre, where the background noise is dominated by the urban hum.

“Class 2 Area” means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

– Absence of urban hum between 19:00 and 23:00 hours
– Evening background sound level defined by natural environment and infrequent human activity
– No clearly audible sound from stationary sources other than from those under impact assessment

“Class 3 Area” means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

– A small community with less than 1,000 population
– Agricultural area
– A rural recreational area such as a cottage or a resort area
– A wilderness area

The urban sound level limits are 5 A-weighted decibels (dBA) greater in comparison to the rural limits to account for the elevated background sound level or the urban hum due to road traffic or adjacent industrial/commercial activities.

Landfill activities and on-Site operations are compared directly against a daytime one-hour Leq sound level limit of 55 dBA for landfill operations that are limited to 7 a.m. to 7 p.m. under the “Noise Guidelines for Landfill Sites” (N-1), October 1998.

3.5.5 2021 ECA and Existing Sensitive Receptors

The 2021 ECA amendment application that was prepared for the fill rate amendment confirmed that the Study Area immediately surrounding the Site is a mixed acoustical Class 2 and Class 3 area, depending on the proximity of the sensitive receiver to the adjacent road corridors and traffic volumes.

The Facility is located in a mixed acoustical Class 2 and Class 3 area, depending on the proximity of the sensitive receiver to the Highway 3 corridor. Acoustical Class 2 areas are defined by NPC-300 as an Noise environment with elevated daytime noise levels. Acoustical Class 3 areas are defined by NPC-300 as rural areas with an acoustical environment that is dominated by natural sounds having little or no road traffic.

The nine residential dwellings located along Highway 3 are considered to be Class 2 receivers and the five residential dwellings situated away from the corridor are considered to be Class 3 receivers. However, N-1 is the applicable regulatory Guideline for compliance assessment purposes for this Site and the proposed capacity increase.

The nearest residential dwelling is approximately 232 m from the property boundary.

3.5.5.1 Landfill Existing Conditions

Brooks Road Landfill is proposing to increase the total landfill capacity by 219,400 m^3 maintaining the current daily approved fill rate. With this increase in mind, the equipment currently utilized on-Site is expected to continue. Therefore, the significant environmental noise sources at the Landfill include the following is considered a maximum volume to allow for flexibility in Site operations:

- 2x Leachate Aerator in an Enclosure (24/7 steady state operation) (91.4 dBA)
- 3x Bulldozers (daytime operation only) (106.3 dBA)
- 2x Compactors (daytime operation only) (106.5 dBA)
- 1x Rock Truck (daytime operation only) (105 dBA)
- 2x Excavators (daytime operation only) (106.5 dBA)
- 2x Skid Steers (daytime operation only) (109.1 dBA)
- 1x Sheepsfoot Packer (daytime operation only) (106.5 dBA)

SSA haul route truck activities are summarized below:

Table 3.4 On Site Vehicle Volumes

Type of Vehicle	Day 7a.m.- 7 p.m. (Trips/hour)	Evening 7p.m.- 11 p.m. (Trips /hour)	Night 11 p.m.- 7 a.m. (Trips /hour)
On-Site Haul Route (Source TR2)	16	0	0

These noise sources generate continuous steady state mechanical noise and will be the subject of analysis for the evaluation. These noise sources are input into an industry standard Noise model that includes all significant Site structures (buildings, equipment, storage tanks and silos).

CADNA A, version 2023, is based on the ISO 9613-2 standard “Noises – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation.” The CADNA A model is the industry standard for environmental noise modeling in Ontario.

The worst-case cumulative Site-wide sound levels estimated at the receptor(s) included attenuation effects due to geometric divergence, atmospheric attenuation, barriers/berms, ground absorption and directivity, as applicable significant noise sources at off-Site buildings were input into the model as intervening structures.

CADNA A modelling assumptions applied include the following:

- **Noise Sources** | All sources were modelled using the 1/1 octave band data from manufacturer’s sound level data or reference materials
- **Noise Source Elevation** | The heights of the noise sources were modelled at the tallest point to represent the worst-case line of sight and emission of noise
- **Ground Absorption** | The model included water (G=0), soft/porous ground (G=1), and gravel/hard ground (G=0.25)
- **Receptor Elevation** | POR receptor heights were modelled appropriately to represent the worst-case elevation based on one or two-storey residences at the worst-case compass directions from the Site as no houses are present
- **Time-weighted Adjustment** | Time-weighted adjustments for sources that do not operate continuously were utilized
- **Tonality** | A +5 dBA adjustment was applied for tonal sources if applicable
- **Foliage** | Foliage attenuation was not considered in our analysis as a conservative assumption

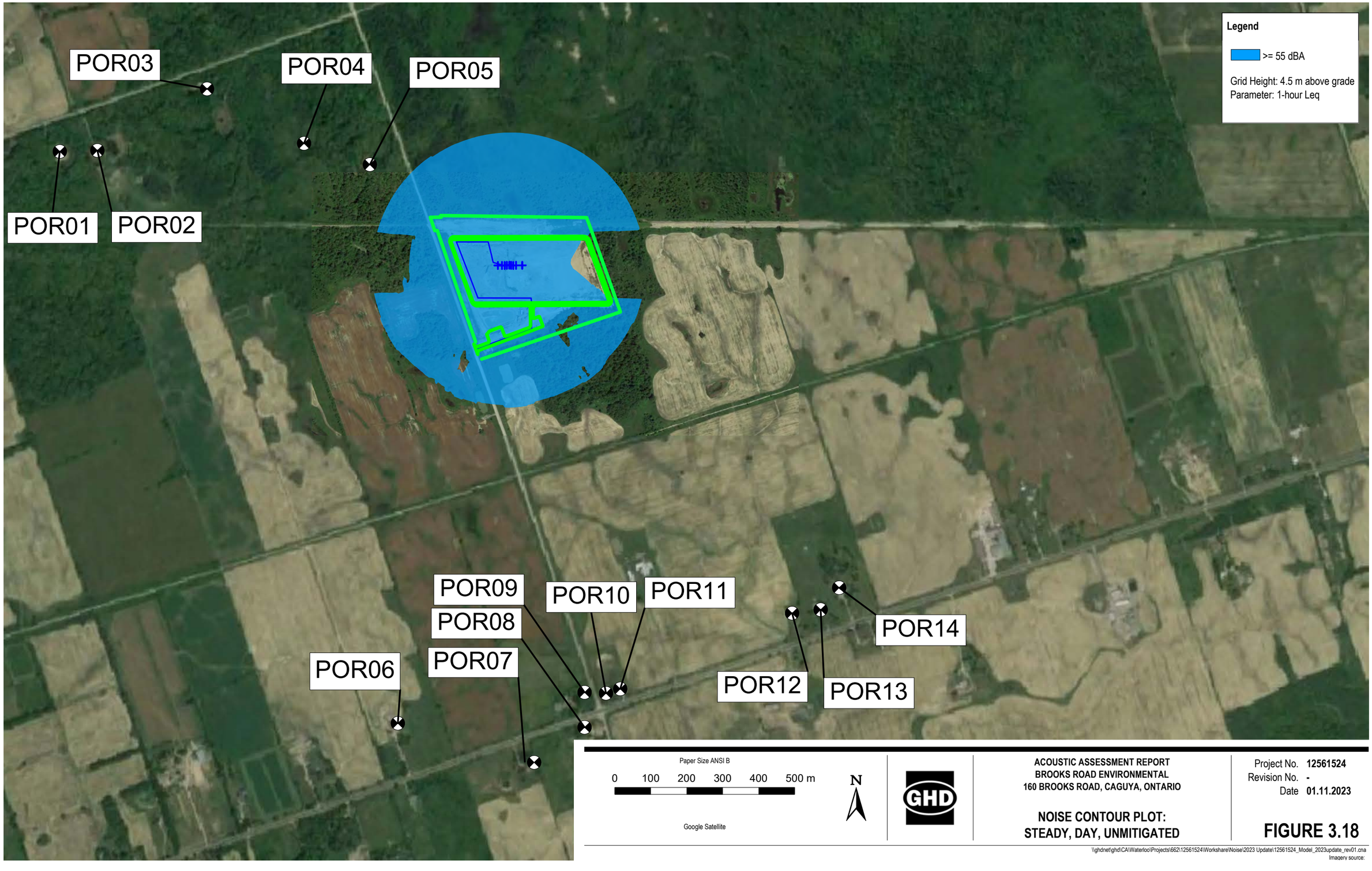
Table 3.5 Noise Modelling Parameters

Item	Model Parameters	Model Setting
1	Temperature	10°C
2	Relative humidity	70%
3	Wind speed	Downwind condition; wind speed of 3 m/s
4	Max. Search Radius (m)	2500 m
5	Noise propagation model	CADNA A (DataKustik 2023)
6	Standard	ISO 9613
7	Terrain parameters	Flat topography was assumed
8	Reflection parameters	2 orders of reflection

In order to predict the future worst-case noise impacts from the Project activities, representative octave band noise data was used, measured from construction/processing equipment similar to what is noted to be required for the Project. This data was obtained from the United Kingdom's Department of Environment Food and Rural Affairs (DEFRA) Update of Noise Database for Prediction of Noise on Construction and Open Sites, 2005 and 2006 (common source used globally). The United States Department of Transportation, Federal Highway Administration (FHWA) document FHWA Roadway Construction Noise Model User's Guide, 2006 was used as a supplemental document to obtain sound level data for equipment not listed by DEFRA.

The existing Landfill noise contours are presented on **Figure 3.17**. The noise impacts predicted at the 14 residential dwellings are below the 55 dBA noise limit (blue contour plot) defined in Guideline N-1. The future off-Site environmental noise impact from the Brooks Road Landfill Facility will be modelled using this industry standard acoustical model methodology to evaluate the capacity modifications in terms of the net effects.

See **Appendix E** for a detailed Noise Assessment Report.



GHD

ACOUSTIC ASSESSMENT REPORT
BROOKS ROAD ENVIRONMENTAL
160 BROOKS ROAD, CAGUYA, ONTARIO

NOISE CONTOUR PLOT:
STEADY, DAY, UNMITIGATED

Project No. **12561524**
Revision No. **-**
Date **01.11.2023**

FIGURE 3.18

\\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Workshare\Noise\2023 Update\12561524_Model_2023update_rev01.cna
Imagery source:

3.6 Natural Environment

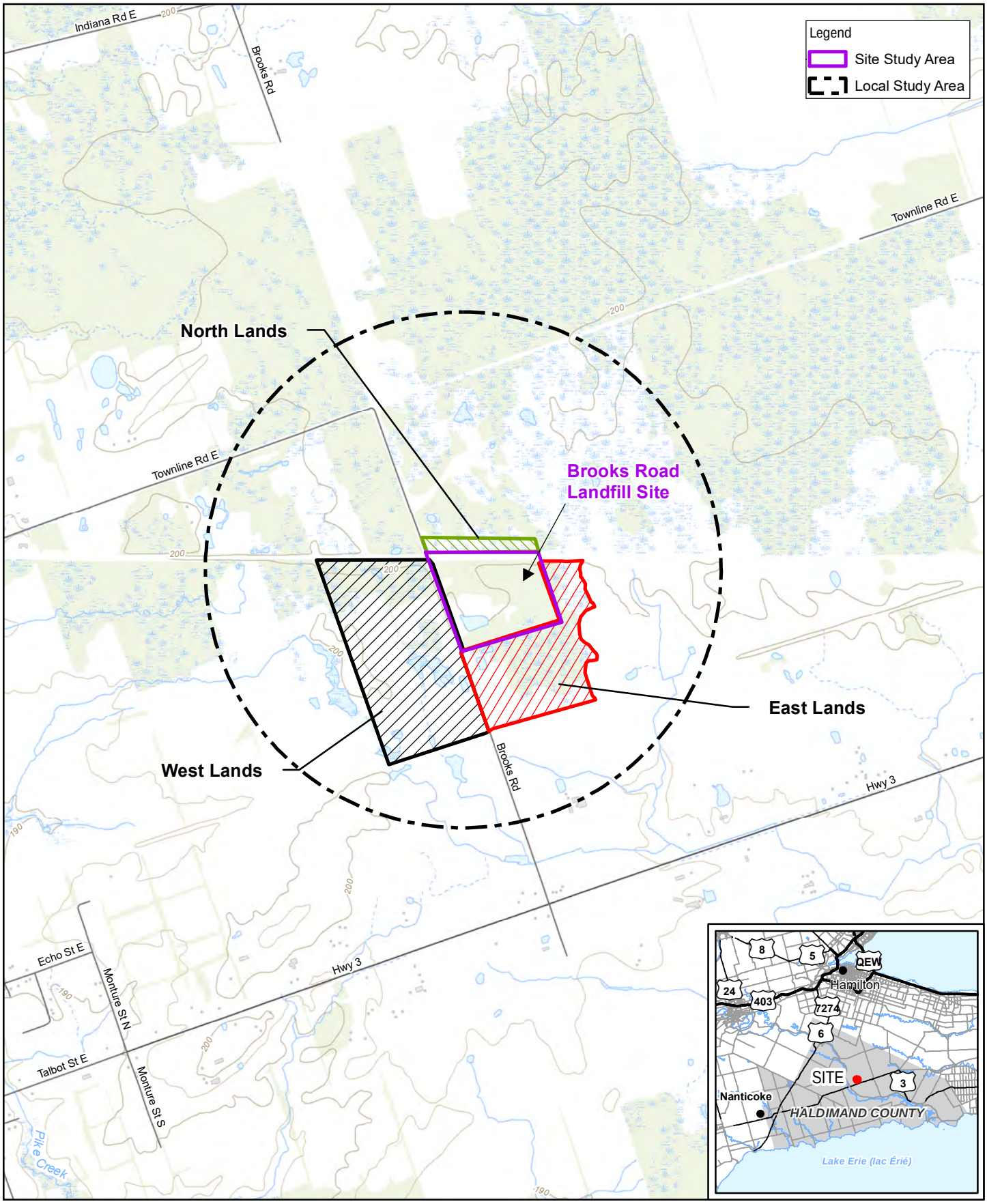
3.6.1 Study Area

The Natural Environment Study Areas to be discussed in relation to the preparation of this ESR are as follows:

– **SSA** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
– **LSA** – all lands and waters within a 1 km radius of the SSA boundaries

The lands surveyed within the LSA, surrounding the SSA, are referred to throughout this report as three areas: North Lands, East Lands, and West Lands.

The area to the south and east of the SSA (herein referred to as “East Lands”) consists of undeveloped rural property consisting of a combination of agricultural fields and forested lands. On the west side of Brooks Road (herein referred to as “West Lands”) is a rural property which is characterized by agricultural fields and small forested plots. To the north of the SSA, there is a rural property consisting of limited agricultural fields and forested lands.



Paper Size ANSI A

0 125 250 375 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

SITE LOCATION MAP

Project No. 12561524
Revision No. -
Date Dec 8, 2022

FIGURE 3.19

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3.6.2 Methodology

3.6.2.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Natural Environment Study Team to determine existing Natural Environment conditions within the Study Areas. The sources reviewed are outlined in **Table 3.6.**

Table 3.6 Secondary Source Information Reviewed

Source	Information Reviewed
Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF)	– Species at Risk (SAR) – Natural Heritage Features data layers from Land Information Ontario – Aquatic Resource Area (ARA) Survey Points
MECP	– SAR in Ontario
Fisheries and Oceans Canada (DFO)	– 2022 SAR fish, mussel, and critical habitat maps for the Study Areas
GRCA	– Fisheries Management Plan (2001) – Wetlands map layer
Niagara Peninsula Conservation Authority (NPCA)	– Wetlands map layer
GHD	– Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment (February 2017)
CRA	– Scoped Environmental Impact Study Former Railway Corridor Lands North of Brooks Road Landfill, Haldimand County, ON (December 2013)
Ontario Breeding Bird Atlas (OBBA)	– Breeding bird data for the Study Areas
Ontario Butterfly Atlas (OBA)	– Species records for the Study Areas
Ontario Reptile and Amphibian Atlas (ORAA)	– Species records for the Study Areas

3.6.2.2 Consultation

The Guelph District MNDMNRF, the MECP, the GRCA, and the NPCA were consulted on March 2, 2022, to request available natural heritage information, aquatic records, relevant wildlife records and SAR records. A response was received from MNDMNRF and NPCA on March 4, 2022, from GRCA on March 8, 2022, and from MECP on September 13, 2022. Additional information provided by the agencies was incorporated into this report. Agency correspondence is included in Appendix A of the Natural Environment Assessment Report (see **Appendix F**).

Although there was no direct consultation with the agencies during the preparation of this *Natural Environment Assessment Report*, the MNDMNRF, GRCA, and NPCA were consulted extensively during the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017). GRCA and NPCA also participated in a Site walk with GHD ecologists to confirm wetland boundaries in the North Lands on July 5, 2013. GRCA conducted an additional Site walk with GHD ecologists on June 12, 2014, to confirm the wetland boundaries of the East Lands.

A meeting was held with the Mississauga's of the Credit First Nation (MCFN) on July 19, 2022, and provided an opportunity for GHD to answer questions the MCFN had regarding the proposed capacity expansion of the Brooks Road Landfill.

3.6.2.3 Species at Risk Screening

Prior to conducting the field surveys, a screening of SAR with potential to be present within the Study Areas was completed. The term SAR is used to encompass species that are listed as Endangered (END), Threatened (THR), or Special Concern (SC) under the provincial *Endangered Species Act* (ESA; 2007) or under the federal *Species at Risk Act* (SARA; 2002). Only species listed as THR and END receive protection under the ESA. SC species may be protected under other policy instruments such as those for Significant Wildlife Habitat (OMNR 2000). With the exception of migratory birds protected by the *Migratory Bird Convention Act* (MBCA; 1994) and aquatic species, SARA generally does not apply on non-federal lands.

3.6.2.4 Field Investigations

GHD staff conducted various field investigations within the North and East Lands throughout 2020 to 2022 to identify natural environment habitats, and species and features present within the Study Areas (**Table 3.7**). Field surveys were conducted within the LSA that were directly adjacent to the SSA (up to 150 m radius or limited to the right-of-way of Brooks Road) to accurately characterize the neighbouring habitat and natural features present. No wildlife species surveys were conducted within the SSA due to active operation of the landfill and limited suitable habitat; however, incidental observations were collected at all field visits and are discussed in sections below.

Table 3.7 Field Investigations

Field Investigation	Dates
Ecological Land Classification and Vegetation Inventory	July 10, 2022 (East Lands) June 28, 2021 (North Lands)* June 29, 2020 (North Lands)*
Amphibian Surveys	April 12, May 11, and June 15, 2022 (North, East, and West Lands) March 25, April 13, and June 28, 2021 (North Lands)* May 28, 2020; June 29, 2020 (North Lands)*
Breeding Bird Surveys	June 10, June 27, and July 10, 2022 (East Lands)
Songmeter recording	June 13 to July 10, 2022 (North Lands)
Incidental Species Observations	Collected during all field visits
Notes	
* Completed as part of ECA monitoring of the North Lands which are provided here for a more fulsome characterization of the Study Areas (GHD 2021, 2022).	

Data collection focused on assessing vegetation and wildlife habitat characteristics within the Study Areas. Methodology for each field survey is provided below.

3.6.2.5 Aquatic Community Surveys

The MNDMNRF were consulted for aquatic community information. Aquatic community surveys were not completed during this round of Study Area investigations due to:

– The footprint of the SSA, from the natural environment perspective, is coincident with the existing property boundary
– Semi-aquatic species such as Blanding's turtle will be considered to have assumed presence (based on local records)
– Water discharged from Site is governed by an ECA that is not anticipated to change because of these activities

– Additional Site controls and mitigation measures at this property boundary which limit natural environment interactions with the Site and surrounding areas are employed following the recommendations of the recent Vertical Expansion EA

3.6.2.6 Ecological Land Classification and Botanical Inventory

Vegetation communities within the East Lands were mapped and described following the *First Approximation – ELC System for Southern Ontario* (Lee et al. 1998) and the *Southern Ontario ELC Scheme* (Draft; Lee et al. 2008). A botanical inventory (including a search for rare plant species) was completed for each ELC unit where access permitted within the LSA. The vegetation inventory was compiled and refined by incidental observations recorded throughout all field visits.

3.6.2.7 Wetland Boundaries

Wetland boundaries were delineated by GHD, GRCA, and NPCA in the North Lands on July 5, 2013. GHD and GRCA delineated the wetland boundaries in the East Lands on June 12, 2014. Wetland delineations of the Study Areas were prepared following Ontario Wetland Evaluation System (OWES) methods (MNR 1994; MNR 2013). 2022 ELC mapping confirmed those wetland boundaries delineated in 2013 and 2014.

Calling Amphibian Surveys

Calling amphibian surveys were conducted according to the Marsh Monitoring Protocol (BSC 2009) and were carried out at six stations within wetlands in the North, East, and West Lands. All surveys commenced a half hour after sunset and consisted of listening at each station for three minutes after two minutes of silence. During the survey, any frogs or toads heard calling were documented and a measure of 1, 2, or 3 for the abundance of each species within 50 m of the survey point, 50 – 100 m of the survey point, or greater than 100 m of the survey point was applied.

Breeding Bird Surveys

Breeding bird surveys were conducted on June 10, June 27, and July 10, 2022, within the East Lands. This was conducted during the breeding season when most birds are on their territories engaged in breeding activities. Surveys were conducted between 5:00 and 11:00 a.m. A point count methodology was utilized, where a point count location was surveyed for five minutes, and all species seen and heard were recorded. Breeding evidence was recorded to determine if the species was a possible, probable, or confirmed breeder following protocols of the Ontario Breeding Bird Atlas (Cadman et al. 2007). Locations of the Breeding Bird Survey (BBS) stations were identified in the *Terrestrial and Aquatic EA Report for the Brooks Road Landfill Site Vertical Capacity Expansion EA* (GHD 2017).

A songmeter (SM1) was also installed in the North Lands to collect audio recordings of breeding bird occurrences outside of the survey periods. The songmeter collected recordings for five minutes of every hour for three hours after sunrise and three hours after sunset during from June 13, 2022, until July 11, 2022. This captured breeding bird presence during the time of the day when vocal calling was highest for songbird species. Audio recordings were analyzed by avian ecologists to determine species presence.

3.6.2.8 Incidental Wildlife Observations

Observations and signs of wildlife were recorded, including browse, tracks, trails, scat, burrows, remains, nests, and vocalizations.

3.6.3 Description of Natural Environmental Existing Conditions

The LSA was dominated by agricultural lands under active row crops, forests, and wetlands. A photographic log is presented in Appendix B of the Natural Environment Assessment Report (See **Appendix F**).

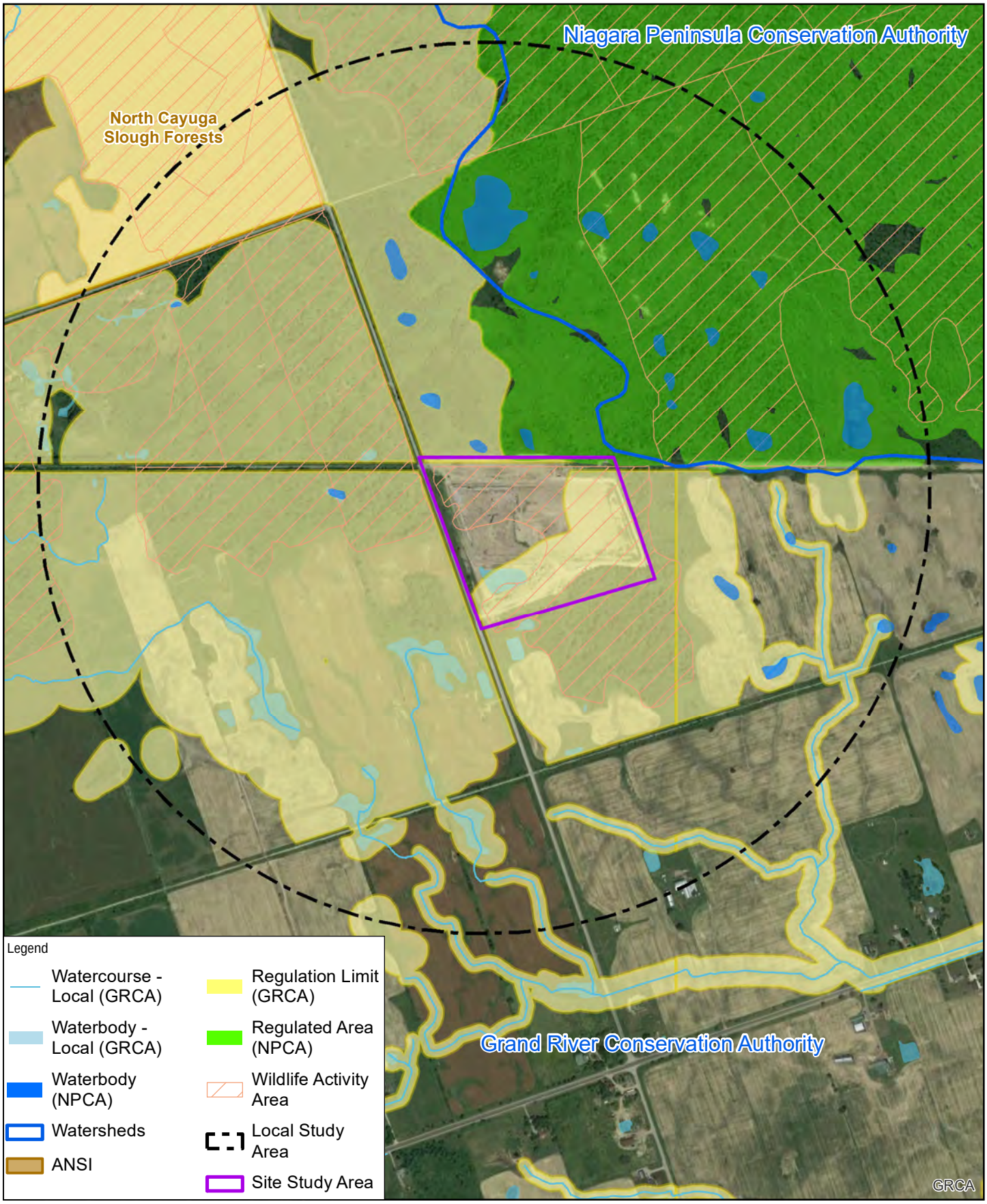
3.6.3.1 Designated Areas

The LSA contains natural landscape features of provincial significance (see **Figure 3.19**).

The North Cayuga Slough Forest is an Area of Natural and Scientific Interest (ANSI), located in the northwest portion of the LSA and the Brooks Road/Townline Road intersection. This 1,214 ha landscape feature is composed of a diverse complex of woodlands, vernal pools and sloughs which are bordered by swamps (GRCA 1997). The sloughs are a result of the Beverly and Toledo silty clay plains and the Lincoln clay plains. Generally, the area is dominated by imperfectly to poorly drained lacustrine silty clay and heavy clay. The upland areas are dominated by sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*) and red oak (*Quercus rubra*). Red maple (*A. rubrum*), swamp white oak (*Q. bicolour*) and black ash (*F. nigra*) typically dominate the low, wet basins. Field communities are characterized by hawthorns (*Crataegus spp.*), southern arrowwood (*Viburnum dentatum*) and narrow-leaved meadowsweet (*Spirea alba*), representing some of the many transitional environments between the distinct upland and low land areas. This area is of special importance due to its textbook clay-plain sediments and sand ridges which lead to the very distinct vegetation patterns. Previous studies have documented that 14 vegetation species and four bird species that are rare nationally, provincially and/or regionally occur in the area. This area is also home to a heronry (GRCA 1997). Of the 14 rare vegetation species, only two were observed in the LSA. These species are discussed further in section below.

The North Cayuga Swamp Wetland Complex is a PSW complex that is also present within the SSA and throughout the LSA in general (see **Figure 3.21**). This wetland complex is made up of numerous individual wetlands dominated by swamp with some marsh wetlands. The PSW extends to the northernmost portion of the SSA and incorporates the wetland elements of the North Cayuga Slough Forest. The complex vegetation community is characterized by thicket swamps of narrow-leaved meadowsweet, buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex vericillata*), or speckled alder (*Alnus incana ssp. rugosa*) with red maple, gray dogwood (*Cornus foemina ssp. racemosa)*, highbush blueberry (*Vaccinium corymbosum*), and willows (*Salix spp.*) as associates (NPCA 2010). The soil is a clay, loam, or silt composition.

Majority of the LSA is white-tailed deer (*Odocoileus virginianus*) wintering area as delineated by the MNDMNRF (**Figure 3.20**). Online mapping shows the majority of the SSA is also included in this delineation; however, given the SSA's fencing and lack of suitable habitat it is unlikely to be used by white-tailed deer for wintering.



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Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

DESIGNATED AREAS

Project No. 12561524
Revision No. -
Date Dec 8, 2022

FIGURE 3.20

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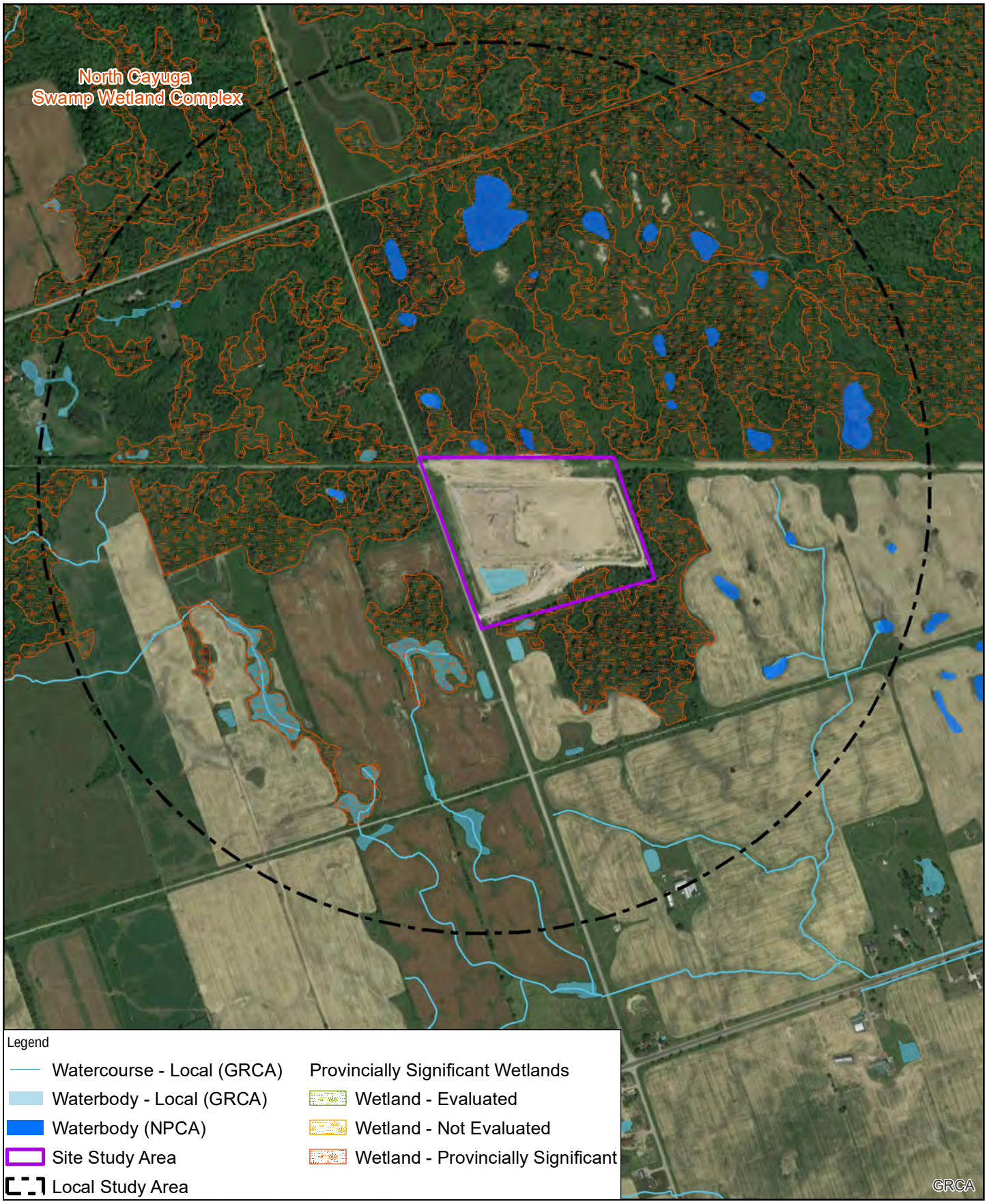

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Map Projection: Transverse Mercator
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Grid: NAD 1983 UTM Zone 17N

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

Project No. 12561524
Revision No. -
Date Dec 8, 2022

PROVINCIALLY SIGNIFICANT WETLANDS

FIGURE 3.21

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3.6.3.2 Aquatic Communities

Consultation with the MNDMNRF identified Pike Creek as present within the LSA; approximately 500 m west of the SSA. Pike Creek has a warm thermal regime with the following species identified: black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), bluntnose minnow (*Pimephales notatus)*, brook stickleback (*Culaea inconstans*), brown bullhead (*Ameiurus nebulosus)*, central mudminnow (*Umbra limi)*, common shiner (Luxilus cornutus), creek chub (*Semotilus atromaculatus*), gizzard shad (*Dorosoma cepedianum*), golden shiner (*Notemigonus crysoleucas),* green sunfish (*Lepomis cyanellus)*, largemouth bass (*Micropterus salmoides*)**,** logperch (*Percina caprodes*), northern pike (*Esox Lucius*), pumpkinseed (*Lepomis gibbosus)*, rock bass (*Ambloplites rupestris*), sunfishes (*Centrarchidae spp.),* and white sucker (*Catostomus commersonii*). Pike Creek does not drain from or into the SSA, therefore was not subject to field investigations.

3.6.3.3 Vegetation Communities and Flora

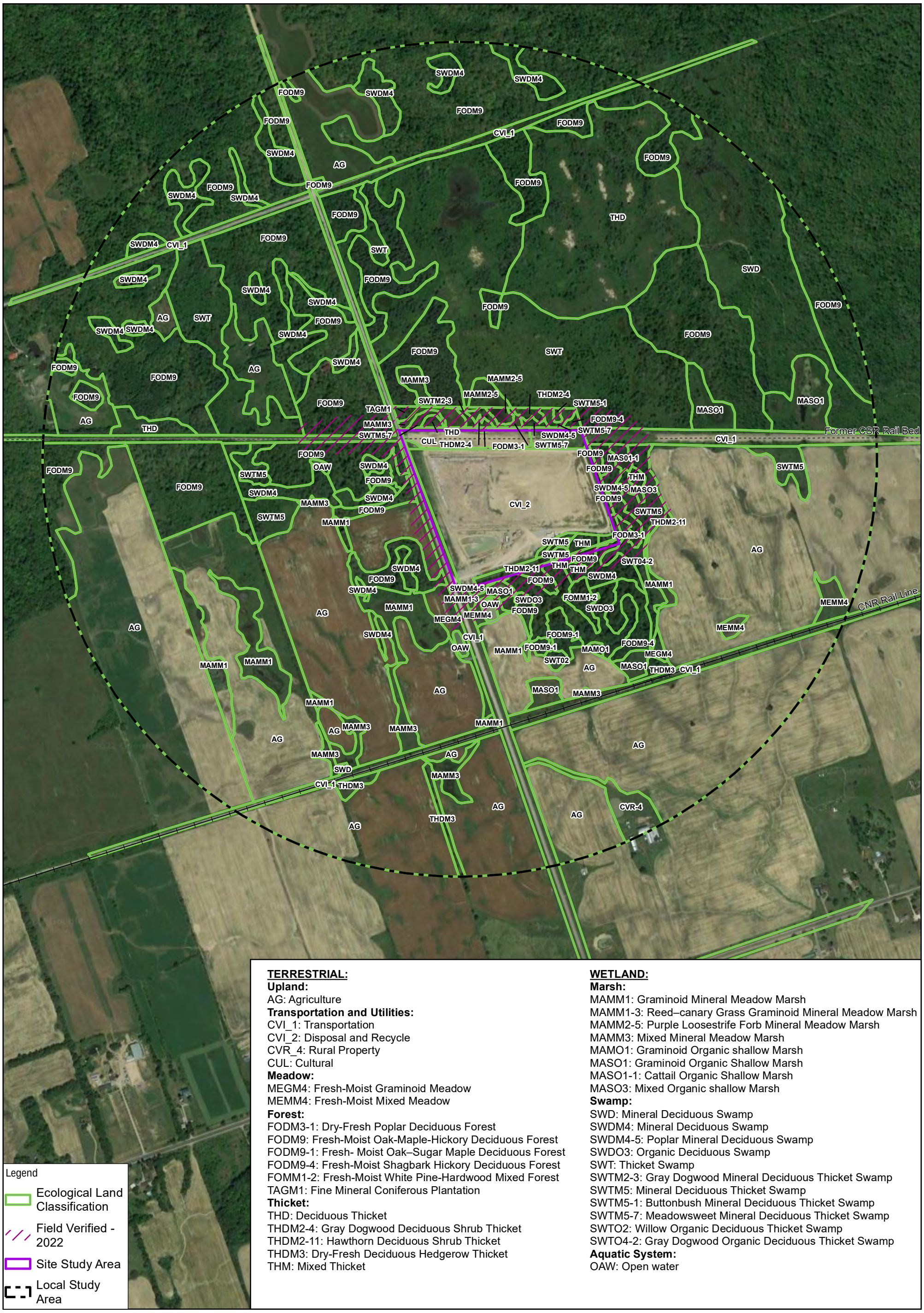
3.6.3.3.1 Vegetation Communities

In June 2022, GHD conducted a vegetation inventory and Ecological Land Classification (ELC) of select areas within the LSA which included the East and North Lands. This inventory and classification builds upon field visits completed between 2013 and 2015 for the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017).

During the 2013 – 2015 EA surveys, a species of interest detected during field activities was pumpkin ash (*Fraxinus profunda*), which is ranked as S2 provincially and is a regionally rare species in the Haldimand-Norfolk County. It is found in swampy areas with standing water for most of the year. A single specimen in poor condition was found along the south base of the abandoned rail line to the east of the landfill property (within the LSA). During 2022 this species was not observed and was likely located outside the selected field areas surveyed.

Another species of interest that was detected in past field investigations conducted by others was black gum (*Nyssa sylvestre*). A small stand of black gum was found in the SSA by Natural Resource Solutions Inc. (NRSI) in 2004 at the southeast corner of the landfill prior to clearing activities. The stand of black gum was identified by GHD on the landfill property during 2016 field investigations (GHD 2017). The trees were found to be tagged and located in the direct vicinity of active landfilling activities, without any tree protection measures. Black gum is a provincially rare species (S3) in Ontario, but within Haldimand-Norfolk County black gum is considered common. Presence of these trees was not confirmed in 2022 surveys; however, wildlife exclusion fence installed around the on-Site wetlands in the southeast corner of the landfill restricts work in this area.

ELC mapping was prepared following Ecological Land Classification for Southern Ontario: A First Approximation (Lee et al. 1998) and is presented on **Figure 3.22**. To complete the classification, ELC-certified ecologists conducted field visits to assess the landform and parent material, soil, and vegetation present. Through assessment of these characteristics, classification of the ecological communities was completed for the North, East, and West Lands in 2016 by GHD. The balance of the LSA (up to a 1 km radius from the SSA) was assessed using aerial photography interpretation and knowledge of the area. Confirmation and update to any vegetation communities to the North and East Lands were completed during the summer of 2022. Thirty-nine ecological land classification community classes are represented within the LSA and include aquatic, swamp, marsh, meadow, thicket, forest, transportation and utilities, and cultural systems. The vegetation inventory is presented in Appendix C of the Natural Environment Assessment Report (see **Appendix F**).



TERRESTRIAL:

Upland:
AG: Agriculture

Transportation and Utilities:
CVI_1: Transportation
CVI_2: Disposal and Recycle
CVR_4: Rural Property
CUL: Cultural

Meadow:
MEGM4: Fresh-Moist Graminoid Meadow
MEMM4: Fresh-Moist Mixed Meadow

Forest:
FODM3-1: Dry-Fresh Poplar Deciduous Forest
FODM9: Fresh-Moist Oak-Maple-Hickory Deciduous Forest
FODM9-1: Fresh- Moist Oak–Sugar Maple Deciduous Forest
FODM9-4: Fresh-Moist Shagbark Hickory Deciduous Forest
FOMM1-2: Fresh-Moist White Pine-Hardwood Mixed Forest
TAGM1: Fine Mineral Coniferous Plantation

Thicket:
THD: Deciduous Thicket
THDM2-4: Gray Dogwood Deciduous Shrub Thicket
THDM2-11: Hawthorn Deciduous Shrub Thicket
THDM3: Dry-Fresh Deciduous Hedgerow Thicket
THM: Mixed Thicket

WETLAND:

Marsh:
MAMM1: Graminoid Mineral Meadow Marsh
MAMM1-3: Reed–canary Grass Graminoid Mineral Meadow Marsh
MAMM2-5: Purple Loosestrife Forb Mineral Meadow Marsh
MAMM3: Mixed Mineral Meadow Marsh
MAMO1: Graminoid Organic shallow Marsh
MASO1: Graminoid Organic Shallow Marsh
MASO1-1: Cattail Organic Shallow Marsh
MASO3: Mixed Organic shallow Marsh

Swamp:
SWD: Mineral Deciduous Swamp
SWDM4: Mineral Deciduous Swamp
SWDM4-5: Poplar Mineral Deciduous Swamp
SWDO3: Organic Deciduous Swamp
SWT: Thicket Swamp
SWTM2-3: Gray Dogwood Mineral Deciduous Thicket Swamp
SWTM5: Mineral Deciduous Thicket Swamp
SWTM5-1: Buttonbush Mineral Deciduous Thicket Swamp
SWTM5-7: Meadowsweet Mineral Deciduous Thicket Swamp
SWTO2: Willow Organic Deciduous Thicket Swamp
SWTO4-2: Gray Dogwood Organic Deciduous Thicket Swamp

Aquatic System:
OAW: Open water

Paper Size ANSI B
0 50 100 150 200
Meters
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

ECOLOGICAL LAND CLASSIFICATION

Project No. 12561524
Revision No. -
Date Dec 8, 2022

FIGURE 3.22

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3.6.3.3.1.1 ELC from 2022 Survey

Characteristics of each of the identified community types observed during the summer of 2022 are provided below. These communities are delineated in **Figure 3.22** as “Field Verified – 2022”.

Upland Communities

AG: Agriculture

Agricultural fields are present throughout the LSA and are actively farmed. At the time of survey, winter wheat (*Triticum aestivum*), corn (*Zea mays ssp. mays*), and soybean (*Glycine max*) crops were planted within the AG fields of the East and West Lands. Small wetland and drainage areas were present throughout the actively farmed agriculture fields.

CVI_1: Transportation

This area is composed of roadways, a decommissioned rail line from which rail ties have been removed, and an active rail line.

CVI_2: Disposal and Recycle

This is the Brooks Road Landfill Site, which is in active operation.

CVR_4: Rural Property

This is a rural property with residential and accessory structures.

CUL: Cultural

This classification is applied to the disturbed and actively managed areas of the clay stockpile. No vegetation is present.

FODM3-1: Dry-Fresh Poplar Deciduous Forest

The dry-fresh poplar deciduous forest is located along the edge of the existing waste disposal area. The topography is relatively flat with moist soil. Trembling aspen (*Populus tremuloides*) dominates the semi closed canopy of this community, with red maple, red oak (*Quercus rubra*), and various shrub species also present within the unit. The sub-canopy, understory and ground layer are dominated by typical upland species such as riverbank grape (*Vitis riparia*), buckthorn (*Rhamnus spp*.), dogwood (*Cornus spp.*), pasture rose (*Rosa carolina*), goldenrod, and bedstraw (*Galium sp*.).

FODM9: Fresh-Moist Oak- Maple-Hickory Deciduous Forest

This forest type is located west of Brooks Road and in close proximity to swamps and is a dense deciduous community composed of shagbark hickory (*Carya ovata*), red maple, sugar maple (*Acer saccharum*), balsam poplar (*Populous balsamifera*), silver maple (*Acer saccharinum*), red oak, white pine (*Pinus strobus*), American beech (*Fagus grandifolia*), ironwood (*Ostrya virginiana*), and swamp white oak (*Quercus bicolor*). Due to the large area of this unit, ground vegetation varied throughout the area and included sensitive fern (*Onoclea sensibilis*), bracken fern (*Pteridium aquilinum*), spotted jewelweed (*Impatiens capensis*), Canada mayapple (*Podophyllum peltatum*), highbush cranberry (*Viburnum trilobum*), garlic mustard (*Alliaria petiolata*), trout lily (*Erythronium americanum*), Canada thistle (*Cirsium arvense*), black raspberry (*Rubus occidentalis*), woodland strawberry (*Fragaria vesca*), and lesser burdock (*Arctium minus)*.

FODM9-4: Fresh-Moist Shagbark Hickory Deciduous Forest

This low forested area is adjacent to one of the slough wetlands and is dominated by shagbark hickory with ironwood, white ash, red oak, red maple, and swamp white oak being present. The soil in this area is moist with a rolling topography. The groundcover includes goldenrod species, trout lily, running strawberry bush (*Euonymus obovatus*), ostrich fern (*Matteuccia struthiopteris*), and other herbaceous species.

THD: Deciduous Thicket

A small pocket of deciduous thicket was observed north of the existing fence line and is dominated by a gray dogwood (*Cornus racemosa)* with patchy canopy coverage of white ash (*Fraxinus americana)*, elm (*Ulmus spp.*), hawthorn (*Crataegus ssp.*), and red maple (*Acer rubrum)*. The ground layer is dominated by timothy grass (*Phleum pratense*), common milkweed (*Asclepias syriaca*), goldenrod (*Solidago sp.*), Canada bluegrass (*Poa compressa*), common cinquefoil (*Potentilla simplex*), oxeye-daisy (*Leucanthemum vulgare*), deptford pink (*Dianthus armeria*), and woodland sedge (*Carex blanda*).

THDM2-4: Gray Dogwood Deciduous Shrub Thicket

This mid-age transitional community is present in multiple locations throughout the LSA and is typically associated with the drier edges of wetlands. The area is similar to the cultural thicket (CUT1) community but is characterized by a dominant shrub cover of gray dogwood. Other community species indicative of an upland environment includes white ash, hawthorn, and goldenrod.

THDM2-11: Hawthorn Deciduous Shrub Thicket

This flat area of mineral soil is located in close proximity to an agricultural field. Hawthorn species dominate this landscape. Very few trees are located within this thicket and other species present include gray dogwood, serviceberry (*Amelanchier sanguinea*), and white pine.

THM: Mixed Thicket

Located to the east of the landfill property, this upland thicket is adjacent to two wetlands. A few large mature white pines have established, and hawthorn, gray dogwood, and European buckthorn are present within the sub canopy.

Wetland Communities

MAMM1: Graminoid Mineral Meadow Marsh

This unit has a broad range of vegetation composition in the shrub and ground vegetation layers. Within the wetland, narrow-leaved cattail (*Typha angustifolia*) and reed-canary grass (*Phalaris arundinacea var. arundinacea*) dominates. Vegetation along the edge of this unit includes common teasel (*Dipsacus fullonum)*, common chicory (*Cichorium intybus)*, red clover (*Trifolium pratense*), cow parsnip (*Heraleum maximum*), goldenrod, bird's-foot trefoil (*Lotus tenuis)*, serviceberry, gray dogwood, reed-canary grass, and oxeye daisy.

MAMM1-3: Reed–canary Grass Graminoid Mineral Meadow Marsh

Located directly to the east of Brooks Road and on the south-west corner of the landfill property, this marsh is dominated by reed-canary grass and very little other vegetation except for a small pocket of narrow-leaved cattail located within a ditch.

MAMM2-5: Purple Loosestrife Forb Mineral Meadow Marsh

Purple loosestrife (*Lythrum salicaria*), large-fruited bur-reed (*Sparganium eurycarpum*), buttonbush (*Cephalanthis occidentalis*), and wool grass (*Scirpus cyperinus*) create a dense understory in this community. This community provides a transition between the bur-reed mineral shallow marsh and a meadowsweet mineral deciduous thicket swamp (SWTM5-7) present in the LSA, north of the SSA.

MAMM3: Mixed Mineral Meadow Marsh

This marsh is located directly beside an agriculture field and receives surface water flow from the surrounding agricultural area due to its low elevation. Graminoid and forb species dominate, and the composition includes European reed grass (*Phragmites australis ssp. Australis)*, goldenrod, bird's-foot trefoil, common teasel, reed-canary grass, Queen Anne's lace (*Daucus carota*, and purple loosestrife. Narrow-leaved cattail, narrow-leaved meadowsweet (*Spiraea alba),* awl fruited sedge (*Carex stipata*), fowl mannagrass (*Glyceria striata),* broadleaf arrowhead (*Sagittaria latifolia*), duckweed (*Lemna minor*), and large-fruited bur-reed are also present within the understory layer.

MASO1-1: Cattail Organic Shallow Marsh

The cattail organic shallow marsh is a small community located at the base of the old rail line to the east of the landfill property. The marsh is comprised of organic soils and is dominated by narrow-leaved cattail. The other vegetation consisted of bog hemp (*Boehmeria cylindrica*), greater pond sedge (*Carex riparia*), and spotted jewelweed. This wetland is attached by a small channel which flows south to another wetland (MASO3).

MASO3: Mixed Organic Shallow Marsh

The mixed organic shallow marsh is comprised of organic soils and surface water with maximum depths over 0.5m in some areas. The vegetation community consists of phragmites (*Phragmites australis var. australis*), duckweed, water-plantain (*Alisma spp.*), and enchanter's nightshade (*Circaea canadensis ssp. canadensis*). Willow trees (*Salix spp.*) and shrubs are present throughout the wetland.

SWDM4: Mineral Deciduous Swamp

The mineral deciduous swamp is located within a forest community near agricultural fields. Aerial photographic interpretation was used to determine this habitat. Based on this interpretation, it is expected that this swamp is comprised of mineral soils and many deciduous tree species. Field investigations found red maple, trembling aspen, and balsam poplar. Gray dogwood was observed in the shrub layer, as well as sensitive fern and mosquito bulrush (*Scirpus hattorianus*). The ground layer was comprised of celery buttercup (*Ranunculus sceleratus*), red raspberry (*Rubus idaeus*), fowl mannagrass, and riverbank grape.

SWDM4-5: Poplar Mineral Deciduous Swamp

This habitat is found in multiple locations across the property, typically along the edge of the existing waste disposal facility. It is characterized as a transition between wetland and forest habitats. The majority of the canopy is located along the edge of the existing waste disposal property and is dominated by trembling aspen. Red maple, blue spruce (*Picea pungens)*, sugar maple, pin oak (*Quercus palustris*), white ash, and red oak all compose the tree canopy. Many shrub species, including red osier dogwood, hawthorn, and nannyberry (*Viburnum lentago*), are present within this unit. Spotted jewelweed, sensitive fern, narrow-leaved meadowsweet, reed-canary grass, yarrow (*Achillea millefolium*), white sweet clover (*Melilotus albus*), water-plantain, shallow sedge (*Carex lurida*), and common cinquefoil composes the dominant ground vegetation. Standing surface water and buttressed roots are present within the unit.

SWTM2-3: Gray Dogwood Mineral Deciduous Thicket Swamp

The gray dogwood mineral deciduous thicket swamp represents a mid-age transition community between the similarly characterized meadowsweet mineral deciduous thicket swamp (SWTM5-7*)* and the large mixed mineral meadow marsh (MAMM3). It is characterized by a robust sub-canopy dominated by gray dogwood. Specimens of red maple, speckled alder (*Alnus incana*), and common alder (*Alnus glutinosa*) form the canopy layer. The other species constituting the vegetation community are meadowsweet, sensitive fern, reed-canary grass, spotted jewelweed, boneset (*Eupatorium perfoliatum*), pussy willow (*Salix discolor*), and bottle brush sedge (*Carex hystericina*).

SWTM5: Mineral Deciduous Thicket Swamp

The mineral deciduous thicket swamp is present at multiple locations and is composed of primarily shrub species. Aerial photographic interpretation was used to determine this habitat in multiple areas but a field verified unit exits to the east of the landfill property. Species including gray dogwood, serviceberry, red osier dogwood, and hawthorn species are present within this unit. Ground vegetation includes narrow-leaved meadowsweet, sedge, rush, grass, and forb species. Small pockets of narrow-leaved cattail and reed-canary grass are also present.

SWTM5-1: Buttonbush Mineral Deciduous Thicket Swamp

The buttonbush mineral deciduous thicket swamp is surrounded by a large meadowsweet mineral deciduous thicket swamp (SWTM5-7). This community is comprised of thick sub-canopy of buttonbush and willow species. Bladderwort (*Utricularia vulgaris*), cypress-like sedge (*Carex pseudocyperus*), meadowsweet, swamp white oak, rye grass (*Lolium perenne*), soft-stemmed rush (*Juncus effusus*), and blue vervain (*Verbena hastata*) were also present.

SWTM5-7: Meadowsweet Mineral Deciduous Thicket Swamp

The meadowsweet mineral deciduous thicket swamp is characterized by a robust understory composed of obligate and facultative wetland species such as narrow-leaved meadowsweet, gray dogwood, and purple loosestrife. Ground cover includes moss and fowl meadow grass (*Poa palustris*). The silty clay soil lacked horizons, but mottles were observed within the top 10 centimetres (cm) of the surface.

SWTO4-2: Gray Dogwood Organic Deciduous Thicket Swamp

The gray dogwood organic deciduous thicket swamp is a mid-age community present and is typically associated with wet low-lying habitat. The swamp is characterized by organic soils, deciduous community vegetation, and is driven by a dominant shrub cover of gray dogwood with a various species including sensitive fern, lily of the valley (*Convallaria majalis*), false solomon's seal (*Maianthemum racemosum ssp. racemosum)*, and narrow-leaved meadowsweet, all of which are indicative of a wetland environment.

3.6.3.3.1.2 ELC from 2016 Survey

Characteristics of each of the identified community types previously reported in the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017) is provided below. These communities are delineated in **Figure 3.21** outside of the "Field Verified – 2022" hatching.

Upland

MEGM4: Fresh Moist Graminoid Meadow

The fresh moist graminoid meadow is mainly characterized by mineral soil and low growing grass species. Garlic mustard, cow vetch (*Vicia cracca*), goldenrod, blueberry (*Vaccinium sp*.), Bebb's sedge (*Carex bebbi*), reed-canary grass, common teasel, lesser burdock, large-fruited bur-reed, wood sorrel (*Oxalis acetosella*), and other sedge, forb, and grass species are present within this meadow. Serviceberry, hawthorn (*Crataegus spp*.), and European buckthorn present along its periphery. A very small stream also runs through this unit.

MEMM4: Fresh-Moist Mixed Meadow

The fresh-moist mixed meadow is located in an upland area surrounding a pond excavated for agricultural use. The area has disturbed soils and is primarily composed of forb and graminoid species such as reed-canary grass, common milkweed, bird's-foot trefoil, Queen Anne's lace, asters (*Aster spp*.), and common chicory. No trees or shrubs are present.

FODM9-1: Fresh- Moist Oak – Sugar Maple Deciduous Forest

This upland forest interior landscape is surrounded by slough wetlands. Sugar maple, red maple, shagbark hickory, ironwood and swamp white oak compose the canopy of this forest. The understory is composed of fern species (Polypodiidae spp.*),* trout lily, mayapple, garlic mustard, spotted jewelweed, and Canada thistle.

FOMM1-2: Fresh-Moist White Pine-Hardwood Mixed Forest

This raised elevation area compared to the surrounding supports both coniferous and deciduous tree species and associated vegetation. The mineral soil is well drained and mature white pine, sugar maple, and white ash are present within this unit. Trout lily, mayapple, garlic mustard, and Canada thistle are also present.

TAGM1: Fine Mineral Coniferous Plantation

The fine mineral coniferous plantation is a mid-age treed community that reflects the surroundings and historic land use as a tree farm. The canopy is composed exclusively of blue spruce. The dominance within the sub-canopy is roughly divided between blue spruce and gray dogwood. Additional upland species include common teasel, goldenrod species, orchard grass (*Dactylis glomerata)*, broadleaf plantain (*Plantago major)* and common cinquefoil in the understory and as ground cover.

THDM3: Dry-Fresh Deciduous Hedgerow Thicket

This area is located south of the SSA and is situated along a rail bed. It is surrounded by marsh and agricultural fields. It has a raised topography compared to the surrounding landscape and is comprised of hawthorn species, common apple (*Malus pumila*), European buckthorn, amongst others.

Wetland

MAMO1: Graminoid Organic Shallow Marsh

The graminoid organic shallow marsh comprises a small wetland area located adjacent to an agricultural field and on the edge of a forest habitat. Vegetation includes primarily emergent sedge and graminoid species with small willow shrubs located on the periphery of the wetland.

MASO1: Graminoid Organic Shallow Marsh

The graminoid organic shallow marsh is a large wetland area dominated by tall robust vegetation. Standing water was present during multiple field surveys. Species composition is dominated by reed-canary grass, broad leaved water plantain (*Alisma subcordatum*), duckweed, pondweed (*Potamogeton sp.*), Queen Anne's lace, purple loosestrife, and vetch species (*Vicia spp.*).

SWDO3: Organic Deciduous Swamp

Sloughs with deep organic soils are present in most areas of the maple organic deciduous swamp unit. The canopy layer is dominated by red maple, American beech, shagbark hickory, and sugar maple. Small sporadic open water habitats are present, and many wetland sedges, ferns, and aquatic species are present. These include sensitive fern, bracken fern, spotted jewelweed, duckweed, false solomon's seal, narrow-leaved meadowsweet, etc.

SWD: Deciduous Swamp

This swamp is a diverse community comprised of many small tree stands containing deciduous tree species including red maple, shagbark hickory, trembling aspen, ironwood, hawthorn species, and burr oak (*Quercus macrocarpa*). Shrub species include gray dogwood, red osier dogwood, and serviceberry, among others.

SWT: Thicket Swamp

This swamp is a diverse community with small tree stands. It contains small patches of deciduous trees including trembling aspen, red maple, American beech, and ironwood. Shrub species dominate the landscape and include gray dogwood, red osier dogwood, and serviceberry, among others.

SWT02: Willow Organic Deciduous Thicket Swamp

The willow organic deciduous thicket shrub wetland is a small wetland with organic soil and an open water feature surrounded by willow tree and shrub species. This wetland overflows across a farmed field into a marsh wetland during the wet season. Other vegetation includes serviceberry, gray dogwood, duckweed, and graminoid species.

OAW: Open Water

Small open water habitats are present within the LSA, located near agriculture fields. These open water habitats were historically created by farmers for irrigation of crops within the surrounding fields. These ponds are uniform in shape and have little aquatic vegetation present.

3.6.3.3.2 Flora

A total of 139 vascular plants were identified to species level during field investigations, with one identified to genus (hawthorn [*Crataegus sp.*]). Of the species identified, 87 are native, 52 are non-native. 67 of the native species for which information is available have S-Ranks[22] of 'S5', indicating they are 'secure' in the province. Virginia creeper,

[22] Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario.

southern water-plantain, American reed, and Black walnut have an S-Rank of 'S4?' indicating they are 'apparently secure' in the province, however some uncertainty about the assigned rank exists. 10 species possess a ranking of S4 indicating that they are uncommon but not rare, with some cause for long-term concern due to declines or other factors.

81 of the native species for which information is available have co-efficient of conservatism[23] (CC) values of 0-6, indicating they are tolerant to moderately tolerant of disturbance. Six species possess a ranking of 7-9 which indicates that they have a low tolerance for disturbance.

No SAR plants were identified during the field investigation.

A list of vascular plant species identified during field investigations is provided in Appendix C of the Natural Environment Assessment Report (see **Appendix F**).

3.6.3.4 Herpetofauna

Herpetofauna encompasses all amphibians and reptiles. Calling amphibian monitoring was conducted and is further discussed below. Reptile-specific field surveys were not conducted during field investigations. However, the Ontario Reptile and Amphibian Atlas was reviewed, and incidental species observations were recorded at each field visit.

Herptile species identified in the Ontario Reptile and Amphibian Atlas as occurring within the Study Areas include:

– American bullfrog (Lithobates catesbeianus)
– American toad (Anaxyrus americanus)
– Blanding's turtle (Emydoidea blandingii)*
– Blue-spotted salamander (Ambystoma laterale)
– Dekay's brownsnake (Storeria dekayi)
– Eastern gartersnake (Thamnophis sirtalis sirtalis)
– Eastern Milksnake (Lampropeltis triangulum)
– Eastern red-backed salamander (Plethodon cinereus)
– Eastern ribbonsnake (Thamnophis sauritus)
– Gray treefrog (Hyla versicolor)
– Green frog (Lithobates clamitans)
– Midland painted turtle (Chrysemys picta marginata)
– Northern leopard frog (Lithobates pipiens)
– Northern map turtle (Graptemys geographica)
– Northern watersnake (Nerodia sipedon sipedon)
– Red-bellied snake (Storeria occipitomaculata)
– Red-spotted newt (Notophthalmus viridescens viridescens)
– Smooth greensnake (Opheodrys vernalis)
– Snapping turtle (Chelydra serpentine)
– Spotted salamander (Ambystoma maculatum)
– Spring peeper (Pseudacris crucifer)
– Western chorus frog (Pseudacris triseriata), Carolinian population
– Wood frog (Lithobates sylvaticus)

[23] Rank of 0 to 10 based on plant's degree of fidelity to a range of synecological parameters: (0-3) Taxa found in a variety of plant communities; (4-6) Taxa typically associated with a specific plant community but tolerate moderate disturbance; (7-8) Taxa associated with a plant community in an advanced successional stage that has undergone minor disturbance; (9-10) Taxa with a high fidelity to a narrow range of synecological parameters (Oldham et al., 1995).

Note: * denotes historical record (pre-2000)

American bullfrog, eastern gartersnake, eastern milksnake, green frog, northern leopard frog, northern watersnake, eastern red-backed salamander, and red-bellied snake were observed during 2020 – 2022 field investigations. Additional calling amphibians recorded in the LSA are detailed below. Blanding's turtle, snapping turtle, and Dekay's brownsnake were observed during 2013 – 2015 LSA field surveys (GHD 2017).

3.6.3.4.1 Calling Amphibian Surveys

Six calling amphibian stations were surveyed in the North, East, and West Lands according to the Great Lakes Marsh Monitoring Protocol (BSC 2009) in spring 2022 (**Figure 23**). All stations had detections of calling amphibians. Results of the calling amphibian surveys during 2020 – 2022 can be found in Appendix D of the Natural Environment Assessment Report (see **Appendix F**).

The composition of species detected during the amphibian surveys is representative of the amphibian population in the adjacent areas, where suitable habitat exists. Surveys in the North and East Lands confirmed the presence of American bullfrog, American toad, gray treefrog, green frog, northern leopard frog, spring peeper, and western chorus frog. Surveys in the West Lands confirmed the presence of the same species, with the exception of American bullfrog. In total, eight species of calling amphibians were documented in the LSA.

Each of the species recorded during 2020 – 2022 calling amphibian surveys had been previously documented in the vicinity as part of the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017). No species listed under the provincial ESA or the federal SARA were recorded during calling amphibian surveys.

3.6.3.5 Birds

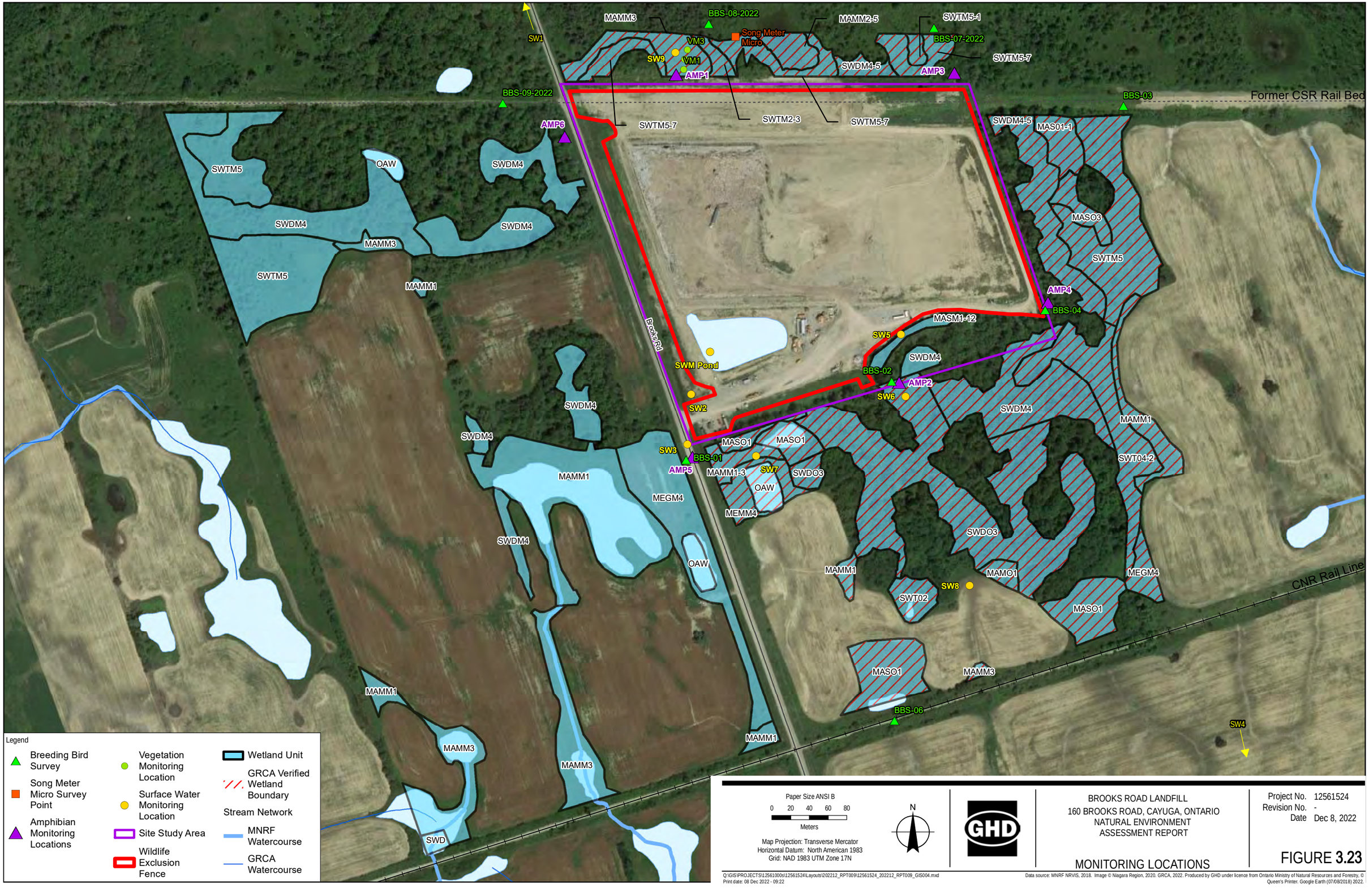
Breeding bird surveys were conducted on June 10, June 27, and July 10, 2022, in the East Lands. A total of 61 species were detected during the surveys, 44 of which displayed evidence of breeding. A list of the species detected with evidence of breeding is provided in Appendix E of the Natural Environment Assessment Report (see **Appendix F**).

The SM1 recorder was deployed in the North Lands from June 10 – July 10, 2022, at the location identified on **Figure 3.23**. For consistency, the recordings were analyzed by the avian ecologist who completed the in-field breeding bird surveys. A list of all species detected by the SM1 is provided in **Appendix E** of the Natural Environment Assessment Report (see **Appendix F**)**.** The SM1 could only document presence of singing species and cannot provide visual observation of species.

In total, 71 species of birds were observed in the LSA and SSA during 2022 breeding bird surveys by GHD ecologists. Four of these species are SAR: barn swallow, eastern wood-pewee (*Contopus virens),* Canada warbler (*Cardellina canadensis*), and wood thrush (*Hylocichla mustelina*). Least bittern (*Ixobrychus exilis)* was heard vocalising within the East Lands in 2014 (GHD 2017). This species was not detected during the 2022 surveys within the LSA or SSA. Species at risk are discussed in greater detail in **Section 3.6.3.8**.

3.6.3.6 Mammals

Mammal-specific field surveys were not conducted as part of the project, but incidental observations were recorded. During field investigations big brown bat (*Eptesicus fuscus*), eastern cottontail (*Sylvilagus floridanus*), northern raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), white-tailed deer (*Odocoileus virginianus*), and unidentified bats were observed.


SW1
MAMM3
BBS-08-2022
MAMM2-5
SWTM5-1
Song Meter Micro
VM3
BBS-07-2022
SW9
VM1
SWTM5-7
AMP1
SWDM4-5
AMP3
BBS-09-2022
BBS-03
Former CSR Rail Bed
AMP6
SWTM5-7
SWTM2-3
SWTM5-7
SWDM4-5
MAS01-1
SWTM5
OAW
SWDM4
SWDM4
SWDM4
MASO3
MAMM3
SWTM5
SWTM5
MAMM1
AMP4
BBS-04
MASM1-12
Brooks Rd
SW5
SWM Pond
SWDM4
BBS-02
AMP2
SW6
SW2
SWDM4
SWDM4
MAMM1
MASO1
MASO1
SW3
BBS-01
SWT04-2
AMP5
MAMM1-3
SW7
SWDO3
OAW
MAMM1
MEGM4
MEMM4
SWDO3
SWDM4
OAW
MAMM1
MAMO1
MEGM4
SW8
CNR Rail Line
SWT02
MASO1
MASO1
MAMM3
BBS-06
SW4
MAMM1
MAMM3
MAMM1
MAMM3
SWD
Legend
Breeding Bird Survey
Song Meter Micro Survey Point
Amphibian Monitoring Locations
Vegetation Monitoring Location
Surface Water Monitoring Location
Site Study Area
Wildlife Exclusion Fence
Wetland Unit
GRCA Verified Wetland Boundary
Stream Network
MNRF Watercourse
GRCA Watercourse
Paper Size ANSI B
0 20 40 60 80
Meters
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N
N
GHD
BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT
MONITORING LOCATIONS
Project No. 12561524
Revision No. -
Date Dec 8, 2022
FIGURE 3.23
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Print date: 08 Dec 2022 - 09:22
Data source: MNRF NRVIS, 2018. Image © Niagara Region, 2020. GRCA, 2022. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer. Google Earth (07/08/2018) 2022.

3.6.3.7 Incidental Wildlife Observations

Wildlife observations were collected during each field visit in addition to breeding bird and amphibian surveys. A list of incidental faunal species observations can be found in **Table 3.8**.

Table 3.8 Incidental wildlife observed within the Study Areas from 2020 to 2022

Species Observed		S-Rank	Conservation Status	
Common Name	Scientific Name		SARO	SARA
Amphibians				
American bullfrog	*Lithobates catesbeianus*	S4	N/A	N/A
Red-backed salamander	*Plethodon cinerus*	S5	N/A	N/A
Birds				
American robin	*Turdus migratorius*	S5B	N/A	N/A
American woodcock	*Scolopax minor*	S4B	N/A	N/A
Barn swallow	*Hirundo rustica*	S5	Threatened	Threatened
Canada goose	*Branta canadensis*	S5	N/A	N/A
Chipping sparrow	*Spizella passerina*	S5B	N/A	N/A
Common grackle	*Quiscalus quiscula*	S5B	N/A	N/A
Common yellowthroat	*Geothlypis trichas*	S5B	N/A	N/A
Eastern towhee	*Pipilo erythrophthalmus*	S4B	N/A	N/A
Great blue heron	*Ardea herodias*	S4	N/A	N/A
Gray catbird	*Dumetella carolinensis*	S4B	N/A	N/A
Indigo bunting	*Passerina cyanea*	S4B	N/A	N/A
Killdeer	*Charadrius vociferus*	S5B, S5N	N/A	N/A
Mourning dove	*Zenaida macroura*	S5	N/A	N/A
Northern cardinal	*Cardinalis cardinalis*	S5	N/A	N/A
Red-winged blackbird	*Agelaius phoeniceus*	S4	N/A	N/A
Song sparrow	*Melospiza melodia*	S5B	N/A	N/A
Swamp sparrow	*Melospiza georgiana*	S5B	N/A	N/A
Turkey vulture	*Cathartes aura*	S5B	N/A	N/A
Wild turkey	*Meleagris gallopavo*	S5	N/A	N/A
Yellow warbler	*Setophaga petechia*	S5B	N/A	N/A
Unidentified duck	N/A	N/A	N/A	N/A
Unidentified gull	Laridae spp.	N/A	N/A	N/A
Crustaceans				
Unidentified terrestrial crayfish	N/A	N/A	N/A	N/A
Insects				
Monarch	*Danaus plexippus*	S2N, S4B	Special Concern	Special Concern

Species Observed		S-Rank	Conservation Status	
Common Name	Scientific Name		SARO	SARA
Mammals				
Big brown bat	*Eptesicus fuscus*	S5	N/A	N/A
Eastern cottontail	*Sylvilagus floridanus*	S5	N/A	N/A
Northern raccoon	*Procyon lotor*	S5	N/A	N/A
Red fox	*Vulpes vulpes*	S5	N/A	N/A
Striped skunk	*Mephitis mephitis*	S5	N/A	N/A
White-tailed deer	*Odocoileus virginianus*	S5	N/A	N/A
Unidentified bat	N/A	N/A	N/A	N/A
Reptiles				
Eastern gartersnake	*Thamnophis sirtalis sirtalis*	S5	N/A	N/A
Eastern milksnake	*Lampropeltis triangulum*	S4	N/A	N/A
Northern watersnake	*Nerodia sipedon sipedon*	S5	N/A	N/A
Red-bellied snake	*Storeria occipitomaculata*	S5	N/A	N/A
Notes				
S-Rank: Sub-national Rank S2: Very rare in Ontario; usually between 5-20 occurrences S4: Common in Ontario: apparently secure, usually more than 100 occurrences S5: Very common in Ontario, demonstrably secure B: Breeding species N: Non-breeding species SARO: Species at Risk in Ontario (provincial) SARA: Species at Risk Act (federal)				

3.6.3.8 Species at Risk

Numerous SAR have been observed within the Study Areas or have been flagged through agency correspondence or background review as having the potential occur within the Study Areas (**Table 3.9**). Incidental observations of all species, including any SAR encountered, were collected during field investigations and were detailed previously in **Table 3.8**. SAR species-specific surveys were not completed for a number of reasons including:

– Natural areas within the SSA are very small and limited to a small section of the southern boundary of the SSA. This area provides little available habitat for any of the listed SAR based on its proximity to the Site operations, small size, and presence of a chain link fence at the SSA boundary.
– Mitigation measures currently in place to dissuade wildlife access/use of the landfill property include:
  - Chain link fence is present around the perimeter of the property which dissuades larger reptile and mammal access to the SSA
  - Silt fence along the perimeter of the property is an effective deterrent for small reptiles, mammals, and amphibian access to the SSA
  - Daily landfilling activities (e.g., noise, human presence, heavy machinery) also provide deterrents for use of the SSA by wildlife

Operational practices (i.e., daily cover) further act to deter wildlife use of the SSA.

Table 3.9 Species at Risk Summary

Species		Observed within the Local Study Area	Conservation Status	
Common Name	**Scientific Name**		**SARO**	**SARA**
Birds				
Bank swallow	*Riparia riparia*	No	Threatened	Threatened
Barn swallow	*Hirundo rustica*	Yes*	Threatened	Threatened
Bobolink	*Dolichonyx oryzivorus*	No	Threatened	Threatened
Canada warbler	*Cardellina canadensis*	Yes	Special Concern	Threatened
Cerulean warbler	*Setophaga cerulea*	No	Threatened	Endangered
Chimney swift	*Chaetura pelagica*	No	Threatened	Threatened
Eastern meadowlark	*Sturnella magna*	No	Threatened	Threatened
Eastern wood-pewee	*Contopus virens*	Yes	Special Concern	Special Concern
Golden-winged warbler	*Vermivora chrysoptera*	No	Special Concern	Threatened
Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum pratensis*	No	Special Concern	Special Concern
Least bittern	*Ixobrychus exilis*	Yes^	Threatened	Threatened
Red-headed woodpecker	*Melanerpes erythrocephalus*	No	Endangered	Endangered
Wood thrush	*Hylocichla mustelina*	Yes	Special Concern	Threatened
Yellow-breasted chat	*Icteria virens*	No	Endangered	Endangered
Insects				
Monarch	*Danaus plexippus*	Yes	Special Concern	Special Concern
Mammals				
Eastern small-footed myotis	*Myotis leibii*	No	Endangered	N/A
Little brown myotis	*Myotis lucifugus*	No	Endangered	Endangered
Northern myotis	*Myotis septentrionalis*	No	Endangered	Endangered
Tri-coloured bat	*Perimyotis subflavus*	No	Endangered	Endangered
Reptiles				
Blanding's turtle – Great Lakes/St. Lawrence population	*Emydoidea blandingii*	Yes^	Threatened	Threatened
Eastern ribbonsnake	*Thamnophis sauritus*	No	Special Concern	Special Concern
Midland painted turtle	*Chrysemys picta marginata*	No	Under consideration	Special Concern
Eastern milksnake	*Lampropeltis triangulum*	Yes*	Not at risk	Special Concern
Northern map turtle	*Graptemys geographica*	No	Special Concern	Special Concern
Snapping turtle	*Chelydra serpentina*	Yes^	Special Concern	Special Concern

Species		Observed within the Local Study Area	Conservation Status	
Common Name	Scientific Name		SARO	SARA
Vascular Plants				
American chestnut	*Castanea dentata*	No	Endangered	Endangered
Black ash	*Fraxinus nigra*	Yes^	Endangered	N/A
Butternut	*Juglans cinerea*	No	Endangered	Endangered
Eastern flowering dogwood	*Cornus florida*	No	Endangered	Endangered
Notes				
* Observed within the SSA ^ Observed within the LSA during 2013 – 2015 surveys (GHD 2017) SARO: Species at Risk in Ontario (provincial) SARA: Species at Risk Act (federal)				

Background review found 29 SAR which have historically been recorded in the Study Areas. Twenty-four species with a moderate or high likelihood of occurrence within the LSA are discussed further. The complete list of SAR and their potential to occur is provided in Appendix F of the Natural Environment Assessment Report (see **Appendix F**).

3.6.3.8.1 Endangered Species

Birds

Red-headed woodpecker (*Melanerpes erythrocephalus*) is a provincially and federally designated endangered species with a moderate likelihood of occurrence within the LSA due to suitable habitat being present.

Yellow-breasted chat (*Icteria virens virens*) is a provincially and federally endangered species and has a moderate likelihood of occurrence as suitable habitat is present within the LSA.

Mammals

Little brown myotis (*Myotis lucifugus*), tri-colored bat (*Perimyotis subflavus*), and northern myotis (*Myotis septentrionalis*) are all provincially and federally endangered species with a high likelihood of occurrence within the LSA due to the presence of suitable habitat (i.e., trees for roosting). Eastern small-footed myotis (*Myotis leibii*) is provincially endangered, not listed federally, and has a moderate likelihood of occurrence within the LSA due to suitable habitat (i.e., rocky areas for roosting) potentially being present.

Vascular Plants

American chestnut (*Castanea dentata*) is listed as endangered provincially and federally. This species has a moderate likelihood of occurrence as suitable habitat is present within the LSA; however, was not detected during any of the field investigations.

Black ash (*Fraxinus nigra*) is listed as endangered provincially and not listed federally. Protection under the ESA has been suspended until January 26, 2024, under O. Reg. 23/22 in order to document a proper approach and consultation with all parties. This species was observed by GHD in 2016 in the LSA and has a moderate likelihood of occurrence as suitable habitat is present; however, was not detected during any of the field investigations within the SSA.

Butternut (*Juglans cinerea) is a provincially and federally endangered species.* Butternut has a moderate likelihood of occurrence as suitable habitat is present within the LSA; however, was not detected during any of the field investigations.

Eastern flowering dogwood (*Cornus florida) is a provincially and federally endangered species.* Eastern flowering dogwood has a moderate likelihood of occurrence as suitable habitat is present within the LSA; however, was not detected during any of the field investigations.

3.6.3.8.2 Threatened Species

Birds

Bank swallow (*Riparia riparia*) is a provincially and federally threatened species. They have a moderate likelihood of occurrence as potentially suitable habitat is present within the LSA.

Barn swallow (*Hirundo rustica*) is a provincially and federally threatened species. Barn swallows were observed throughout the Study Areas on multiple occasions and have a high likelihood of occurrence within the Study Areas due to suitable foraging habitat.

Cerulean warbler (*Setophaga cerulea)* is a provincially threatened and federally endangered species with a moderate likelihood of occurrence within the LSA due to the presence of potentially suitable habitat.

Least bittern (*Ixobrychus exilis*) is a provincially and federally threatened species with a high likelihood of occurrence within the LSA due to the presence of suitable habitat. Least bittern was observed vocalising in the East Lands during 2014 surveys (GHD 2017).

Reptiles

Blanding's turtle (*Emydoidea blandingii*) is a provincially and federally threatened species. A Blanding's turtle was observed on Brooks Road in the vicinity of the entrance of the landfill, on June 12, 2014, during wetland delineation with GRCA (GHD 2017). This species has a high likelihood of occurrence within the LSA due to suitable habitat being present.

3.6.3.8.3 Special Concern Species

These species do not receive protection under the ESA or SARA; however, populations and habitats of ESA-listed special concern species may be considered Significant Wildlife Habitat. Impacts to these species should be avoided where possible by avoiding natural habitat features beyond the SSA.

Birds

Canada warbler (*Cardellina canadensis*) is a provincially designated special concern species, and a federally designated threatened species. Canada warbler was detected in the North Lands via the SM1 and has a high likelihood of occurrence within the LSA.

Eastern wood-pewee (*Contopus virens*) is a provincially and federally designated special concern species. Eastern wood-pewee was detected on multiple occurrences during the breeding bird surveys. This species has a high likelihood of occurrence due to suitable habitat being present within the LSA.

Wood thrush (*Hylocichla mustelina*) is a provincially designated special concern species, and a federally designated threatened species. Wood thrushes were detected on during the breeding bird surveys and SM1 audio recordings. They have a high likelihood of occurrence within the LSA due to suitable habitat being present.

Insects

Monarch (*Danaus plexippus*) is listed as special concern provincially and federally and was observed within the LSA. This species is considered to have a high likelihood of occurring as their larval foodplant, common milkweed, is present within the Study Areas.

Reptiles

Eastern ribbonsnake (*Thamnophis sauritus*) are a provincially and federally designated special concern species. *They* have a high likelihood of occurrence as suitable habitat is present within the LSA.

Midland painted turtle (*Chrysemys picta marginata*) is a federally designated special concern species and is currently under consideration for provincial designation. Midland painted turtles have a high likelihood of occurrence within the LSA as suitable habitat is present.

Eastern milksnake (*Lampropeltis triangulum*) is listed as not at risk provincially but is listed as special concern federally. Eastern milksnake was observed within the SSA and have a high likelihood of occurring within the LSA due to suitable habitat being present. Wildlife exclusion fencing has since been installed to limit the presence of wildlife within the SSA and is maintained as part of mitigation measures associated with the 2019 facility expansion (Notice of Approval EA File number 03-08-02 (Approval), issued in 2019 under the *Environmental Assessment Act*).

Northern map turtle (*Graptemys geographica)* is listed as special concern provincially and federally. This species has a high likelihood of occurring within the LSA due to suitable habitat being present.

Snapping turtle (*Chelydra serpentina)* is listed as special concern provincially and federally. A snapping turtle was observed within the LSA during 2013 field investigations (GHD 2017) and has a high likelihood of occurring within the LSA due to suitable habitat being present.

3.7 Cultural Heritage Environment

Cultural Heritage resources include archeological resources, built heritage resources, and cultural heritage landscapes.

3.7.1 Study Area

The Cultural Heritage Study Areas to be discussed in relation to the preparation of this ESR are as follows:

– **SSA**: Including all lands (i.e., 14.3 ha) within the existing, approved boundaries of the Site
– **LSA**: Including all lands and waters within a 1 km radius of the SSA boundaries including agricultural, residential, and municipal properties

3.7.2 Methodology

Available secondary sources of information were collected and reviewed to determine Heritage and Culture existing conditions within the LSA. The following sources of secondary information were collected and reviewed:

– Heritage Haldimand Designated Properties Inventory

3.7.3 Existing Conditions

3.7.3.1 Archaeological Resources

The screening checklist, Criteria for Evaluating Archeological Potential, developed by the Ministry of Citizenship and Multiculturalism, was completed as part of the Environmental Screening Report (see **Appendix G1**) determining that archeological potential within the study area is low and therefore archeological assessment was not undertaken.

3.7.3.2 Built Heritage Resources and Cultural Heritage Landscapes

Following a review of the Heritage Haldimand Designated Properties Inventory[24] it was concluded that there are no heritage properties located within the LSA. The “Criteria for Evaluating Potential for Built Heritage Resources and

[24] Heritage Haldimand, 2015. Heritage Haldimand Designated Properties. Available at: http://www.haldimandcounty.on.ca/residents.aspx?id=68

Cultural Heritage Landscapes: A Checklist for the Non-Specialist" (see **Appendix G2**) was completed and identifies the Site is within the Grand River watershed, which is a designated Canadian Heritage River watershed. There are no known heritage attributes located within the LSA. The Site has been subjected to extensive and intensive disturbance and is therefore considered to not have any potential for cultural heritage resources.

3.8 Transportation Existing Conditions

3.8.1 Study Area

The Transportation Study Areas to be discussed in relation to the preparation of this ESR are as follows:

– **SSA** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
– **LSA** – the area within the vicinity of the Site extending approximately 1 km in all directions from the SSA boundaries

Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

Transportation

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 21, 2022**

FIGURE 3.24

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Print date: 21 Oct 2022 - 13:33

Data source: Google Earth Imagery, Date: 07/08/2018

3.8.2 Methodology

3.8.2.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Transportation Study Team to determine existing Transportation conditions within the Study Areas. The following sources of secondary information were collected and reviewed in completing the 2018 Individual Environmental Assessment:

– Haldimand County Annual Average Daily Traffic (AADT) data, 2005
– Haldimand County Annual AADT data, 2011

3.8.2.2 Process Undertaken

Information on the Transportation Existing Conditions within the Study Areas was gathered from a combination of secondary source research, field investigations and discussions with Haldimand County staff.

3.8.2.3 Field Investigations

As part of the 2018 Individual Environmental Assessment, turning movement counts were conducted at the intersection of Highway 3 and Brooks Road and at the existing Brooks Road Landfill Site driveway during the weekday a.m., mid-day and p.m. peak periods and Saturday mid-day peak periods. These counts were completed on Saturday, December 5, 2015 and on Monday, December 7, 2015.

3.8.2.4 Agency Consultation

Also, as part of the 2018 Individual Environmental Assessment, discussions with Haldimand County staff took place in December 2015 to confirm AADT data.

3.8.3 Description of Traffic Existing Conditions

3.8.3.1 Road Network

The following two major roads provide access to the existing Brooks Landfill:

Highway 3 (Talbot Road) – within the vicinity of Brooks Road, Highway 3 (Talbot Road) is a two-lane road with a posted speed limit of 80 km/hour (kph). The intersection of Highway 3 and Brooks Road is stop controlled on Brooks Road with both eastbound and westbound right turn taper on Highway 3.

Brooks Road – Brooks Road is a two-lane road that extends from Highway 3(Talbot Road) in the south and terminates at Indiana Road to the north. The speed limit on this road is 50 kph. Brooks Road is paved from Highway 3 to just north of the Brooks landfill driveway access where it changes to a gravel road for the remaining length to Indiana Road.

3.8.3.2 Traffic Data

Historical AADT data was obtained from Haldimand County. The 2005 AADT on Brooks Road approximately 500 m north of Highway 3 was 144 two-way trips. In 2011 the AADT was slightly lower at 114 two-way trips. Discussions with staff confirmed that the split is approximately 50/50 between north and south volumes.

Turning movement counts were also conducted on Saturday, December 5, 2015 and on Monday, December 7, 2015 at both the intersection of Highway 3 and Brooks Road and at the existing Brooks Road Landfill Site driveway during the weekday a.m., mid-day and p.m. peak periods and Saturday mid-day peak periods. Detailed turning movement data sheets are found in Appendix A for the Transportation Assessment Report (see **Appendix H**).

3.8.3.3 2022 Base Traffic Conditions

To establish the base 2022 traffic conditions and capture any expected background growth in traffic volumes at the study area intersections, a conservative compound annual growth rate of 2.0% was adopted and utilized to forecast grow the 2015 turning movement counts to 2022. The base 2022 traffic volumes also includes the estimated 16 Site trucks per day as a result of the proposed vertical expansion approved in 2018. To provide a conservative and worst-case scenario analysis, all 16 of the daily truck trips associated with the vertical expansion were applied to each peak hour (i.e., all 16 will enter/exit the Site within each of the peak hours which results in a large over estimation of the daily traffic volumes to the Site).

The resulting 2022 weekday a.m., mid-day and p.m. peak hour as well as the Saturday peak hour volumes are summarized in **Figure 3.25**.

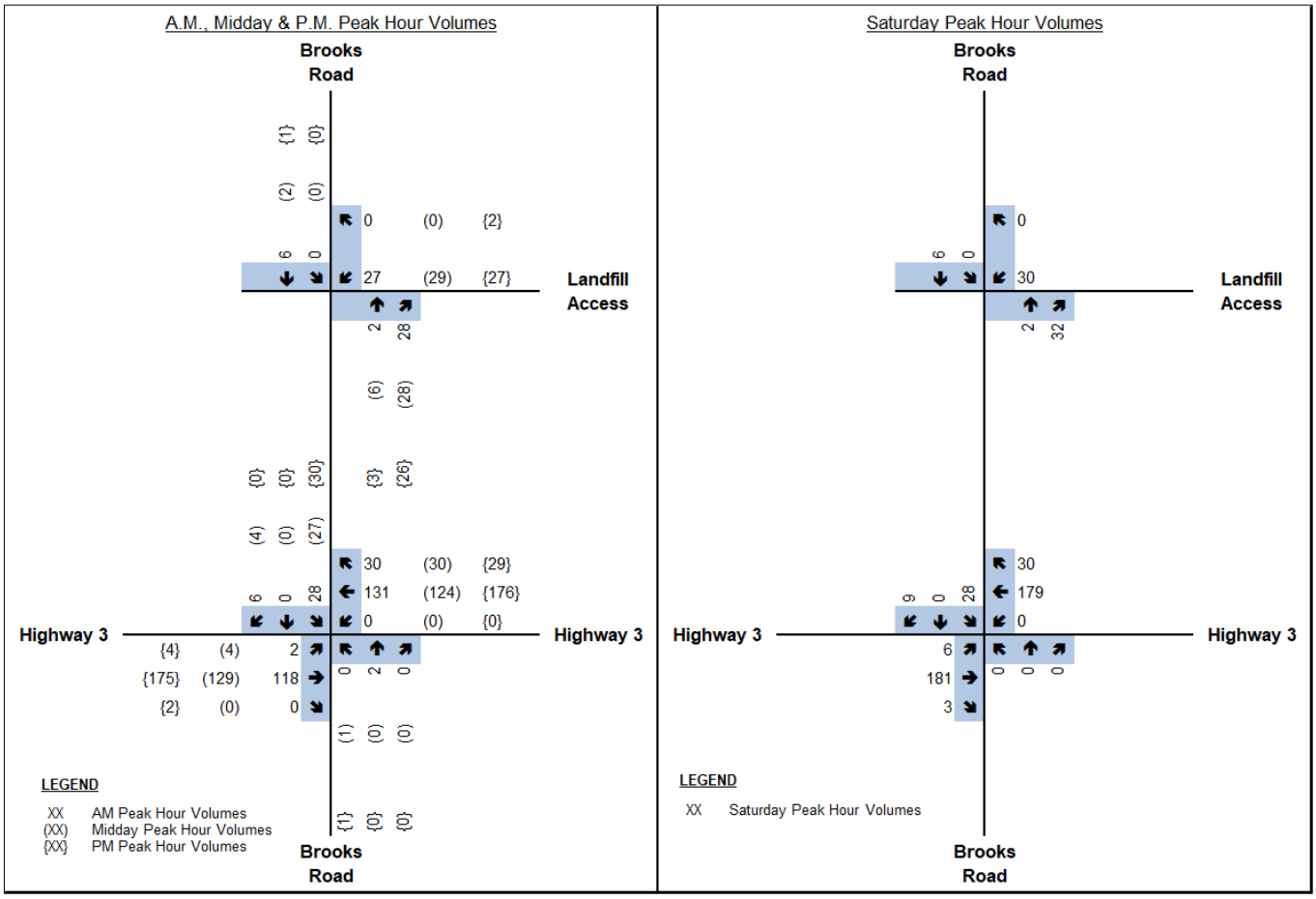


Figure 3.25 2022 Existing Peak Hour Volumes

Traffic on Brooks Road is predominately truck traffic specific to the landfill operation, traffic on Highway 3 is a mix of both commuter and truck traffic.

3.8.3.4 Landfill Operations

The Brooks Road Landfill Site is currently open and accepting waste during the week and on Saturdays. The Site currently handles 1,000 tonnes of material per day based on the following five different truck configurations:

– Walking floor – can handle 25 to 40 metric tonnes per load
– Roll-off – can handle 0.5 to 10 metric tonnes per load
– Front End – can handle 3 to 12 metric tonnes per load

– Tri-axle – can handle 14 to 22 metric tonnes per load
– Dump trailer – can handle 34 to 42 metric tonnes per load

The current maximum daily truck traffic at the landfill assuming delivery of 1,000 tonnes of material per day is 16 to 24 walking floor trucks, 2 to 4 front end trucks and 2 to 6 roll-offs for a total of 34 inbound and 34 outbound trucks plus another one or two trips for staff over the period of a day. This number can increase slightly if there are certain soil jobs on the Site as the walking floor trucks are replaced with Dump trailers and Tri-axle trucks.

The turning movement counts conducted at the Site driveway on Saturday December 5, 2015 and Monday December 7, 2015, show the following total volume of trucks entering and exiting the landfill during the peak hours:

– Weekday am peak hour – 12 inbound and 11 outbound
– Weekday mid-day peak hour – 12 inbound and 13 outbound
– Weekday pm peak hour – 10 inbound and 13 outbound
– Saturday mid-day peak hour – 16 inbound and 14 outbound

The traffic volumes confirm that the peak operating times for the landfill occur during both the weekday and Saturday mid-day peak hours when the maximum volumes of inbound and outbound traffic were observed.

Coincidentally, a review of the 2015 traffic counts confirms that the volume of inbound and outbound traffic from the landfill during the two survey dates was considerably higher than the typically expected volumes provided by the operator assuming delivery of 1,000 tonnes of material per day. It was confirmed that during the two survey dates, there was a transfer of clean clay to another property that resulted in approximately 75 additional loads throughout both days.

As a result, the analysis of the existing 2022 conditions not only includes the approved vertical expansion but also includes additional traffic that is not typical for existing operations and results in slightly reduced capacity at both the Site driveway on Brooks Road and at the intersection of Brooks Road and Highway 3.

3.8.3.5 Capacity Analysis

As a measure of the existing capacity on the adjacent road network surrounding the Brooks Landfill, both the Site access on Brooks Road and the stop-controlled intersection of Brooks Road and Highway 3 were analyzed using the projected 2022 turning movement volumes for the weekday am, mid-day, pm and Saturday peak hours (see **Table 3.10**). A summary of the capacity analysis using Synchro version 10 is summarized in the following table with detailed reports provided in Appendix A of the Transportation Assessment Report (**Appendix H**).

Table 3.10 Existing Capacity Analysis

Intersection	Movement v/c ratio (LOS) delay			
	A.M. Peak	Mid-Day Peak	P.M. Peak	Sat Peak
Brooks Road and Landfill access	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec
Brooks Road and Highway 3	EBTLR = 0 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS B 11 Sec SBTLR = 0.05 LOS B 10 Sec	EBTLR = 0 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS B 11 Sec SBTLR = 0.05 LOS B 11 Sec	EBTLR = 0 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS B 12 Sec SBTLR = 0.06 LOS B 12 Sec	EBTLR = 0.01 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS A 0 Sec SBTLR = 0.07 LOS B 12 Sec

The turning movements at both study intersections currently operate with levels of service 'B' or better during the weekday am, mid-day, pm and Saturday mid-day peak hours.

The analysis of existing conditions confirms no current capacity constraints at either study intersection despite the higher than normal traffic volumes captured during the survey of existing traffic volumes as a result of the movement of clean clay off-Site.

3.8.3.6 Safety Analysis

Collision Analysis

A review of available data shows that there is no indication that either Highway 3 in the vicinity of Brooks Road, or Brooks Road north to the Site has experienced significantly higher collision frequency than the historical average accident rate along Highway 3 in Haldimand County.

Sight Line Analysis

The Site entrance in its current location satisfies the sight distance requirements for trucks approaching and departing from the Site. Brooks Road is fairly straight with little deviation in the horizontal or vertical alignment. Existing sight distances are in excess of 350 metres both to the north and south of the driveway access which exceeds the required sight distance based on TACC standard of 85 m for stopping sight distance which for a posted speed limit of 50 kph (60 kph design speed).

4. Potential Environmental Effects, Mitigation Measures, and Net Environmental Effects

This section documents the potential effects on the environment, mitigation measures and net environmental effects for each technical disciplines resulting from the proposed landfill expansion. In addition, any future monitoring requirements to be implemented for each discipline are also described.

4.1 Methodology

A project description, based on the Design and Operation Report, was prepared so that potential environmental effects and mitigation measures could be identified. The Site Layout Plan is provided in **Figure 1.2** and the following is a general summary of the proposed undertaking.

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final Site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This will be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch will be required to accommodate the proposed changes to the final Site contours. The former railway property will continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in **Table 4.1**.

Table 4.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted north by 30 m. East and west ditches will extend north to maintain full perimeter ditch.
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Surface Water

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2.0** of this report.

The assessment of effects was achieved by conducting a hydrologic modelling of predicted effects of the landfill on surface water based on the proposed expansion scenario. The existing computer model PCSWMM 2012 Version 5.0.022 was updated to complete a hydrologic analysis to estimate changes in peak flows and runoff volumes from the Site under various storm event conditions for the proposed vertical expansion. Distinct design storm hyetographs were created in PCSWMM, based on the Environment Canada's Rainfall Intensity Duration Frequency

(IDF) Values for the Hamilton Airport. The 2, 5, 10, 25, 50, and 100-year 24- hour, SCS Type 2 distribution, storm events were considered in the hydrologic modelling to provide a design basis for on Site SWM features (quantity control).

The stormwater management system for the Site was designed to provide water quality and water quantity control of surface water runoff. Water quality treatment is provided through extended detention of the 4-hour duration 25 mm storm event. The SWM pond is designed to provide water quantity control for all storm events up to the 100-year storm, via attenuation of peak flows to below the Pre-Development Condition. Estimated runoff from the Regional Storm (Hurricane Hazel) has been assessed to demonstrate an ability to safely convey flow to downstream receivers.

At minimum, internal drainage ditches were sized to accommodate the peak flow generated from the 3-hour duration 25-year storm, as required by the MECP Guidelines.

The effects of the proposed landfill expansion on surface water is forecasted to be minimal based on the minor changes in contributing drainage areas in SSA.

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a “Yes” answer was given in the Screening Criteria Checklist) for those Surface Water criteria which might be affected by the project as identified in **Section 2.0**. The effects assessment describes how existing environmental conditions in the Study Area(s) will change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2.0**, a “Yes” was applied to the following Surface Water criteria:

Might the Project:

– *Cause negative effects on surface water quality, quantities, or flow?*
– *Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?*

With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.2.1 Surface Water Potential Effects

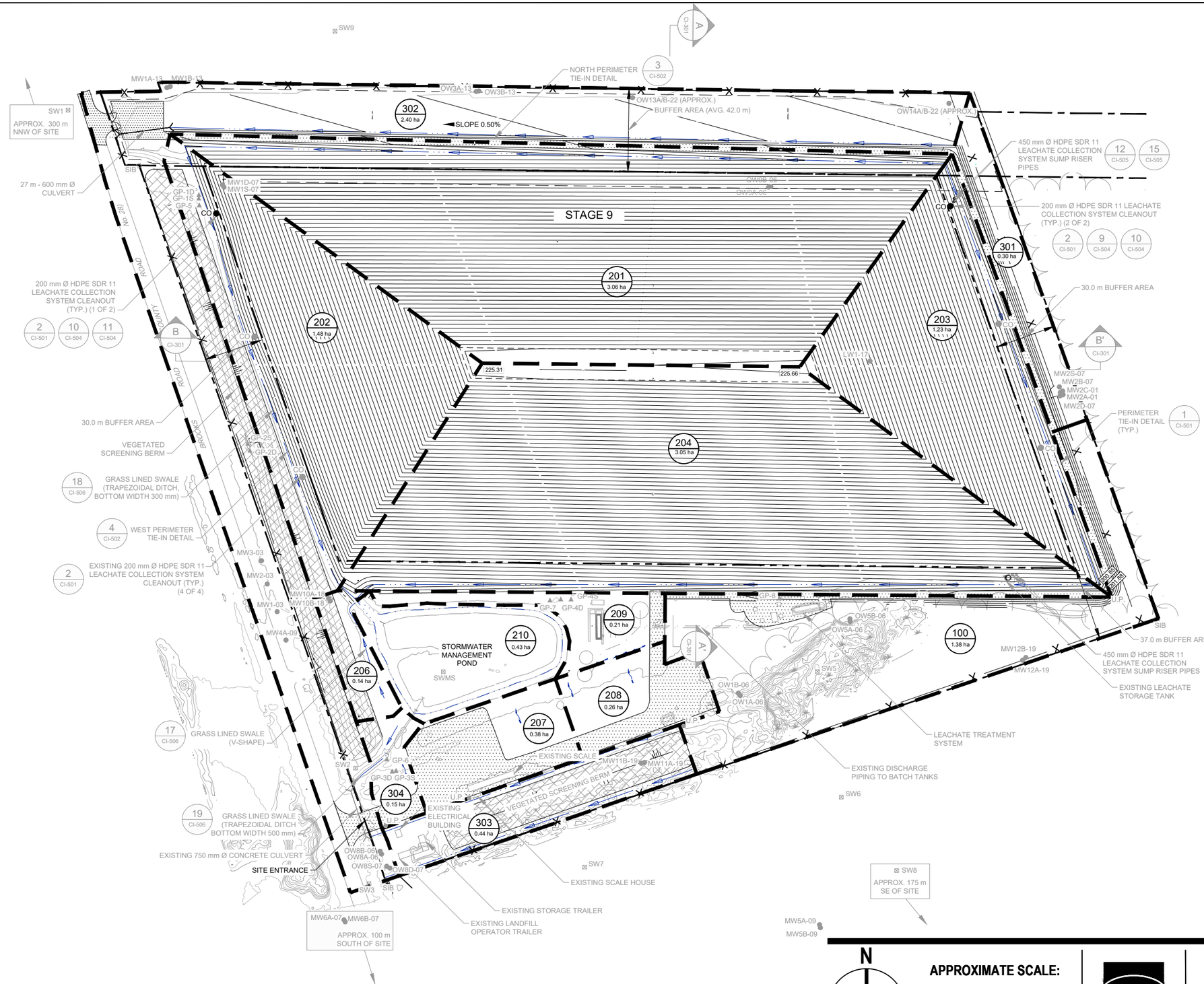
The proposed landfill expansion will result in changes to the existing landfill footprint, , final contours, and on-Site operations especially towards the northern side of the Site. These changes may cause negative effects on the following with respect to surface water:

– Surface water quality: minor erosion/soil loss due to slope transition from the proposed milder slope to the existing approved steep landfill slopes. Based on the Universal Soil Loss Equation (USLE), an increased slope will lead to increased soil loss due to erosion. The increase in soil loss will be minor as slope is only one of numerous factors that affect soil loss. The erosion will show up in stormwater runoff as slightly increased concentrations of Total Suspended Solids (TSS) and TSS related pollutants (e.g., metals entrained in the soil).
– Surface water quantity: similar runoff peak flows and volumes to existing landfill are expected. Based on hydrologic modelling completed in the SWM Plan report, there is no significant increase in runoff peak flow rates or volumes for the existing landfill slopes compared to the approved final closure conditions. Although the modelling was performed on the design for the existing condition, it is expected that the results for the proposed expansion will be similar.

The revised drainage areas are presented on **Figure 4.1** and a summary of the subcatchment parameters for contributing drainage areas to the SWM pond is presented in **Table 4.2** below:

Table 4.2 Proposed Subcatchment Parameters for Contributing Drainage Areas to SWM Pond

Catchment ID	Area (ha)	Slope (%)	Imperviousness Area (%)	Imperviousness Area (ha)	SCS Curve Number
201	3.06	25	5	0.15	73
202	1.48	25	7	0.10	74
203	1.23	25	5	0.06	72
204	3.05	25	8	0.24	73
206	0.14	2	5	0.01	72
207	0.38	2	95	0.36	98
208	0.26	2	95	0.25	98
209	0.21	2	5	0.01	72
210	0.43	10	100	0.43	98
Total	10.24				



LEGEND:

- 201 / 3.00 ha — CATCHMENT ID/AREA
- CATCHMENT BOUNDARY
- 192.0 — TOP OF FINAL COVER CONTOUR (1.0 m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5 m INTERVAL (m AMSL))
- 202 — EXISTING CONTOUR (2.0 m INTERVAL)
- EXISTING CONTOUR (1.0 m INTERVAL)
- PROPERTY LINE
- FENCE LINE
- EXISTING CLAY STOCKPILE AREA
- DRAINAGE DITCH
- EXISTING FORCEMAIN
- PROPOSED LIMIT OF WASTE
- EXISTING LOW AREA
- GRANULAR SURFACE / ACCESS ROADS
- SCREENING BERM
- EXISTING TREELINE
- OW1B-06 — EXISTING OBSERVATION WELL
- MW2A-01 — EXISTING MONITORING WELL
- CO — EXISTING CLEANOUT
- CO — CLEANOUT
- SW6 — EXISTING SURFACE WATER MONITORING LOCATION
- GP-3S — EXISTING GAS PROBE
- U.P. — EXISTING UTILITY POLE
- LW1-17 — EXISTING LEACHATE WELL
- EXISTING CULVERT
- CULVERT
- EXISTING DOUBLE GATE
- EXISTING SINGLE GATE
- S.I.B. — EXISTING STANDARD IRON BAR
- DOUBLE GATE

N

APPROXIMATE SCALE:

0 200 400 600m

GHD

BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

PROPOSED CONDITIONS CATCHMENT DELINEATION

Project No. **12561524**
Date **NOVEMBER 2023**

FIGURE 4.1

Filename: N:\CA\Waterloo\Projects\662\12561524\Workshare\SWM_Assessment\CAD\Prop\Figure 4.2\12561524-GHD-00-00-CGP-CI-003.dwg
Plot Date: 14 November 2023 12:16 PM

4.2.2 Surface Water Mitigation Measures

Mitigation measures such as SWM controls are provided within the Site to convey surface runoff and provide sufficient water quality storage prior to discharge off-Site. These control measures will help to attenuate peak discharge for water quantity and meet the water quality requirement in accordance with the MECP Planning and Design Manual 2003 (SWMP Manual). Also, best management practices such as good vegetative coverage will be established on the final cover of the landfill to reduce erosion and maintain existing hydrologic conditions.

The existing stormwater controls within SSA include drainage ditches and the SWM pond which are summarized in subsequent sections.

4.2.2.1 Drainage Ditch

The existing drainage ditches on Site have a maximum depth of 1 m with side slopes of 4H:1V on landfill side and 3H:1V on the perimeter access roadside of the ditches. Surface runoff is conveyed from the final cover and access road to the SWM pond. The ditches were designed with sufficient capacity to convey flow in excess of that generated by the 100-year or Regional storm.

4.2.2.2 SWM Pond

The existing SWM pond has a maximum permanent pool depth of 0.6 m, 4H:1V side slopes, and a berm in the midsection of the pond that will create an extended flow path, which will allow for additional settling of suspended solids. Surface water runoff volumes up to the 5-year storm event will be discharged via the riser pipe outlet. The outlet structure provides 24 hours of extended detention for the 25 millimetre (mm) storm event runoff volume.

In the case of water quality concern (i.e., spill) within the Site, the riser pipe outlet is equipped with a sluice gate which can be closed to contain the impacted water and temporarily prevent discharge from the pond up to a 5-year storm event. The waters will be tested and disposed in accordance with the applicable guidelines and via appropriate means and methods.

The SWM pond with a permanent pool volume of 1,266 m^3 and a total live storage volume in excess of 5,502 m^3 has sufficient capacity to detain the runoff from all storm events up to and including the Regional storm event.

4.2.3 Surface Water Net Environmental Effects

This section documents the net effects assessment for the Brooks Road Landfill Site Expansion Screening from a Surface Water Resources perspective. The net effect analysis is based on the following assumptions:

- The final cover will be vegetated and no pollutants of any kind (i.e., pesticides, herbicides, fertilizers) will be applied to the final cover once it has been fully vegetated.
- Only areas on the final cover and access roads to the north are changing, no other area of the landfill will change slopes or have its drainage significantly re-configured in any way.
- No surface water will ever come in contact with waste. Any surface water that infiltrates through the final cover will be captured by the leachate collection system and treated.
- There will be no leachate seeps or exchange of surface water and leachate.

The proposed expansion of the landfill will increase the imperviousness percent of the contributing drainage areas to the SWM pond by less than 2 percent, and expanded areas will maintain equal precent impervious area as the existing condition with a good vegetative coverage. The design capacity and storage volume for the existing drainage ditches and SWM pond respectively, exceeds the MECP requirements for Enhanced level protection. Therefore, the SWM pond as designed will mitigate all water quality and quantity effects leading to minimal impact to surface water on Site.

Hydrologic modelling results including comparison tables and output files for the existing approved and vertical expansion proposed condition are provided in the Surface Water Assessment Report (see **Appendix A**).

4.2.4 Surface Water Monitoring Requirements

As specified in the Landfill and Industrial Sewage ECAs, the monitoring requirements for the Site includes the following:

– Quarterly grab samples from the monitoring locations,
– Laboratory analysis of grab samples, and
– Annual monitoring reports.

4.3 Geology & Hydrogeology

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that are based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2.0** of this report.

The assessment of effects was carried out by modelling the predicted effects of the landfill on the hydrogeologic regime under the scenario of the proposed expansion. The modelling took into consideration the existing conditions at the Site, the known hydrogeologic characteristics, as documented extensively in previous reports (including the most recent annual monitoring reports), and the proposed modifications to the Site design. Modelling was undertaken to estimate the quantitative and qualitative effects on the local hydrogeologic regime resulting from the lateral expansion of the waste footprint and landfilling of additional waste. The modelling takes into consideration the proposed design, including final cover, the liner system and the leachate collection system. The modelling considered scenarios that included worst-case mass loading to the underlying hydrogeologic regime (i.e., used maximum measured concentrations in leachate between 2017-2021 and considers the period when landfilling is near final capacity and maximum leachate generation volumes were reached).

Modelling included two scenarios. The first scenario involved 6 m of leachate mounding over the composite liner for 50 years, followed by complete failure of the HDPE liner. In this scenario, the leachate collection system and the HDPE liner were modelled with a service life of 50 years in order to maintain consistency with the previously modelled failure scenario. Following the 50 year service period, the HDPE liner was removed from the liner system and the leachate head was maintained at 6 m above the base of the collection system. The second scenario modelled the effect of 6 m of head on the liner system with the HDPE liner entirely absent for the duration of the model.

Appendix A of the Geology & Hydrogeology Assessment Report includes a report entitled Hydrogeologic Assessment – Landfill Expansion, Brooks Road Landfill (GHD, 2022) (Hydrogeologic Assessment Report). This report provides a full description of the hydrogeologic assessment of the proposed landfill expansion design, including descriptions of the methodology, existing conditions and predicted results of the expansion modelling. The results of the modelling demonstrate that the Site design features are sufficiently protective of the local hydrogeologic regime. The results of modelling indicate that concentrations of contaminants of concern entering the basal till aquifer will be reduced by an average factor of 4 prior to off-Site migration.

Groundwater quality is forecasted to be acceptable at the downgradient boundary with respect to the Ontario Drinking Water Standards (ODWS) and Site-specific Reasonable Use Concept (RUC) criteria.

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a “Yes” answer was given in the Screening Criteria Checklist) for those geology and hydrogeology criteria which might be affected by the project as identified in **Section 2.0**. The effects assessment describes how existing environmental conditions in the Study Areas will change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2.0**, a “Yes” was applied to the following geology and hydrogeology criteria:

Might the Project:

– *Cause negative effects on groundwater quality, quantity, or movement?*

– *Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?*

With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.3.1 Geology & Hydrogeology Potential Effects

The potential effects on the geology and hydrogeology environment are related primarily to the release of waste-related contaminants into the subsurface hydrogeologic regime. This release will occur as a result of leachate generated within the waste mound exiting the landfilled waste mass through the bottom or sides of the landfill and migrating into the shallow water table aquifer or the basal till/bedrock aquifer. Leachate-related impacts could travel downward from within the waste mass until reaching the basal till/bedrock aquifer. Once entering this aquifer, the impacts will travel laterally as advective flow in the direction of the natural horizontal hydraulic gradient (to the south).

4.3.2 Geology & Hydrogeology Mitigation Measures

The mitigation measures implemented into the design to reduce or eliminate the potential effects on the geology and hydrogeology environment include:

1. The final cover
2. The leachate collection system
3. The liner system

In addition to these engineered controls, the Site is also situated within a fine-grained (clay-rich) stratigraphic sequence with significant vertical thickness. This natural feature provides additional protection of the underlying aquifer as well as some beneficial attenuation capacity.

Section 6 of the Hydrogeologic Assessment Report provides a fulsome description of the modelling inputs, which includes the relevant design elements of engineered controls and the natural geologic setting. These elements in combination represent the measures which mitigate the potential effects of the proposed landfill expansion.

4.3.3 Geology & Hydrogeology Net Effects

The net effects of the proposed landfill expansion on geology and hydrogeology are those anticipated remaining effects after mitigation measures are applied. Accordingly, the results of the predictive modelling undertaken to estimate the magnitude of groundwater alteration resulting from the Project represent the net effects.

Section 6.5.3 of the Hydrogeologic Assessment Report describes the results of the predictive modelling. The primary receptor of concern with respect to the net effects is groundwater quality within the basal till/bedrock aquifer at the downgradient Site boundary. As described in Section 6.5.3 of the Hydrogeologic Assessment Report, water quality at the downgradient Site boundary within the basal till/bedrock aquifer is predicted to meet ODWS and Site-specific RUC criteria even at peak concentrations under the scenario of leachate collection system failure. On the basis of this predictive modelling, the proposed expansion is expected to result in only negligible or insignificant alterations to the geology and hydrogeology environment.

4.3.4 Geology & Hydrogeology Monitoring Requirements

A comprehensive leachate and groundwater monitoring program (water levels and quality) is proposed. This proposed program includes a trigger level and contingency implementation plan in order to supplement the routine program and

ensure appropriate responses are implemented in the event that water quality results indicate that an undesirable effect on groundwater quality is imminent.

The proposed routine monitoring program and trigger level and contingency implementation plan are outlined in detail in Section 7 of the Hydrogeologic Assessment Report.

4.4 Land Use & Socio-Economic

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2.0** of this report.

The land use and socio-economic existing conditions characterized for each criterion identified in the Screening Criteria Checklist were assessed taking into consideration the project description and Site Plan in order to identify potential effects that may result from the proposed undertaking. Following the determination of potential effects, measures required to mitigate any potential effects were developed and the resulting net effects (with the application of mitigation measures) were determined.

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a “Yes” answer was given in the Screening Criteria Checklist) for those Land Use criteria which might be affected by the project as identified in **Section 2.0**. The effects assessment describes how existing environmental conditions in the Study Area(s) will change as a result of the construction and operation of the proposed undertaking.

As described in Section 2.0, a “Yes” was applied to the following Land Use & Socio-Economic Criteria:

Might the Project:

– *Use hazard lands or unstable lands subject to erosion?*
– *Result in aesthetics impacts (e.g., visual and litter impacts)?*
– *Cause negative effects related to traffic?*
– *Be located within 8 km of an aerodrome/airport reference point?*

4.4.1 Land Use & Socio-Economic Potential Effects

The proposed undertaking is compatible with planning and by-law documents for the area and will continue to be consistent with the Provincial Policy Statement. Operation of the landfill will not affect land uses within 500 m as all operations will take place within the Site boundaries. BMPs will be implemented by BRE to manage nuisance related effects during construction and operation.

The proposed expansion mayrequire the use of hazard lands or lands subject to erosion such as GRCA-regulated lands. On-site operations may cause potential negative effects on the geology and hydrogeology as well as on the natural habitat and wildlife in this area.

As identified in the Screening Criteria Checklist and Section 3.3.3.5 above, portions of the SSA, Site Vicinity Study Area, and LSA are GRCA regulated areas and zoned as Wetland. The proposed expansion will require GRCA permit to expand within the regulated lands.

As identified in Section 2, there are no potential effects anticipated to neighborhood or community character as the Site of the proposed expansion is located within an area currently zoned as Disposal Industrial. No negative effects on local businesses, institutions, or public facilities are anticipated. There will be no negative impacts on recreation, cottaging, and tourism as there are no recreational lands designated in the SSA and LSA. There will be no increase in the demand for community services and/or infrastructure as a result of the proposed expansion and no change in the economic base of the surrounding community, local employment, or labour supply.

The proposed undertaking is a horizontal and vertical expansion of the existing landfill and will cause an increase in the landfill height and may cause negative visual and aesthetic impact in absence of mitigation measures. However, this will not exceed currently approved peak contours and can be mitigated.

The results of the Transportation Assessment Report (see **Appendix H**) conducted as part of this Environmental Screening Process concluded that the truck traffic associated with the proposed capacity expansion will not contribute any additional traffic within the study area due to maintaining the maximum approved fill rates. With no additional traffic being generated by the Site, minimal impact is expected to traffic safety, and traffic operations. No potential road improvements are required or recommended.

Three local airfields, Cayuga (Bruce Field) Airport, Cayuga East Airport, and Grand River Executive (York) Airport, are located within 8 km of the Site. However, the proposed expansion will not cause negative impacts to the airports and will not interfere with the flight paths as no tall structures, such as stacks, exist or are proposed at the Site.

4.4.2 Land Use & Socio-Economic Mitigation Measures

Potential negative effects on the natural environment and wildlife will be mitigated through BMPs such as the final cover system, leachate collection system, and liner system. In addition to these engineered controls, the Site is also situated within a fine grained (clay rich) stratigraphic sequence with significant vertical thickness. This natural feature provides additional protection of the underlying aquifer as well as some beneficial attenuation capacity. A silt fence is also installed in areas of possible sediment migration.

Detailed mitigation measures are outlined in the Natural Environment Assessment Report (see Appendix B) and Geology and Hydrogeology Assessment Report (see Appendix B)..

With no additional truck traffic generated by the proposed capacity expansion, no mitigation measures are recommended in order to avoid or minimize impacts on transportation.

There is a wire fence around the perimeter of the site. The western part of the existing Site located on Books Road has a visual berm which includes a chain link fence with visual screen as mitigation to visual impact, providing a visual barrier to passersby. The visual screen will be augmented in response to the increased landfill height as a visual and aesthetic mitigation measure.

4.4.3 Land Use & Socio-Economic Net Environmental Effects

Potential negative environmental effects during construction related to dust, odour, noise, and traffic will be mitigated through the use of best management practices.

The results of the Land Use and Socio-Economic Assessment indicate that there will be a change to the current visual scenario as a result of the proposed expansion. However, this can be mitigated by increasing the height of the existing visual screen, vegetating the screening berm and/or introducing additional plantings on the Site. This would minimize views of the Site from surrounding areas.

4.5 Air Quality

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2** of this report.

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a “Yes” answer was given in the Screening Criteria Checklist) for those Air Quality criteria which might be affected by the project as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Areas will change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2**, a “Yes” was applied to the following geology and hydrogeology criteria:

Might the Project:

- *Cause negative effects on air quality due to emissions (for parameters such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other contaminants)?*
- *Cause negative effects from the emission of greenhouse gases (e.g., carbon dioxide, carbon monoxide, methane)?*
- *Cause negative effects from the emission of dust or odour?*

With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.5.1 Air Quality Potential Effects

4.5.1.1 Potential Odour Effects

Ontario does not have an odour standard. However, a value of one odour unit (OU) is sometimes used by the MECP as a limit for odour impacts at sensitive receptors such as residences. Based on the existing conditions odour studies, it has been shown that the frequency of exceedances of the odour levels at the nearest sensitive receptors will not exceed than 0.5% for any modelled year.

As discussed previously, the estimated landfill gas production for the Site is extremely small and is not expected to result in any off-Site odour impacts.

Additionally, GHD conducted numerous odour analyses in 2014, 2016, 2017, 2019 and 2022, and concluded that there were high on-Site odour levels near the leachate tank and the working face in the earlier studies but were lower in the 2019 studies after the installation of the leachate treatment system. Odours at the concentration currently observed at the Site typically do not result in complaints at off-Site sensitive receptor locations. This has been investigated through numerous odour monitoring programs that did not identify any on-Site odours being observed at off-Site locations.

Lastly, the Site currently implements several operational measures in order to reduce and/or mitigate odour impacts from the Site and will continue to implement these operational measures. These include:

- Continuing with the daily odour monitoring program carried out by the Site Operator.
- If odours are evident on the property boundary, increase the amount of daily cover applied on the waste.
- Minimize the active working face. Apply interim cover at a minimum thickness of 300 mm on areas of the landfill where landfilling has ceased for 6 months or more.
- Continue with the use of odour control granules for odour mitigation. Assess areas of placement and their effect on odour mitigation.

4.5.1.2 Potential Air Quality Effects

The air contaminant of concern for this Site is particulate matter. Other air contaminants are expected to be insignificant. As previously discussed, potential tailpipe and brake and tire wear emissions from vehicles operating at the landfill are insignificant. Also, the estimated landfill gas production of only 297 m^3/hour (175 cubic feet per minute) confirms that any potential off-Site impacts of compounds in the gas, such as methane, will be insignificant.

Particulate is primarily produced by vehicle traffic on the landfill roads. The particulate matter that is of concern is based on the re-suspension of particulate matter from traffic on the roads. The tailpipe and brake and tire wear has been determined to be insignificant sources of particulate matter. The Ontario ambient air quality criterion for TSP is

120 µg/m^3 on a 24-hour basis. There are other particulate provincial and federal criteria for PM_{10} and $PM_{2.5}$. These particulate emissions will also occur from vehicle traffic on the landfill roads.

It is GHD's experience that if one can show compliance with the TSP standard, a site with road traffic being the major source, then the PM_{10} and $PM_{2.5}$ concentrations will also be below criteria.

However, for completeness, GHD has modeled the TSP, PM_{10} and $PM_{2.5}$ emissions in the assessment of the alternatives.

The TSP, PM_{10} and $PM_{2.5}$ emissions from the on-Site roads were estimated based on truck traffic and emissions factors from the United States Environmental Protection Agency (USEPA).

Particulate off-Site concentrations were estimated using the AERMOD air dispersion model which is an approved dispersion model under O. Reg. 419/05. The AERMOD model incorporates five years of meteorological data to determine the worst-case air concentration. Therefore, the modeling results can be considered to be conservative.

The on-Site haul roads were previously modelled for 50 trucks per day. This is the same amount of daily trucks proposed in this amendment. The Site has paved the on-Site roadway from the Site entrance to the landfill as was identified in the previous study.

TSP, PM_{10} and $PM_{2.5}$ from the Site were previously evaluated at the property boundary and all residential dwellings. The predicted worst case particulate impact at the property boundary is as follows:

– TSP – 50 trucks per day – 122.4 µg/m^3
– PM10 – 50 trucks per day – 64.18 µg/m^3
– PM2.5 – 50 trucks per day – 8.8 µg/m^3

The predicted maximum worst case particulate impact at the sensitive receptors is as follows:

– TSP – 50 trucks per day – 5.78 µg/m^3
– PM10 – 50 trucks per day – 4.56 µg/m^3
– PM2.5 – 50 trucks per day – 0.61 µg/m^3

MECP AAQC for TSP is 120 µg/m^3, 50 µg/m^3 for PM_{10}, and 27 µg/m^3 for $PM_{2.5}$. The modelled concentration at the sensitive receptors are well below the MECP AAQC for all particulate matter fractions. The modelled concentration at the property boundary is right at the AAQC for TSP and PM10 and the concentration of PM2.5 remains well below the MECP AAQC. There have been no changes to the modelled impacts from the previous application.

4.5.1.3 Climate Change Assessment

The existing landfill operations had an estimated greenhouse gas (GHG) emissions of approximately 15,000 tonnes of CO2equivalents (CO2e) in 2023. With the current landfill approval, the GHG emissions are estimated to reach about 20,000 tonnes CO2e. With the proposed Stage 9 expansion, the GHG emissions are projected to be approximately 22,600 tonnes CO2e. This amounts to an increase in GHG emissions of about 2,600 tonnes CO2e relative to the current landfill's estimated maximum GHG emissions.

Ontario's 2021 GHG emissions were reported to be 150.6 million tonnes CO2e and Ontario's goal is to reach 144 million tonnes CO2e by 2030. The projected increase in CO2e emissions as a result of the Brook Road Landfill expansion (2,600 tonnes) is only 0.002% of Ontario's 2030 GHG emissions target. Therefore, the Brooks Road Landfill GHG emissions can be considered insignificant relative to Ontario's total GHG emissions.

4.5.2 Air Quality Mitigation Measures

The Site has completed numerous mitigation measures since the previous application such as the introduction of SOPs for odour and dust and operation of a leachate treatment system. The Air Quality and Odour were assessed for the proposed conditions in the previous assessment and the identified mitigation measures were implemented. The Site is committed to continuing the mitigation measures.

Construction operations during the expansion may impact TSP emissions from the site. A dust management plan will be developed during the construction period to mitigate these emissions.

4.5.3 Air Quality Net Effects

No change to the net effects from the existing landfill operation are anticipated as a result of the proposed capacity change, based on the continued implementation of the mitigation measures.

4.5.4 Air Quality Monitoring Requirement

There are no additional monitoring requirements at this time.

4.6 Noise

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2** of this report.

Steady State Sound Level Impact Assessment

The worst-case assessment of steady-state noise sources at the selected points-of-reception was based on measured sound pressure levels. CADNA A version 2023 was used to model the potential impacts of the significant noise sources. CADNA A calculates sound level emissions based on the ISO 9613-2 standard “Noises – Attenuation of Sound during Propagation Outdoors”.

The worst-case cumulative Facility-wide attenuated sound levels estimated at the receptor(s) included attenuation affects due to geometric divergence, atmospheric attenuation, barriers/berms, ground absorption and directivity, as applicable for all significant noise sources. Off-Site buildings were input as intervening structures.

Future Landfill Operation Sound Levels

In order to consider future compliance of noise levels from the Site, an evaluation was carried out on the on the predicted sound levels that will be associated with the proposed capacity increase. The criteria for landfilling-related sound levels are established in the MECP guidelines for Site[25], and are as follows:

– 55 dBA for daytime operations (7 am to 7 pm)
– 45 dBA for nighttime operations (7 pm to 7 am)

The assessment considered the potential changes in existing truck traffic routes on-Site and on the haul route to support the proposed capacity increase.

These noise sources are input into an industry standard Noise model that includes all significant on-Site structures (buildings, equipment, storage tanks and silos). CADNA A version 2023 is based on the ISO 9613-2 standard “Noises – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation.” The CADNA A model is the industry standard for environmental noise modeling in Ontario.

The worst-case cumulative Site-wide sound levels estimated at the receptor(s) included attenuation effects due to geometric divergence, atmospheric attenuation, barriers/berms, ground absorption and directivity, as applicable significant noise sources at off-Site buildings were input into the model as intervening structures.

In order to predict the future worst-case noise impacts from the Project activities, representative octave band noise data was used, measured from construction/processing equipment similar to what is noted to be required for the Project. This data was obtained from the United Kingdom’s Department of Environment Food and Rural Affairs

[25] MECP’s NPC-300 “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning,” October 2013.

(DEFRA) Update of Noise Database for Prediction of Noise on Construction and Open Sites, 2005 and 2006 (common source used globally). The United States Department of Transportation, Federal Highway Administration (FHWA) document FHWA Roadway Construction Noise Model User's Guide, 2006 was used as a supplemental document to obtain sound level data for equipment not listed by DEFRA.

Final (near closure) landfill topography was selected to evaluate the worst-case noise impact exposure for off-Site residences based on the final vertical expansion. The final landfill topography elevates the source height and documents the worst-case position of the noise sources relative to the off-Site receivers based on line-of-sight. Representative noise specifications were used for all mobile equipment such as trucks and bulldozers and applied to the on-Site travel routes based on the cell development design concept.

Landfill activities and supporting equipment are compared directly against a daytime one-hour Leq sound level limit of 55 dBA for landfill operations for all PORs.

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a "Yes" answer was given in the Screening Criteria Checklist) for those Noise criteria which might be affected by the project as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Area(s) will change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2**, a "Yes" was applied to the following Noise criteria:

Might the Project:

– *Cause negative effects from the emission of noise?*

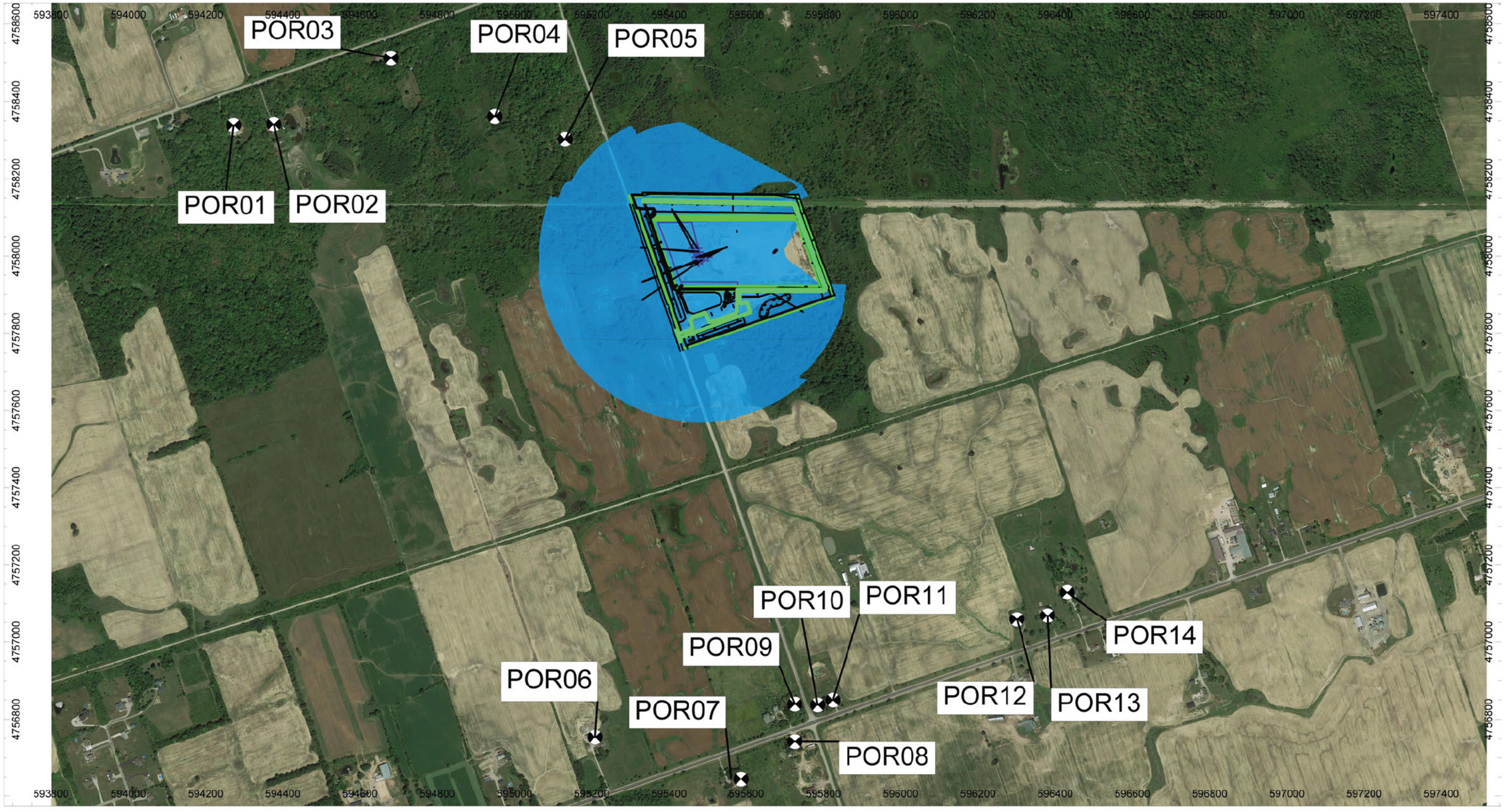
With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.6.1 Noise Potential Effects

The proposed capacity increase will result in noise emissions associated with truck movements to/from the Site and on-Site landfill equipment requirements. Fourteen off-Site residential dwellings will be potentially impacted from the existing Landfill activities. The predicted noise impact range is 42 to 53 dBA (rounded). POR5 is the most impacted at 53 dBA. All residential dwellings are below the 55 dBA noise limit.

From a potential noise impact exposure perspective, the future conditions for additional capacity are near identical and the only difference is the potential for truck traffic on the haul route up to 16 trucks per hour during daytime operations only and the elevated height of the tracked vehicles at the worst-case elevation when approaching cell closure.

Noise contours for the proposed Future Conditions are presented on **Figure 4.2**.



Source: Google Satellite

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GHD

ACOUSTIC ASSESSMENT REPORT
BROOKS ROAD ENVIRONMENTAL
160 BROOKS ROAD, CAGUYA, ONTARIO

NOISE CONTOUR PLOT - STATIONARY SOURCES, DAY

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FIGURE 4.2

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Workshare\Noise\Model\12561524-Model.cna

4.6.2 Noise Mitigation Measures

Based on the description of the proposed capacity increase provided in **Section 1** and the characterization of Noise Existing Conditions within the Study Areas described in **Section 3**, there are no mitigation measures recommended to be incorporated into the future conditions designs in order to avoid or minimize impacts from Noise. Mitigation measures are not required because the predicted off-Site noise impact meets the applicable 55 dBA regulatory noise limit.

As all residential dwellings are below the 55 dBA noise limit, no specific mitigation measures are required. The implementation of BMPs, as recommended in the Vertical Capacity Expansion EA such as barriers and/or berms at Landfill perimeter and administrative controls that limit on-Site landfilling activities will serve to minimize noise impacts from the Site.

The Site also has a Noise BMP Plan (BMPP) that Facility staff adhere to which was developed in January 2021. The BMPP details the following recommended activities to minimize noise emissions on Site:

4.6.2.1 Equipment Inspection and Maintenance Procedures

As a minimum, the following activities or events shall be inspected and recorded in the inspection logs:

- Monthly inspection of haul routes and roadways will be carried out and maintenance will be performed within 1 month or as soon as conditions will allow
- Unpaved roads and regularly travelled portions of the Site will be re-graded as required
- All on-Site BRE and contractor heavy mobile equipment is to be inspected before first use and annually afterwards to comply with NPC-115 equipment guidelines
- All heavy mobile equipment shall be kept in good working order and fitted with working mufflers if required. Effective Noise control depends on machinery being in good condition and fitted with working mufflers

4.6.2.2 Best Practices and Control Measures for Landfilling Activities

Landfill operators, machine operators and contractors are recommended to review and follow the practices and controls as outlined below:

- All heavy mobile equipment activities will be limited to daytime hours (07:00 to 19:00 hours).
- All heavy mobile equipment shall be kept in good working order as deterioration may increase equipment sound levels.
- Vehicle movements are recommended to stay within movements areas and reduce the use of back-up alarms, where practical. This should coincide with safety considerations.
- If alternate hauling route is proposed by BRE, a qualified individual should be consulted and approve the change.
- Administrative controls are required to eliminate uncontrolled tailgate banging and the use of experienced equipment operators.
- Where equipment back-up alarms will be used near areas that are potentially environmentally sensitive, alternative alarms should be used to reduce sound levels and annoyance. Ambient adjustable, strobe light or broadband alarms are options to consider.
- Landfilling activities should be limited to daytime hours (07:00 to 19:00 hours).

It is noted that due to improvements in operations and change in waste acceptance type has limited the Landfill's issues with pests over the last two years and have never used a audible pest control system. Should pest control devices or similar activities be utilized in the future these systems will be assessed for noise to ensure no negative off-Site noise impacts prior to operation.

4.6.2.3 Recordkeeping

Records shall be kept of when and how Noise control measures are implemented and when complaints, if any, are received. Example of a complaint form is provided in Appendix D. The form will be updated every 5 years or upon employee turnover. As a minimum, the following activities will take place if a complaint is received:

- Complaints or concerns expressed directly to contractors or Site personnel should be communicated immediately to the Site Manager so the formal complaint process can be initiated and followed up
- The complaint form will provide the description of the complaint, environmental conditions, operations at time of incident, and description of all responses and follow up actions
- Reporting will be conducted with the intent to manage any potential Noise issues through operational changes to construction and landfilling
- If the complaint is valid or persistent (i.e., not an upset condition), investigation through sound level measurements will be conducted and reported
- On an annual basis, the complaint records will be reviewed and any unfavourable trends will be examined further to identify corrective actions and included in the annual report

4.6.3 Noise Net Environmental Effects

Similar to the Vertical Capacity Expansion EA and Fill Rate Amendment Screening, the 14 residences that were anticipated to experience a change in the predicted off-Site noise impact due to the previously approved landfill expansion, may continue to hear landfill activities; however, even with the increased capacity, no change from the noise analysis completed as part of the Vertical Capacity Expansion EA and Fill Rate Amendment will occur. With existing mitigation measures and best practices, all residential dwellings are below the 55 dBA noise limit.

4.6.4 Noise Monitoring Requirements

No monitoring requirements are needed for on-going noise compliance.

4.7 Natural Environment

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2** of this report.

The assessment of the proposed capacity expansion was conducted in two steps:

- **Step 1: Confirm Screening Criteria and Indicators/Measures**
  Prior to undertaking the net effects assessment, the Natural Environment screening criteria, indicators, and measures were reviewed and confirmed for application to the proposed capacity expansion
- **Step 2: Undertake the Net Effects Analysis**
  With the screening criteria, indicators, and measures confirmed through the preceding step, a net effects analysis of the proposed capacity expansion was carried out consisting of the following activities:
  - Identify potential effects (based on measures) on the Natural Environment
  - Develop and apply avoidance/mitigation/compensation/enhancement measures
  - Determine net effects on the Natural Environment

General Assumptions

The following evaluation was carried out under the assumption that the 2023 Design and Operations Report (GHD 2023) for the Brooks Road Landfill Site depicts the most up-to-date conceptual design for the proposed capacity

expansion. Should the conceptual design change, the need for mitigation and the potential for net effects will need to be reassessed.

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a "Yes" answer was given in the Screening Criteria Checklist) for those Natural Environment criteria which might be affected by the project as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Areas will change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2** (**Table 2.1**), a "Yes" was applied to the following Natural Environment criteria:

Might the Project:

– *Cause negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat?*

– *Cause negative effects on designated wetlands?*

– *Cause negative effects on wildlife habitat, populations, corridors, or movement?*

With respect to the above criteria, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.7.1 Natural Environment Potential Effects

4.7.1.1 Cause Negative Effects on Rare (Vulnerable), Threatened or Endangered Species of Flora or Fauna or their Habitat

There are several rare (vulnerable), threatened or endangered species of flora and fauna or their habitat within the LSA and/or SSA. The proposed capacity expansion could have a negative effect on these species and/or habitats, potentially causing the species to become extirpated (i.e., locally extinct).

4.7.1.2 Cause Negative Effects on Designated Wetlands

The proposed capacity expansion will result in changes to the existing landfill footprint,, final contours, and on-Site operations and may cause negative effects on designated wetlands. PSWs are present on all sides of the Site and are also located within the southeastern boundary of the SSA. The proposed capacity expansion could cause negative effects to the PSWs through changes in water quality, impacts to wetland habitat, and impacts to flora and fauna species.

4.7.1.3 Cause Negative Effects on Wildlife Habitat, Populations, Corridors, or Movement

The proposed capacity expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause negative effects on wildlife habitats, populations, corridors, or movements. The MNDMNRF's Natural Heritage Information Centre (NHIC) mapping delineates Wildlife Activity Area (WAA; white-tailed deer wintering area) throughout most of the SSA and LSA. The proposed capacity expansion will not reduce the available WAA.

4.7.2 Natural Environment Mitigation Measures

There are a number of existing mitigation measures in place to dissuade wildlife access to the existing landfill Site and to prevent human/wildlife conflicts. Chain link fence is present around the perimeter of the property, which dissuades larger reptile and mammal access to the Site. Based on the proximity to the PSW, a wildlife exclusion fence was installed in December 2021 within the chainlink fence as an effective deterrent for small reptile, amphibian, and mammal access to the Site. Also, in December 2021, a new silt fence was installed along the northern perimeter of the

property and at several locations around the Site where run-off potential is high. There are also very limited natural areas on the landfill Site itself and daily landfilling activities (e.g., noise, human presence, heavy machinery) also provide deterrents for wildlife use of the Site. Other operational practices (i.e., daily cover) further act to deter wildlife use of the Site.

General BMPs for continued operation of the landfill should include:

– Notify Site operators and delivery contractors of the presence of reptiles and amphibians in the surrounding areas. This includes visual identification tools for SAR common to the area.
– Any wildlife incidentally encountered during Site operation activities will not be knowingly harmed and will be allowed to move away from the area on its own if at all possible.
– In the event that an animal encountered during Site operation activities does not move from the area, or is injured, the Site Supervisor will be notified.
– In the event that the animal is a known or suspected SAR, the Site Supervisor will contact MNDMNRF SAR biologists for advice.
– Wildlife exclusion fence and erosion and sediment controls shall be maintained until all disturbed areas of the Site, including the pond and swales, have fully stabilized and vegetated areas have achieved 70 percent of the native background density of growth. The condition of all swales, culverts, vegetation, infiltration basin outlet, and outflow channels leading to the Brooks Road drainage ditch and off Site will be noted at regular intervals.

4.7.3 Natural Environment Net Effects

The proposed capacity expansion will migrate the northern landfill perimeter north by approximately 30 m. This land is already within the Site boundary and within the chainlink, wildlife exclusion, and silt fences; as such, net effects are anticipated to be negligible. **Table 4.3** details the potential effects, mitigation measures, and net effects on the Natural Environment.

Table 4.3 Natural Environment Potential Effects, Mitigation Measures, and Net Effects

Screening Criteria	Indicators	Potential Effects	Mitigation Measures	Net Effects
Negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat	Predicted impact on flora and fauna including rare (vulnerable), threatened, or endangered species	Potential to cause species to become extirpated (i.e., locally extinct)	Chainlink and wildlife exclusion fence to prevent fauna entering Site No clearing to be conducted outside of the Site boundary	No net effects to flora and fauna within the Site and Local Study Areas
	Predicted impact on flora and fauna habitat	Clearing and grubbing may cause destruction to flora and fauna habitat	No clearing or grubbing to be conducted outside of the Site boundary	No net effects to flora and fauna habitat within the Site and Local Study Areas
Negative effects on designated wetlands	Predicted changes in water quality	Water quality could deteriorate with the migration of sediment from the landfill into the wetland	Silt fence is installed in areas of possible sediment migration	No net effects to water quality in designated wetlands within the Site and Local Study Areas
	Predicted impact on wetland habitat	Wetland habitat could deteriorate with the migration of sediment from the landfill into the wetland	Silt fence is installed in areas of possible sediment migration	No net effects to wetland habitat in designated wetlands within the Site and Local Study Areas
	Predicted impact on flora and fauna	Migration of sediment from the landfill into the wetland may have	Silt fence is installed in areas of possible sediment migration	No net effects to flora and fauna in designated wetlands

Screening Criteria	Indicators	Potential Effects	Mitigation Measures	Net Effects
		a negative impact on flora and fauna		within the Site and Local Study Areas
Negative effects on wildlife habitat, populations, corridors, or movement	Predicted impact on wildlife habitat	WAA (white-tailed deer wintering area) is present throughout most of the SSA and LSA and the increased footprint may reduce the available WAA	Existing chainlink and wildlife exclusion fence prevent fauna entering Site. The proposed expansion is confined to the fenced Site	No net effects on wildlife habitat within the Site and Local Study Areas
	Predicted impact on wildlife populations	The proposed capacity increase may lead to reduced or increased wildlife populations	The proposed expansion is confined to the existing Site boundary	No net effects on wildlife populations within the Site and Local Study Areas
	Predicted impact on habitat linkages within the Local Study Area	The proposed capacity increase may impact habitat linkages in the Local Study Area	The proposed expansion is confined to the existing Site boundary	No net effects on habitat linkages within the Site and Local Study Areas

4.7.4 Natural Environment Monitoring Requirements

To ensure that the mitigation measures identified are implemented as envisioned, a strategy and schedule was developed for monitoring environmental effects. With these mitigation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the proposed undertaking.

Calling Amphibian Monitoring

Calling amphibians are recommended to be monitored annually to confirm there is no migration of sediment from the proposed capacity expansion (i.e., from grading throughout the SSA, final cover construction) is not causing negative impacts to the wildlife inhabiting the surrounding wetlands. Monitoring should focus on Locations 1 through 4, as the potential impacts to the natural environment at Locations 5 and 6 are considered to be negligible given their distance from the SSA. These annual monitoring events should be conducted during Year 1, Year 2, and every three years following for a minimum of four monitoring events, commencing in the first year of construction. When conducted in accordance with the Marsh Monitoring Protocol (BSC 2009).

Surface Water Quality Monitoring

The Site currently implements a surface water monitoring program based on the requirement of ECA No. A110302. The surface water monitoring program includes water quality monitoring and surface water flow measurements. This program consists of a network of nine monitoring stations (one on-Site and eight off-Site) indicated in **Figure 3.22** and is conducted to confirm run-off is not causing negative impacts to the wetland. Water quality monitoring and surface water flow measurements at all of the surface water stations take place on a quarterly basis (generally March, May, August, December) with an attempt to correlate the surface water monitoring with rainfall events. Continuation of this program provides a reasonable monitoring effort for potential effects monitoring. Further information on surface water quality monitoring is available in the *Design and Operations Report* (GHD 2022).

Fencing Inspections

The following measures will be conducted to mitigate potential effects associated with the perimeter wildlife exclusion/silt fence and confirm that it is effective:

– Routine inspections of the integrity of the perimeter wildlife exclusion/silt fence. Inspections are to be conducted quarterly with copies of the inspection reports maintained on-Site for two years

- Incidental observations of wildlife exclusion/silt fence or perimeter chainlink fence disrepair and/or evidence of wildlife attempting to enter the SSA should be reported immediately to the Site Supervisor or Site Manager and addressed in a timely fashion
- Any fencing disrepair is to be addressed by BRE in a timely fashion

4.8 Traffic

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2.0** of this report.

Based on the description of the proposed capacity increase provided in **Section 2.0** and the characterization of Transportation Existing Conditions within the Study Area described in **Section 3.0**, the following section provides the Transportation Future Conditions within the Study Areas and any recommended mitigation measures for the 2026 horizon year when the Site is anticipated to reach capacity. The future conditions traffic analysis utilizes the existing 2022 conditions as a baseline and incorporates additional corridor growth to the traffic volumes.

As previously presented in **Table 3.9**, the maximum daily truck traffic before and after the proposed capacity expansion does not change and remains at 25 to 50 trucks per day. As a result, the turning volumes entering and exiting the Site access are not expected to change from exiting conditions.

Horizon Year

The proposed capacity expansion for the existing Site is expected to extend the life of the landfill by approximately two years from 2024 to 2026. Therefore, a future horizon year of 2026 has been assumed representing the worst-case scenario which includes the anticipated corridor growth expected until the Site reaches capacity. Haldimand County's Traffic Impact Study Guidelines for developments generating less than 500 peak hour vehicle trips requires future conditions traffic analysis be conducted for both the opening year and 5 years after opening. However, post 2026, the Site will generate no traffic onto the surrounding road network and therefore, analysis of future conditions was limited to the 2026 horizon year.

Background Volume Growth Rate

In order to capture any expected background growth in traffic volumes at the study area intersections, a conservative compound annual growth rate of 2.0 percent has been adopted and will be utilized to forecast for the 2026 traffic volumes.

Future Traffic Volumes

The Forecasted 2026 turning movement counts were projected at both the intersection of Highway 3 and Brooks Road and at the existing Brooks Road Landfill Site driveway during the weekday a.m., mid-day and p.m. peak periods and Saturday mid-day peak periods. This includes the existing truck traffic corresponding to approximately 1,000 tonnes per day. As previously noted, to provide a conservative and worst-case scenario analysis, the daily truck trips associated with the Site were applied to each peak hour (i.e., the total amount of daily truck trips will enter/exit the Site within each of the peak hours). The resulting weekday a.m., mid-day and p.m. peak hour as well as the Saturday peak hour volumes are summarized in **Figure 4.3**. No additional Site trips were accounted for in the 2026 horizon year as the maximum daily number of trucks generated by the Site remains at 25 to 50 trucks after the proposed capacity expansion.

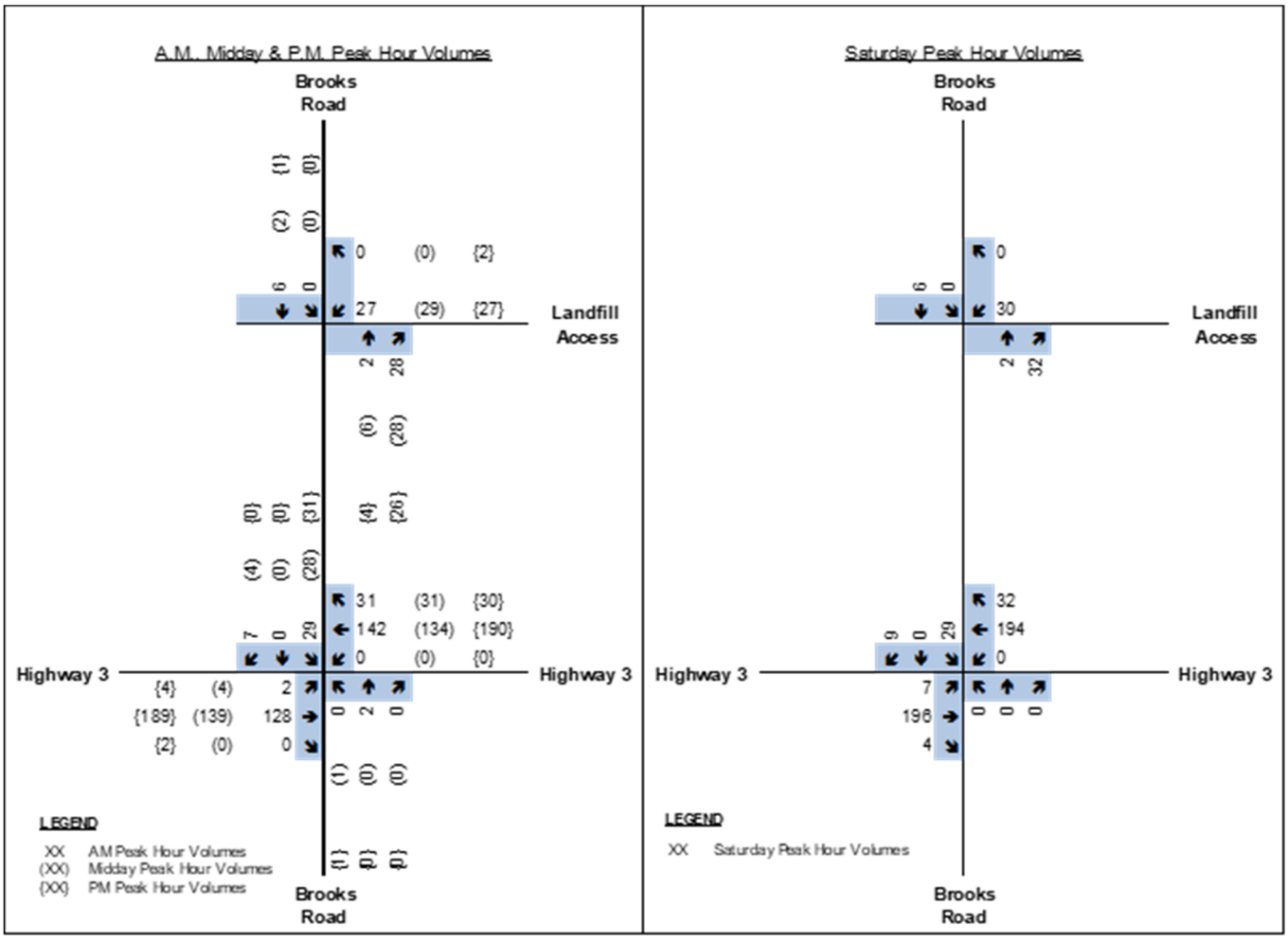


Figure 4.3 2026 Future Total Peak Hour Volumes

Capacity Analysis

As a measure of the capacity on the adjacent road network surrounding the Brooks Road Landfill at peak operations (i.e., 1,000 tonnes of material per day translating to 25 to 50 daily trucks), both the Site access on Brooks Road and the stop-controlled intersection of Brooks Road and Highway 3 were analyzed using the projected 2026 peak turning movement volumes for the weekday a.m., mid-day, p.m. and Saturday peak hours. A summary of the capacity analysis using Synchro version 10 is summarized in the **Table 4.4** with detailed reports provided in Appendix A of the Traffic Assessment Report (**Appendix H**).

Table 4.4 Future Conditions Capacity Analysis at Peak Operations

Intersection	Movement v/c ratio (LOS) delay			
	A.M. Peak	Mid-Day Peak	P.M. Peak	Sat Peak
Brooks Road & Brooks Road Landfill Site access	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0 SEC	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0 SEC	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0 SEC
Brooks Road & Highway 3	EBTLR = 0 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS B 11 SEC SBTLR = 0.06 LOS B 11 SEC	EBTLR = 0 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS B 11 SEC SBTLR = 0.05 LOS B 11 SEC	EBTLR = 0 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS B 12 SEC SBTLR = 0.06 LOS B 12 SEC	EBTLR = 0.01 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS A 0 SEC SBTLR = 0.08 LOS B 12 SEC

Both intersections overall are expected to operate with minimal delay and substantial excess capacity under future 2026 conditions. Individual movements at both study intersections are expected to operate with levels of service 'B' or better representing minimal delay, and volume-to-capacity (v/c) ratios not exceeding 0.08 representing substantial excess capacity, during the weekday a.m., mid-day, p.m. and Saturday mid-day peak hours.

The analysis of future 2026 conditions under peak operations confirms no vehicle delay issues or capacity constraints at either study intersection resulting from the proposed capacity expansion.

Safety Analysis

Collision Analysis

Existing conditions collision analysis determined no indication that either Highway 3 in the vicinity of Brooks Road or Brooks Road north to the Site has experienced significantly higher collision frequency than the historical average accident rate along Highway 3 in Haldimand County. Since no additional Site traffic is generated by the proposed capacity expansion, safety conditions remain unchanged.

Sight Line Analysis

Existing conditions sight line analysis determined the Site entrance in its current location satisfies the sight distance requirements for trucks approaching and departing from the Site.

As described in **Section 2.0**, a "Yes" was applied to the following Transportation criteria:

Might the Project:

– Cause negative effects related to traffic?

With respect to the above criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed.

4.8.1 Traffic Potential Effects

Based on the Future Conditions traffic analysis undertaken in this section, it is expected that the proposed capacity expansion will have a negligible transportation effect at the study area intersections and surrounding road network. Truck traffic associated with the proposed capacity expansion will not contribute any additional truck traffic within the study area, therefore it is not expected to adversely affect residents, businesses, institutions and movement of farm vehicles in the local study area.

4.8.2 Traffic Mitigation Measures

With no additional truck traffic generated by the proposed capacity expansion, no mitigation measures are recommended in order to avoid or minimize impacts on Transportation.

4.8.3 Traffic Net Environmental Effects

As no mitigation measures beyond those incorporated into the design are recommended, the net impacts of the capacity expansion from a transportation perspective are expected to be negligible as represented in the Future Transportation Conditions analysis undertaken in this section.

4.9 Cultural Heritage

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the Ontario Heritage Act.

The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

4.10 Other

The proposed landfill expansion will not change the types of wastes the facility is permitted to receive and will not result in the creation of non-hazardous waste materials requiring disposal (the landfill currently receives non-hazardous wastes as permitted by the existing Environmental Compliance Approval).

The proposed expansion will not cause any other negative environmental effects not covered by the criteria outlined in this presentation.

4.11 Summary of Net Environmental Effects

Table 4.5 provides a summary of the anticipated net environmental effects associated with the proposed facility.

Table 4.5 Net Effects Summary Table

Environmental Component	Summary of Predicted Net Environmental Effects
Surface Water	– Continuous operation of the stormwater management pond to remove the excess TSS and ensuring good vegetative coverage in the expanded areas to reduce erosion will result in no net effects on surface water quality on-site or off-site. – Slight change in drainage areas. The proposed expansion of the landfill will increase the imperviousness percent of the contributing drainage areas to the SWM pond by less than 2 percent. However, the SWM pond capacity is sufficient to accommodate this change. – No off-site effects to surface water quantity with continued operation of the stormwater management pond to attenuate peak flows to protect downstream receivers from potential changes in water quantity.

Environmental Component	Summary of Predicted Net Environmental Effects
Geology & Hydrogeology	– The Site is characterized by two relevant groundwater units (a water table unit and a confined basal till overburden/shallow bedrock aquifer) which are separated by a thick layer of stratified silty clay, silty clay till and varved clays which form an aquitard of very low hydraulic conductivity. – The proposed landfill design includes a base constructed of a single composite liner design consisting of a 1.5 mm thick high density polyethylene (HDPE) liner overlying a 750 mm thick engineered clayey liner. – Leachate produced within the landfill will be collected in a leachate collection system installed above the HDPE liner and will be removed from the landfill mound on a continuous basis and treated on Site prior to discharge. – Based on the existing leachate and groundwater quality at the Site and the high level of protection provided by the engineered composite liner and the natural silty clay aquitard, as well as the continuation of a robust monitoring and trigger level program, no net effects to the groundwater quality are anticipated from the proposed expansion.
Land Use & Socio-Economic	– The Site is located in an area zoned as Disposal Industrial. Potential negative effects during construction related to dust, odour, noise, and traffic will be mitigated through the use of BMPs. – There are no net negative environmental effects anticipated with respect to Land Use for the operation from the proposed expansion. – There are no net negative environmental effects anticipated with respect to traffic. – By implementing the height increase of the existing fence on the west side of the Site will mitigate any visual and aesthetic impacts. – No net negative effects are anticipated with respect to Land Use and Socio-Economic environment from the proposed expansion
Air Quality	– The assessment shows that the concentrations of TSP, PM10 and PM2.5 were all well below the AAQC at the sensitive receptors and will continue to be so with the proposed amendment. The cumulative effect for PM2.5 was below the PM2.5 AAQC at the sensitive receptors as well. – The Site has implemented the control measures such as the introduction of SOPs for odour and dust and the operation of a leachate treatment system and will continue with these controls to minimize the Air Quality and Odour impacts from the Site operations. – No change to the net effects from the existing landfill operation are anticipated as a result of the proposed capacity change, based on the continued implementation of the mitigation measures

Environmental Component	Summary of Predicted Net Environmental Effects
Noise	– The BRE Facility is located in a mixed acoustical Class 2 and Class 3 area based on the MECP NPC 300 guideline and depending on the proximity of the off-Site residential dwellings to Highway 3. – Nine residential dwellings located along Highway 3 are considered to be Class 2 receivers and the five residential dwellings situated away from the corridor are considered to be Class 3 receivers. N-1 is the applicable regulatory Guideline for compliance assessment purposes for the Facility and the proposed capacity increase requires that the BRE Facility achieve a noise limit of 55 dBA at all off-Site residential dwellings of concern. The Landfill is limited to daytime only operations from 7 a.m. to 7 p.m. The Existing Conditions at the BRE Facility are below the 55 dBA noise limit. – The capacity increase considers one future conditions evaluation which will remain well below the Guideline N-1 noise limit of 55 dBA at all existing sensitive points of reception. –
Natural Environment	– The proposed capacity expansion will migrate the northern landfill perimeter north by approximately 30 m. This land is already within the Site boundary and within the chainlink, wildlife exclusion, and silt fences; as such, net effects are anticipated to be negligible.
Traffic	– The analysis of future conditions undertaken for the 2026 horizon year when the Site is anticipated to reach maximum capacity, indicates the site will continue to be acceptable from a traffic operations and safety perspective. – Under peak operations no vehicle delay issues or capacity constraints at either study intersection are expected. – Concerning safety, it is expected that since no additional site traffic is generated by the proposed capacity expansion, existing safety conditions will not deteriorate, and Site traffic will continue to be safely accommodated by the existing site entrance; therefore, there are no net negative effects.
Cultural Heritage	– The screening checklist, Criteria for Evaluating Archaeological Potential, developed by the Ministry of Citizenship and Multiculturalism, was completed as part of the Environmental Screening Report (see **Appendix G1**) determining that archaeological potential within the study area is low and therefore archaeological assessment was not undertaken. – The screening checklist, Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, developed by the Ministry of Citizenship and Multiculturalism, was completed as part of the Environmental Screening Report (see **Appendix G2**) determining that the study area has low potential for built heritage resources and cultural heritage landscapes. Therefore, no technical cultural heritage studies have been undertaken.

5. Consultation and Engagement

BRE strived to openly communicate the facts of the Project to various stakeholder groups who might be affected by the Project. The stakeholder groups who have been consulted include Government Agencies, Indigenous Communities, and the public (**Table 5.1**).

The consultation activities described in the following sections, and the consultation documentation provided in **Appendix K** were developed in accordance with the consultation expectations set out in the *Ontario Environmental Assessment Act*, MECP's Code of Practice for Preparing and Reviewing Environmental Assessments in Ontario[26], and in MECP's Guide to Environmental Assessment Requirements for Waste Management Projects[27].

Table 5.1 List of Agencies and Indigenous Communities Contacted

Conservation Authorities
GRCA
NPCA
Provincial Agencies
MECP
Ministry of Environment, Conservation and Parks – Hamilton District Office
Ministry of Agriculture, Food and Rural Affairs (MAFRA) – Central Southwest Ontario (Haldimand County)
Ministry of Heritage, Sport, Tourism, Culture Industries (MHSTCI)
Ministry of Education (MOE)
Grand Erie District School Board
Ministry of Municipal Affairs and Housing (MMAH)
MNDMNRF
MTO
Ontario Provincial Police (OPP)
Ontario Provincial Police – Haldimand County
Municipal Agencies
Haldimand County
Indigenous Communities
Six Nations of the Grand River First Nation
Mississaugas of the New Credit First Nation
Métis Nation of Ontario (Head Office, Niagara Region Métis Council, and Hamilton-Wentworth Métis Council)
Haudenosaunee Confederacy Chiefs Council

[26] Ministry of the Environment/Ministry of the Environment, Conservation and Parks. (2014, January). *Code of Practice: Code of Practice for Preparing and Reviewing Environmental Assessments in Ontario*. Source: https://dr6j45jk9xcmk.cloudfront.net/documents/1809/3-8a-11-preparing-and-reviewing-eas-en.pdf

[27] Ministry of the Environment, Conservation and Parks. (2021, July 5). *Guide to Environmental Assessment Requirements for Waste Management Projects*. Source: https://www.ontario.ca/page/guide-environmental-assessment-requirements-waste-management-projects

5.1 Consultation Activities

BRE has consulted with various stakeholder groups in a number of ways, ranging from verbal communication, email correspondence and the delivery of presentations, to the organization of consultation events. The major consultation milestones held and organised by BRE include:

– Circulation and Publication of the Notice of Commencement and Notice of Public Open House – weeks of June 13 and 20, 2022
– Public Open House #1 – June 29, 2022
– Public Open House #2 – October 24, 2023

5.1.1 Notice of Commencement and Public Open House # 1

As noted above, BRE commenced the Environmental Screening process with the publication of a Notice of Commencement and Notice of Public Open House in the Sachem/Glanbrook Gazette and Haldimand Press, the local newspaper in the vicinity of the proposed Site, during the weeks of June 13 and 20, 2022. The Notice of Commencement was also distributed via letter and/or email to members of the Government Review Team, Indigenous Communities, and to 1,674 addresses within N0A postal code, covering the town of Cayuga, via unaddressed Canada Post mail-drop during week of June 20, 2022. The Notice was also posted on the BRE Project website (www.brenvironmental.com) in the “About Brooks Road” and the “2022 Environmental Screening” section. A copy of the Notice of Commencement and Public Open House is provided in **Appendix I**.

5.1.2 Public Open House #1

Public Open House # 1 was held on June 29, 2022 at the Cayuga Kinsmen Community Centre, 15 Thorburn Street South, Cayuga from 5 p.m. to 7 p.m. Notification of this first public Open House was included in the Notice of Commencement, published in the Sachem/Glanbrook Gazette and Haldimand Press during the weeks of June 13 and 20, 2022 and sent via letter and/or email to the contacts on the preliminary Project Contact List, inviting interested stakeholders and members of the community to attend the event. As noted above, a copy of the Notice of Commencement and Public Open House is provided in **Appendix I**. The first Public Open House included an overview of the Environmental Screening Process, including the Screening Criteria Checklist, and preliminary information about the proposed expansion. The objective was to offer opportunity to discuss and solicit feedback and comments on the proposed undertaking. A total of 14 individuals attended Public Open House #1. Attendees included local residents and landowners; members of the Public Liaison Committee for the existing landfill; and a member of the media. Comments and questions (both verbal and written) were welcomed and are summarized in the Public Open House #1 Summary Report along with copies of the display boards and reference material (see **Appendix I**).

In general, the comments ranged from against the proposal to supportive. A majority of comments received during the Open House related to the operations of the existing landfill. Landowners within the immediate vicinity of the Site asked questions regarding the possible height of the expansion, visual impact, odour, noise, wetland protection, potential for impacts to surface and groundwater, traffic, Site life, and post-closure use. Overall, there was good dialogue between the staff and the attendees.

5.1.3 Public Open House #2

Public Open House #2 was held on October 24, 2023 at the Cayuga Kinsmen Community Centre, 15 Thorburn Street South, Cayuga from 6 p.m. to 8 p.m. Notification of the second Public Open House was published in the Sachem online and Haldimand Press newspaper during the weeks of October 12 and 19, 2023 and sent via letter and/or email to the Government Agencies, Indigenous Communities, Project Contact List and to 2,019 addresses within N0A postal code, covering the town of Cayuga, via unaddressed Canada Post mail-drop during week of October 19, inviting interested stakeholders and members of the community to attend the event. Copies of notification for the second Public Open House is provided in **Appendix I**. The second Public Open House included an overview of the Environmental Screening Process, detailed project description, results of various environmental studies conducted

including potential effects, mitigations measures and overall net effects from the proposed expansion along with any monitoring requirements as well as project schedule. The key information presented at the second Open House was the change in planned capacity increase from previously proposed 100,000 cubic metres to 219,400 cubic meters as a result of the change in O. Reg 101/07. The objective was to offer opportunity to discuss and solicit feedback and comments on the proposed undertaking. A total of 13 individuals attended the Public Open House #2. Attendees included local residents and landowners; members of the Public Liaison Committee for the existing landfill; a municipal staff, and a member of the media. Comments and questions (both verbal and written) were welcomed and are summarized in the Public Open House #2 Summary Report along with copies of the display boards and reference material (see **Appendix I**).

Similar to Open House #1, the comments ranged from against the proposal to supportive. A majority of comments received during the Open House related to the Regulation change allowing BRE to seek an increase in the total capacity requested (change from the 1st Open House) as well concerns around the overall timing of the landfill operations and ultimate closure. Residents asked questions regarding the increased height of the expansion from a visual perspective, concerns around landfill liner design, odour, wetland protection, and eventual post-closure use. Overall, there was good dialogue between the staff and the attendees.

5.2 Stakeholder Tracking Database

A stakeholder tracking database was created for the BRE Landfill Expansion Project and includes a list of names and contact information for all stakeholders, serving as a starting point for all project-related communication (see **Appendix I**).

5.3 Indigenous Community Consultation

From the outset of the Screening Process, BRE established and maintained regular contact and communication with Indigenous Communities in the region of the proposed undertaking. A total of four Indigenous communities were contacted including:

– Six Nations of the Grand River First Nation
– Mississaugas of the New Credit First Nation
– Métis Nation of Ontario (Head Office, Niagara Region Métis Council, and Hamilton-Wentworth Métis Council)
– Haudenosaunee Confederacy Chiefs Council

As required at the start of the Screening Process, a copy of the Notice along with the Screening Checklist was provided to each of the Indigenous groups listed above. All four Indigenous Communities were also invited to attend Public Open House #1 and #2 and offers were also extended to organise separate meetings specifically designed to engage each community in meaningful discussions concerning the project. Follow-up phone calls were made in June 2022 to each community to confirm whether they had received the Notice of Commencement and Open House 1 and if they had any questions. A virtual meeting with the Mississaugas of the Credit First Nation was held on July 19, 2022.

A member of the Six Nations of the Grand River First Nation reached out to have a meeting with the project team in response to the Notice of Open House #2. An in-person meeting was held on January 12, 2024, to discuss the project and outcomes with the project team and members of the Six Nations.

None of the consulted Indigenous communities provided comments during Online Open House #2.

Copies of all correspondence with Indigenous communities are included in **Appendix I**.

5.4 Review of the Draft Environmental Screening Report

A Draft ESR was issued to the government agencies from January 8 to February 5, 2024 and to the indigenous communities, public, and interested stakeholders from January 16 to February 13, 2024 with an opportunity to review

and provide comments. According to the Guide, this step is highly encouraged to address any fundamental concerns or to avoid disagreement being raised at a late stage in the process and any technical issues can be suitable resolved prior to the preparation of a final ESR and issuance of a Notice of Completion.

The comments on the Draft ESR along with the responses are summarized and included in **Appendix I**.

5.5 Notice of Completion

As part of the process of making the ESR available for review, BRE issued a formal Notice of Completion to review agencies, Indigenous Communities, and the public beginning on April 3, 2024. A copy of the Notice is included in Appendix J. Specifically, this involved the following activities:

– Publication in the Haldimand Press and Sachem online within the Hamilton Spectator.
– Letter and/or email to members of the Government Review Team, Indigenous Communities, PLC members, and interested members of the public.
– Canada Post mail blast to postal code N0A, within a 5 km radius of Brooks Road Landfill.

The Environmental Screening Process requires proponents to post the ESR for a minimum 60-calendar day review period. The Brooks Road Landfill vertical and horizontal ESR was available for review from April 3, 2024, to June 2, 2024, whereby any interested person can inspect the Environmental Screening Report and provide comments. The comments, including any issues or concerns, should be sent first to GHD, on behalf of the BRE, for potential resolution.

5.6 Summary of the Comments Received & Responses Provided

Over the course of the Screening Process, numerous comments have been directed to BRE and the Project Team. **Table 5.2** summarizes the questions and concerns raised at meetings and obtained via regular mail, email, fax, telephone from members of the public, agencies, PLC and Indigenous Communities

Table 5.2 Summary of Comments Received and Responses Provided

Topic	Agency/ organisation/ community	Comment	Response
Agencies			
Consultation	GRCA	I've recently been assigned Haldimand County coverage for the GRCA. Please include me on the circulation list for this project going forward.	Thank you for your response. We will add you to the contact list. Should we continue to include planning@grandriver.ca in addition to yourself?

Topic	Agency/ organisation/ community	Comment	Response
Consultation	GRCA	no need to include the general GRCA planning email. Also, wondering if any of the public engagement materials from the open house will be posted on Brooks Road's document library either before or after the session. Not sure if I'll be able to make the session, and they'd also be helpful for circulating our Natural Heritage staff. Let me know if you can.	Yes, we will be posting all of the Public Open House display boards to the document library on the website following the event next week. We will also hold a Government Review Team meeting during the Environmental Screening Process to present and discuss the project and provide an opportunity for agencies to ask questions.
Consultation	OPP	My name is Rod LeClair and I'm with the OPP Provincial Liaison Team. Our role is to maintain open lines of communication with groups who may be affected by major events such as protests or demonstrations. I'm not sure if you're familiar with our team or not. We are aware of the Brooks Road Landfill Capacity Expansion project in Cayuga that is currently at the environmental screening process stage. I have been checking your website for information. We would like to attend any meetings in the future about this project if you would be so kind to add me to your distribution list.	Thank you for your message. You have been added to the project contact list, as requested. We will keep you informed of upcoming project events as well as project notices.
Consultation	MECP	Please find attached MECP's Letter of Acknowledgement and attachments in response to the Notice of Commencement for Brook Road Landfill Capacity Expansion Environmental Screening.	Comment recorded in the communication log.
Consultation/ Land Use	NPCA	NPCA staff provide the following preliminary screening comments regarding the Brooks Road Landfill Expansion Environmental Assessment (with accompanying map): – The subject property is located outside NPCA's watershed jurisdictional area; however, a portion of the northern property line borders our jurisdiction.	Comment recorded in the communication log.

Topic	Agency/ organisation/ community	Comment	Response
		– The subject property is adjacent on all sides (including the area within NPCA's jurisdiction) to Provincially Significant Wetlands, specifically the North Cayuga Swamp Wetland Complex. – Given the above, the proposed landfill expansion will not require a permit from NPCA, however we will review and comment on the proposal to ensure the proposed works do not negatively impact the PSW within our jurisdictional area. Please continue to circulate updates and materials regarding this project to NPCA (directly to me is fine).	
Indigenous Communities			
Consultation/Open House 2	Six Nations	Phone Call – In response to the email notification of Open House #2, requested a separate in-person/online meeting to discuss the project	Email sent by GHD proposing multiple meeting times. Followed up on the meeting time to schedule the meeting. Currently waiting for a response.
Public			
Consultation		Two ongoing concerns: Stink, and noise from tracked vehicles.	Comment recorded in the communication log.
Consultation		**Comments Questions Suggestions** <u>Vegetated screening berm (with fence)</u> – Increase fence height as required for increased height of land fill. – Start planting trees on berm for wind screening and visual appeal. <u>Buffer area</u> – Start planting permanent vegetation and trees if not already in progress. <u>Proposed expansion and temporary fill storage</u> – The area along the north boundary and maybe other areas not visible from the road.	Comment recorded in the communication log.

Topic	Agency/ organisation/ community	Comment	Response
		– Plant cover crop, vegetation – better than weeds – May be an opportunity for farmers. – Achieves dust, erosion and runoff control. – Plant permanent vegetation and trees as slopes are completed. <u>Dust control</u> – Due to increased height of fill, use portable windscreens on hilltops as capacity. – expansion progresses. – Reference Stelco Nanticoke coal fields. <u>Stormwater management pond</u> – Plant native species typical of marsh – Improve filtering and subsequent runoff water quality. <u>Odour and gaseous emissions</u> – Found answers to most of my concerns in the FAQ section: – Are smelly additions perfumed or are they treated? – Treat with “odour control product”, hydrogen peroxide or some other oxidizer other than – bleach? – Aerate or vacuum the build-up with underlayed temporary piping as it progresses? – Has a ground gas collection and treatment system been installed? – If not will it be installed as filling progresses? <u>Future use</u> – toboggan hill!	

Topic	Agency/ organisation/ community	Comment	Response
Consultation		Keep your garbage in Metro Toronto. Pollute there instead of finding out of city locations to destroy with your arrogance. Your last expansion was suppose to be the last!!	Comment recorded in the communication log.

6. Overall Advantages and Disadvantages of the Project

In accordance with the *EA Act* and the Guide, the advantages and disadvantages to the environment of the proposed undertaking are required under O. Reg. 101/07. Advantages are positive net environmental effects, and disadvantages are negative net environmental effects. The advantages and disadvantages are based on the net effects described in **Section 4** and the problem/opportunity and purpose of the undertaking described in **Section 1.4**. The purpose of this exercise is to provide an overall conclusion as to whether the net negative environmental effects of the Project are acceptable, based on a balanced assessment against the positive benefits, the screening criteria, and the results and conclusions of the screening process.

In general, the advantage of the Project is that it will provide BRE with an opportunity to respond to the growing demands from existing customers (waste generators) who need a safe and reliable waste management facility for their residual material for approximately two additional years. This includes the ability to accommodate BRE's customers facing seasonal volume increases at certain times of the year (i.e., increased construction generated wastes). The assessment completed demonstrate that there are no net negative environmental effects to increasing the total waste disposal capacity by 219,400 m³. Based on the net effects evaluation and the advantages outlined above, the advantages of this Project outweigh any potential disadvantages as there are no new net negative effects on the environment.

7. Next Steps

Publishing of the Notice of Completion marks the beginning of the 60-calendar-day review period, during which time agencies, Indigenous communities, the public, and other interested parties can review the Environmental Screening Report and provide comments.

If there are outstanding concerns that the Project may adversely impact constitutionally protected Aboriginal and treaty rights, which cannot be resolved in discussion with BRE, then a person or party may request that the Minister make an order for the Project to comply with Section 16 of the *Environmental Assessment Act*. This is referred to as a Section 16 Order, which addresses Individual Environmental Assessments.

If no Section 16 Order requests are received within the 60-day review period, or if a Section 16 Order request is resolved or withdrawn, a Statement of Completion form (per Schedule II of the Guide to Environmental Assessment Requirements for Waste Management Project) will be submitted to the MECP. Upon acknowledgment of the Statement of Completion by the MECP, an application to amend ECA No. A110302 will be prepared and submitted to the MECP by BRE.

8. Summary and Conclusion

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, initiated an Environmental Screening process in accordance with the Waste Management Projects Regulation (O. Reg. 101/07) of the Ontario *Environmental Assessment Act* (EA Act) in order to amend the existing Environmental Compliance Approval (ECA) for the landfill. The landfill is currently approved to receive up to 1,000 tonnes per day and 250,000 tones per year of post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste and has a total approved capacity of 1,045,065 cubic metres (m^3) (including waste and daily/final cover).

Brooks Road Environmental is seeking to expand the total waste disposal capacity by approximately 219,400 cubic metres and consequently to amend the approved ECA to change the approved maximum volumetric capacity for the site including waste and daily cover from 1,045,065 cubic metres to approximately 1,264,465 cubic metres, to change the approved footprint fill area from 6 ha to approximately 7.15 ha and, to change the approved maximum elevation of the fill zone, including final cover from 221.50 metres above mean sea level (mAMSL) to 225.66 mAMSL. There is no change to the currently approved fill rate and accepted waste types.

A change in the above-mentioned components requires a modification to Conditions 3(6), 3(8), and 3(8a) of the approved ECA, which specifies the maximum volumentric capacity of the site, approved footprint fill area, and maximum elevation of the fill zone respectively. This ECA amendment is subject to the Environmental Screening Process in accordance with section 13 of the Waste Management Projects Regulation, (O. Reg. 101/07) of the *EA Act*. This change to the landfill will allow brooks Road Environmental to continue serving its existing customer base and to respond to the economic opportunity of providing waste management services to address the continued and growing demand from local and regional customers that require a facility that is permitted to manage the residual materials they generate. It will provide BRE with increased flexibility in terms of how best to serve its existing waste clients while remaining competitive within the marketplace.

Through the Environmental Screening Process, the potential for the Project to result in adverse environmental effects was assessed. From the results of various environmental studies conducted to assess the Project's potential environmental effects, it was concluded that minor environmental impacts are expected. However, through the application of mitigation measures, the Project is not anticipated to result in any new net effects on the environment. As a result, the advantages of the project outweigh the disadvantages.

Appendix A

Surface Water Assessment Report

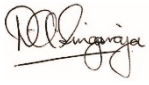
Surface Water Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

Brooks Road Environmental

April 2, 2024

→ The Power of Commitment

Project name		Brooks Road Landfill Expansion					
Document title		Surface Water Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524					
File name		Brooks Road Landfill Capacity Expansion Environmental Screening Assessment Report_V3.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3	Draft	Tochi Azubuike	Dilan Singaraja				11/24/2023
S4	Final	Tochi Azubuike	Dilan Singaraja		Blair Shoniker		4/2/2024

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Contents

Table index

Figure index

Figures following text:

Appendices

1. Introduction

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent). The location of the Site is shown on Figure 1.1.

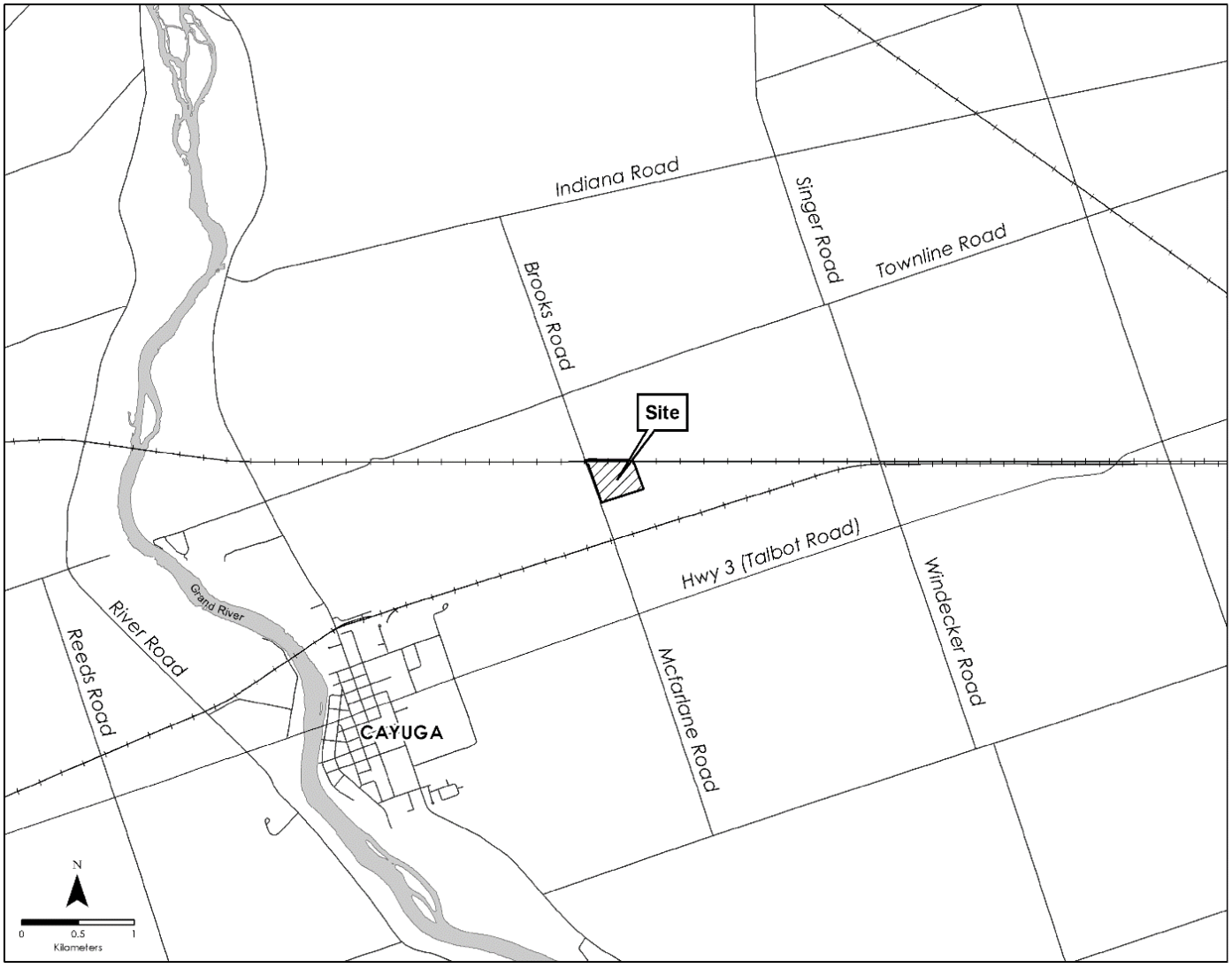


Figure 1.1 Location of the proposed undertaking

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302 (Landfill ECA), has an approved annual fill rate of 250,000 tonnes per year and a total capacity of 1,045,065 cubic metres (m^3) (including waste and cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA) and industrial sewage works ECA No. 1122-BKUPSM (Industrial Sewage ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (CofA, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021. Under the current ECA, the Site is licenced to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3-hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the Site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the MECP on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

In order to meet the growing demand from waste generators and customer for a safe and reliable waste management facility for their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils), Brooks Road Environmental is proposing to expand the capacity of the Brooks Road Landfill by approximately 219,400 m^3, adding capacity equal to approximately two additional years. This expansion would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally, as shown on Figure 1.2.

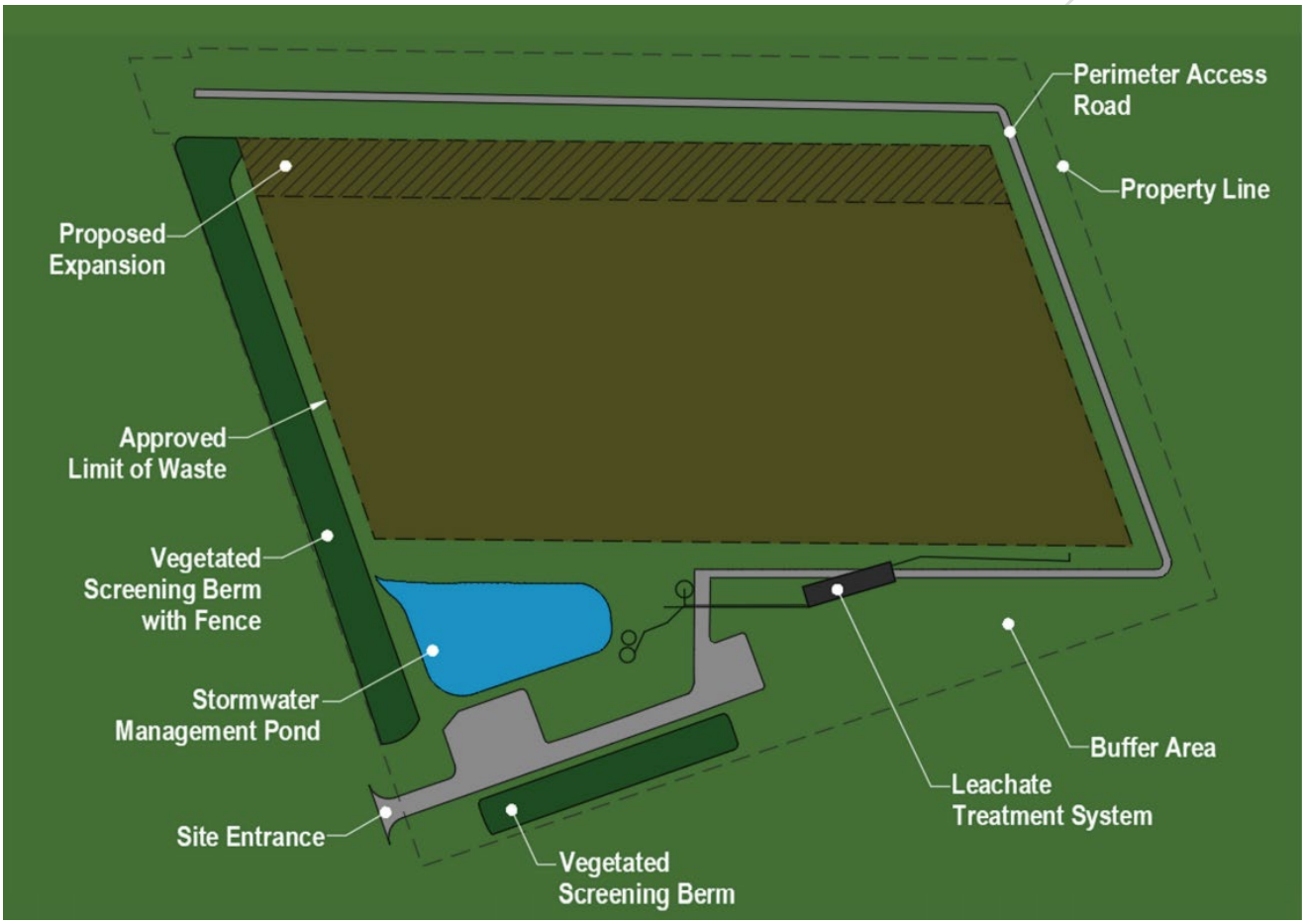


Figure 1.2 Proposed capacity expansion concept

The proposed expansion would amend the approved ECA to allow for landfill volume expansion by approximately 219,400 m^3, allowing for receipt of an approved maximum daily quantity (1,000 tonnes per day) throughout the year, maintaining the approved rate of 250,000 tonnes per year. The proposed change to the total landfill capacity requires additional landfill infrastructure and changes to the currently approved landfill volume, footprint, and final contours.

The proposed Brooks Road Landfill Site capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *EA Act*, as follows:

A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:

1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

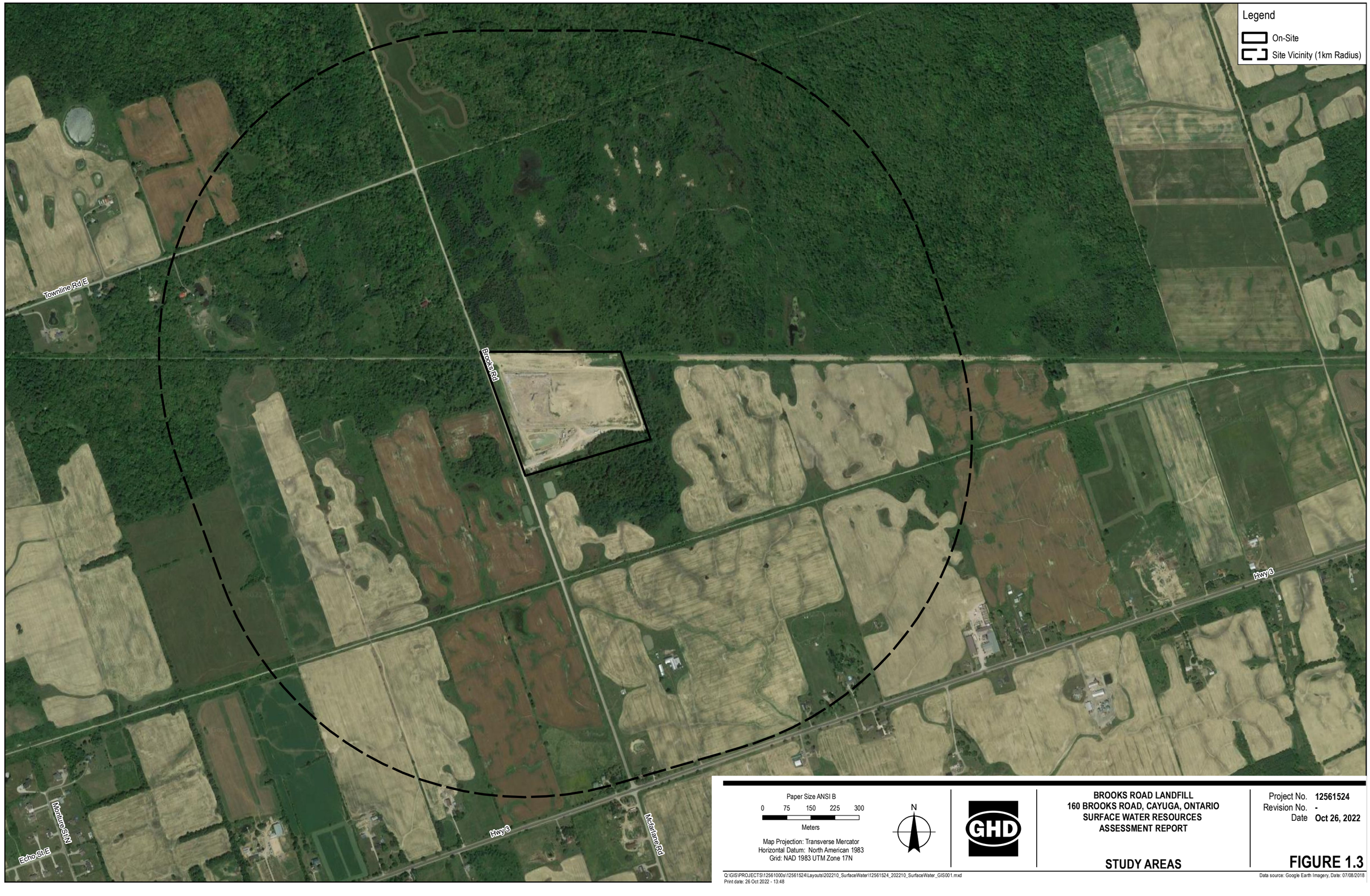
Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process an application will be made to amend the existing ECA No. A110302. The ECA is provided in Error! Reference source not found..

GHD has prepared a Surface Water Assessment on behalf of BRE for the proposed undertaking. This report documents the following as it relates to the surface water environment:

– Baseline/existing conditions (i.e., what exists in the absence of the proposed project).
– Potential effects on the environment, mitigation measures, and net effects.
– Future monitoring requirements to be implemented.

The Study Areas reviewed for the Surface Water Assessment were as follows (see **Figure 1.3**):

– **Site Study Area (SSA)** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended.
– **Local Study Area (LSA)** – includes the lands and waters within the vicinity of the Site extending approximately 1 kilometre (km) from the SSA boundaries including agricultural, residential, and municipal properties.



Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
SURFACE WATER RESOURCES ASSESSMENT REPORT

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 26, 2022**

FIGURE 1.3

Q:\GIS\PROJECTS\12561000s\12561524\Layouts\202210_SurfaceWater\12561524_202210_SurfaceWater_GIS001.mxd
Print date: 26 Oct 2022 - 13:48

Data source: Google Earth Imagery, Date: 07/08/2018

2. Screening criteria checklist

At the beginning of the Environmental Screening, the Screening Criteria Checklist (provided as Schedule I, pp 67 – 69, to the "Guide to Environmental Assessment Requirements for Waste Management Projects") is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of "environment" contained in the *Ontario Environmental Assessment Act.*

As noted in the Guide:

"*The Screening Criteria are presented in the form of a checklist with the option of a "Yes" or "No" response. Mitigation measures **are not** to be considered in concluding whether there is "No" potential environmental effect. That is, the proponent is required to answer "Yes" even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a "Yes" is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required. Where a "yes' has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that no environmental effects are anticipated, it is recommended that additional information is provided in the Environmental Screening Report in order to support the "no effects" conclusion*."

Each criterion is based on a question which is prefaced with the phrase, "*Might the Project*…" Table 2.1 was completed as the first step of the Environmental Screening Process and is a summary of the criteria for the Surface Water Assessment. Further descriptions of the criteria for which a "Yes" response was indicated in the Screening table are discussed in Section 4 of this report.

Table 2.1 Screening criteria checklist – surface water

	Criterion	Yes	No	Additional information
	Might the project…			
1. Surface and groundwater				
1.1	Cause negative effects on surface water quality, quantities, or flow?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause potential negative effects on surface water quality, quantities, or flows.
1.3	Cause significant sedimentation or soil erosion or shoreline or riverbank erosion on or off site?		X	The proposed landfill expansion will result in changes to the existing landfill footprint, final contours, and on-Site operations and may cause some sedimentation on- or off-Site; however, it is not anticipated to be significant.
1.4	Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment.

3. Existing conditions

The following subsections describe the existing conditions that are found within the SSA and LSA of the proposed project.

3.1 Methodology

3.1.1 Available secondary source information collection and review

Available secondary sources of information were collected and reviewed by the Surface Water Study Team to determine existing surface water conditions within the Study Areas. The following sources of secondary information were collected and reviewed:

– Ministry of the Environment, Conservation, and Parks (MECP) Stormwater Management Planning and Design Manual (MECP, March 2003)
– Stormwater Management (SWM) Plan (Conestoga-Rovers & Associates (CRA), September 2013)
– Surface Water (SW) Resources Assessment Report for the Brooks Road Landfill Site, Vertical Capacity Expansion Environmental Assessment (GHD, July 2016)
– Design and Operation (D & O) Report Landfill Expansion Report 81 Revision 1 (GHD, June 2021)
– 2021 Operations and Monitoring (O & M) Report, Brooks Road Landfill Site (GHD, March 2022)

3.1.2 Process Undertaken

The process undertaken for the Surface Water Assessment on the Site includes the following:

– Background Review
– Existing Site Conditions Review
– Field Investigation Review (based on the current surface water monitoring program)
– Proposed Expansion Assessment
– Potential effects, mitigation measures and net effect analysis

3.2 Description of existing conditions

The On-Site drainage patterns are similar to those described in the SWM Plan (2013) and SW Resources Assessment Report (2016). The Site stormwater management practices currently operate under Amended ECA Nos. 1122- BKUPSM, issued in February 2020. The Site drainage network is being configured to the Post Closure Condition, illustrated on Figure 5 of the 2013 SWM Plan. The SWM Plan and SW Resources Assessment are provided in **Appendix B** and **Appendix C**, respectively.

The LSA includes slough forest, woodlot, agricultural, residential, and municipal properties. The SSA topography is very flat with a slight 0.003 metre/metre (m/m) horizontal gradient to the south. The topography across the LSA from north to south ranges from approximately 202 metre above mean seal level (m AMSL) to approximately 196 m AMSL.

The existing SWM drainage characteristics within the Site as described in the SWM Plan and D&O report includes the following:

– Site stormwater runoff is discharged from two outfalls. Runoff from the undeveloped area of land located at the south-east corner of the Site (catchment 100) discharges through Outfall 1. The remainder of the Site discharges through Outfall 2. The existing flow schematic is presented on Figure 2.

– The majority of the Site areas discharge to the existing SWM pond through perimeter ditches including landfill cap areas (Catchments 201-204), areas between the landfill perimeter access road and the visual screening berms to the north and west (Catchments 205-206), segregated recyclable material storage areas, Site trailers, scales (Catchments 207-208) and areas that encompass the pond (Catchments 209-210).
– The rest of the Site areas which are largely undeveloped areas (Catchments 301-303) discharge towards Outfall 2.

A summary of the existing subcatchment parameters for contributing drainage areas to the SWM pond is presented in Table 3.1.

Table 3.1 Existing subcatchment parameters for contributing drainage areas to SWM pond

Catchment ID	Area (ha)	Slope (%)	Imperviousness Area (%)	Imperviousness Area (ha)	SCS Curve Number
201	2.62	25	5	0.13	73
202	0.85	25	7	0.06	73
203	0.88	25	5	0.04	72
204	2.64	25	8	0.21	73
205	1.85	50	0	0.00	74
206	0.13	2	5	0.01	72
207	0.38	2	95	0.36	98
208	0.26	2	95	0.25	98
209	0.27	2	5	0.01	72
210	0.43	10	100	0.43	98
Total	10.31				

Notes:
– Source: Stormwater Management Plan 2013 (Table 3)

The existing stormwater controls on Site include drainage ditches and the SWM pond which are summarized in subsequent sections.

Although the Site is on the boundary of two watersheds and the conditions are primarily ephemeral, the surface water drainage pattern meanders through road-side ditches, farmland, and Norton's Creek to the Grand River, located approximately 7 km from the Site.

3.2.1 Monitoring program

As specified in the Landfill ECA, a surface water monitoring program was developed to assess the surface water quality within the Site and downstream of the Site to ensure compliance with the ECA requirements, Water Management Policies, Guidelines, Provincial Water Quality Objectives (PWQO), published by the MECP in July 1994, and reprinted February 1999. The current surface water monitoring program includes monitoring of surface water quality and quantity, through water sampling and flow rate measurements, respectively.

The surface water monitoring network is currently comprised of nine monitoring locations which includes the following:

– Three off-site background locations: SW1, SW8, and SW9. All three have been established to document the background water quality in the local ditches and ponds. SW9 is located immediately north of the Site, north of OW3A/B-13 monitoring well
– Two On-Site surface water monitoring locations: include one pond (SW5) located in the southern portion of the Site and one On-Site surface water ditch (SW2) located at the discharge from the surface water management system (SWMS)

– Four off-Site surface water monitoring locations: include two ponds (SW6 and SW7) located to the south of the Site; one drainage ditch located immediately downstream of the Site discharge point (SW3), and one drainage ditch (SW4) situated approximately 1 km south and downstream of the Site along Highway No. 3

The surface water monitoring locations are presented on **Figure 3**.

Water quality monitoring and surface water flow measurements at all surface water stations is scheduled to take place on a quarterly basis in March, May, August, and November. An attempt is made to correlate the surface water monitoring with rainfall events. As such, the John C. Munro Hamilton International Airport in Mount Hope, ON Hamilton Airport), located approximately 24 km to the north, is often used to schedule surface water monitoring events.

The comprehensive list of specific surface water parameters analyzed during the monitoring program includes:

– General parameters: Alkalinity, conductivity, chloride, ammonia, nitrate, nitrite, TKN, total phosphorus, TDS, pH, TSS, sulphate, BOD5, COD, phenol, pH
– Metals: arsenic, barium, boron, cadmium, chromium, iron, lead, mercury, copper, zinc
– Organics: ethylbenzene, benzo(a)pyrene, naphthalene
– Field parameters: conductivity, pH, temperature, and dissolved oxygen

The parameter list for the current monitoring period (2021) is provided in Table 5.7 of the 2021 O&M report. The results of surface water monitoring are discussed in Section 5.

4. Potential effects, mitigation measures & net effects

A Project Description, which includes proposed engineering design figures, was prepared so that potential environmental effects and mitigation measures could be identified. The following subsections provide a general summary of the proposed undertaking.

4.1 Description of project components and activities

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This would be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours. The former railway property would continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in Table 4.1.

Table 4.1 Summary of proposed Brooks Road Landfill capacity expansion design vs existing landfill

Design component	Existing landfill	Proposed capacity expansion
Volume (m^3)	1,045,065	1,264,465
Footprint area (ha)	6.07	7.15
Peak elevation (mAMSL) (top of final cover)	221.50	225.66
Peak elevation – top of waste (mAMSL)	220.75	224.91
Crest of slope elevation (mAMSL)	221.0	225.30
Slopes (top/sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing SWM Plan.
Stormwater drainage ditch		Stormwater drainage ditch shifted by 30 m. East and west ditches will extend to maintain full perimeter ditch.
Perimeter roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum daily truck traffic	25 to 50	25 to 50
Post-closure leachate generation rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Methodology and investigations

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2** of this report.

The assessment of effects was achieved by conducting a hydrologic modelling of predicted effects of the landfill on surface water based on the proposed expansion scenario. The existing computer model PCSWMM 2012 Version 5.0.022 was updated to complete a hydrologic analysis to estimate changes in peak flows and runoff volumes from the Site under various storm event conditions for the proposed vertical expansion. Distinct design storm hyetographs were created in PCSWMM, based on the Environment Canada's Rainfall Intensity Duration Frequency (IDF) Values for the Hamilton Airport. The 2, 5, 10, 25, 50, and 100-year 24- hour, SCS Type 2 distribution, storm events were considered in the hydrologic modelling to provide a design basis for on Site SWM features (quantity control).

The stormwater management system for the Site was designed to provide water quality and water quantity control of surface water runoff. Water quality treatment is provided through extended detention of the 4-hour duration 25 mm storm event. The SWM pond is designed to provide water quantity control for all storm events up to the 100-year storm, via attenuation of peak flows to below the Pre-Development Condition. Estimated runoff from the Regional Storm (Hurricane Hazel) has been assessed to demonstrate an ability to safely convey flow to downstream receivers.

At a minimum, internal drainage ditches were sized to accommodate the peak flow generated from the 3-hour duration 25-year storm, as required by the MECP Guidelines.

The effects of the proposed landfill expansion on surface water is forecasted to be minimal based on the minor changes in contributing drainage areas in SSA.

4.3 Surface water net effects

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a "Yes" answer was given in the Screening Criteria Checklist) for those Surface Water criteria which might be affected by the project as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Area(s) would change as a result of the construction and operation of the proposed undertaking.

As described in Section 2, a "Yes" was applied to the following Surface Water criteria:

Table 4.2 Screening criteria checklist – surface water

	Criterion	Yes	No	Additional information
	Might the project…			
1.1	Cause negative effects on surface water quality, quantities, or flow?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause potential negative effects on surface water quality, quantities, or flows.
1.3	Cause significant sedimentation or soil erosion or shoreline or riverbank erosion on or off site?		X	The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause sedimentation on or off site.
1.4	Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment.

With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.3.1 Potential effects on surface water

The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and On-Site operations especially towards the northern side of the Site. These changes may cause negative effects on the following with respect to surface water:

– Surface water quality: minor erosion/soil loss may occur due to steeper slopes for the proposed vertical landfill expansion. Based on the Universal Soil Loss Equation (USLE), an increased slope would lead to increased soil loss due to erosion. The increase in soil loss would be minor as slope is only one of numerous factors that affect

soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of Total Suspended Solids (TSS) and TSS related pollutants (e.g., metals entrained in the soil).

– Surface water quantity: slight increase in runoff peak flows and volumes compared to existing conditions are expected. Based on the updated hydrologic modelling completed, there is no significant increase in runoff peak flow rates or volumes for the proposed landfill expansion compared to the approved existing conditions.

The revised drainage areas are presented on Figure 4 and a summary of the subcatchment parameters for contributing drainage areas to the SWM pond is presented in Table 4.3.

Table 4.3 Proposed subcatchment parameters for contributing drainage areas to SWM pond

Catchment ID	Area (ha)	Slope (%)	Imperviousness Area (%)	Imperviousness Area (ha)	SCS Curve Number
201	3.06	25	5	0.15	73
202	1.48	25	7	0.10	74
203	1.23	25	5	0.06	72
204	3.05	25	8	0.24	73
206	0.14	2	5	0.01	72
207	0.38	2	95	0.36	98
208	0.26	2	95	0.25	98
209	0.21	2	5	0.01	72
210	0.43	10	100	0.43	98
Total	10.24				

4.3.2 Mitigation measures

Mitigation measures such as SWM controls are provided within the Site to convey surface runoff and provide sufficient water quality storage prior to discharge off-site. These control measures will help to attenuate peak discharge for water quantity and meet the water quality requirement in accordance with the MECP Planning and Design Manual 2003 (SWMP Manual). Also, best management practices such as implementing a robust construction period sediment and erosion control program and good vegetative coverage will be established on the final cover of the landfill to reduce erosion and maintain existing hydrologic conditions.

The existing stormwater controls in SSA include drainage ditches and the SWM pond which are summarized in subsequent sections.

4.3.2.1 Drainage ditch

The existing drainage ditches on Site have a maximum depth of 1 m with side slopes of 4H:1V on landfill side and 3H:1V on the perimeter access roadside of the ditches. Surface runoff is conveyed from landfill cap and access road to the SWM pond. The ditches were designed with sufficient capacity to convey flow in excess of that generated by the 100-year or Regional storm.

4.3.2.2 SWM pond

The existing SWM pond has a maximum permanent pool depth of 0.6 m, 4H:1V side slopes, and a berm in the midsection of the pond that will create an extended flow path, which will allow for additional settling of suspended solids. Surface water runoff volumes up to the 5-year storm event will be discharged via the riser pipe outlet. The outlet structure provides 24 hours of extended detention for the 25 mm storm event runoff volume.

In the case of water quality concern (i.e., spill) within the Site, the riser pipe outlet is equipped with a sluice gate which can be closed to contain the impacted water and temporarily prevent discharge from the pond up to a 5-year storm event. The waters will be tested and disposed in accordance with the applicable guidelines and via appropriate means and methods.

The SWM pond with a permanent pool volume of 1,266 m^3 and a total live storage volume in excess of 5,502 m^3 has sufficient capacity to detain the runoff from all storm events up to and including the Regional storm event.

4.3.3 Net effects

This section documents the net effects assessment for the Brooks Road Landfill Site Expansion EA from a Surface Water Resources perspective. The net effect analysis is based on the following assumptions:

– A construction period erosion and sediment control program will be established and maintained through the construction period to minimize sediment migration.
– The landfill cap will be vegetated and no pollutants of any kind (i.e., pesticides, herbicides, fertilizers) will be applied to the cap once it has been fully vegetated.
– Only areas on the landfill cap and access roads to the north are changing, no other area of the landfill will change slopes or have its drainage significantly re-configured in any way.
– No surface water will ever come in contact with waste. Any surface water that infiltrates through the cap will be captured by the leachate collection system and treated.
– There will be no leachate seeps or exchange of surface water and leachate.

The proposed expansion of the landfill will increase the imperviousness percent of the contributing drainage areas to the SWM pond by less than 2 percent. The design capacity and storage volume for the existing drainage ditches and SWM pond respectively, exceeds the MECP requirements for Enhanced level protection. Therefore, the SWM pond as designed will mitigate the water quality and quantity effects leading to minimal impact to surface water on Site.

Hydrologic modelling results including comparison tables and output files for the existing approved and vertical expansion proposed condition are provided in Appendix D.

A summary of the surface water potential effects, mitigation measures and net effects are provided in Table 4.4.

Table 4.4 Summary of surface water potential effects, mitigation measures and net effects

Environmental component	Evaluation criteria	Indicator	Potential effects	Mitigation measures	Net effects
Surface water resources	Surface water quality	Predicted effects on surface water quality on-site and off-site	Based on the USLE, an increased slope would lead to increased soil loss due to erosion. The increase in soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of TSS and TSS related pollutants.	Implement a construction period erosion and sediment control program. Continuous operation of the stormwater management pond to remove the excess TSS. Ensure good vegetative coverage on the expanded areas to reduce erosion	No effects on surface water quality on-site or off-site.
	Surface water quantity	Change in drainage areas	Hydrologic modelling update shows no significant increase in runoff peak flow rates or volumes for the proposed landfill conditions compared to the approved existing conditions.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows.	Slight change in drainage areas. The proposed expansion of the landfill will increase the imperviousness percent of the contributing drainage areas to the SWM pond by less than 2 percent. However, the SWM pond capacity is sufficient to accommodate this change.
		Predicted occurrence and degree of off-site effects	Hydrologic modelling update shows that the stormwater management pond will attenuate runoff peak flow rates for all storm events modelled.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows to protect downstream receivers from potential changes in water quantity.	No off-site effects to surface water quantity.

5. Monitoring requirements and additional approvals

To ensure that the mitigation measures identified in Section 4 are implemented as envisioned, the existing surface water monitoring strategy and schedule as described in Section 3.2.1 for monitoring environmental effects will continue to be implemented On-Site for the proposed landfill expansion. With these mitigation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the proposed undertaking.

5.1 Monitoring requirements

As specified in the Landfill and Industrial Sewage ECAs, the monitoring requirements for the Site includes the following:

– Quarterly grab samples from the monitoring locations
– Laboratory analysis of grab samples
– Annual monitoring reports
– Routine construction period erosion and sediment control inspections

5.2 Previous monitoring results

The background monitoring locations are typically characterized by concentrations of phosphorus, aluminum, and iron that have consistently been reported above the PWQO. Other parameters that have been occasionally detected at concentrations elevated above their respective PWQOs include: phenolics, chromium, cobalt, copper, vanadium, zinc, toluene, and some Polycyclic Aromatic Hydrocarbons (PAH) parameters.

The water quality results for the 2021 monitoring program indicate the following:

– Background surface water monitoring locations (SW1, SW8 and SW9) during 2021 were generally consistent with historical results
– Historic evidence of PAH, metals, and hardness at monitoring locations SW3 and SW6
– There is no direct evidence that landfilling-related activities are impacting water quality at the downstream surface water monitoring locations (SW4, SW5, SW6, SW7)

The 2021 O&M report is provided in Appendix E.

5.3 Additional approvals

No additional approvals are required for surface water conditions.

6. Conclusion

As indicated in the 2013 SWM Plan, the stormwater management system for the Site was designed to provide water quality and water quantity control of surface water runoff prior to off-site discharge. The SWM pond has sufficient capacity for the proposed expansion of the landfill.

GHD anticipates minimal impact to surface water On-Site based on the updated results from the hydrologic analysis. Therefore, no modification to the SWM pond and ditch capacity is recommended for the proposed landfill expansion.

Based on the ECA requirements, it is recommended that the current surface water monitoring program will continue to be implemented at the same locations with corresponding parameters for the proposed landfill expansion.

7. References

Ministry of Environment, March 2003. *Stormwater Management Planning and Design Manual (SWMP Manual).*

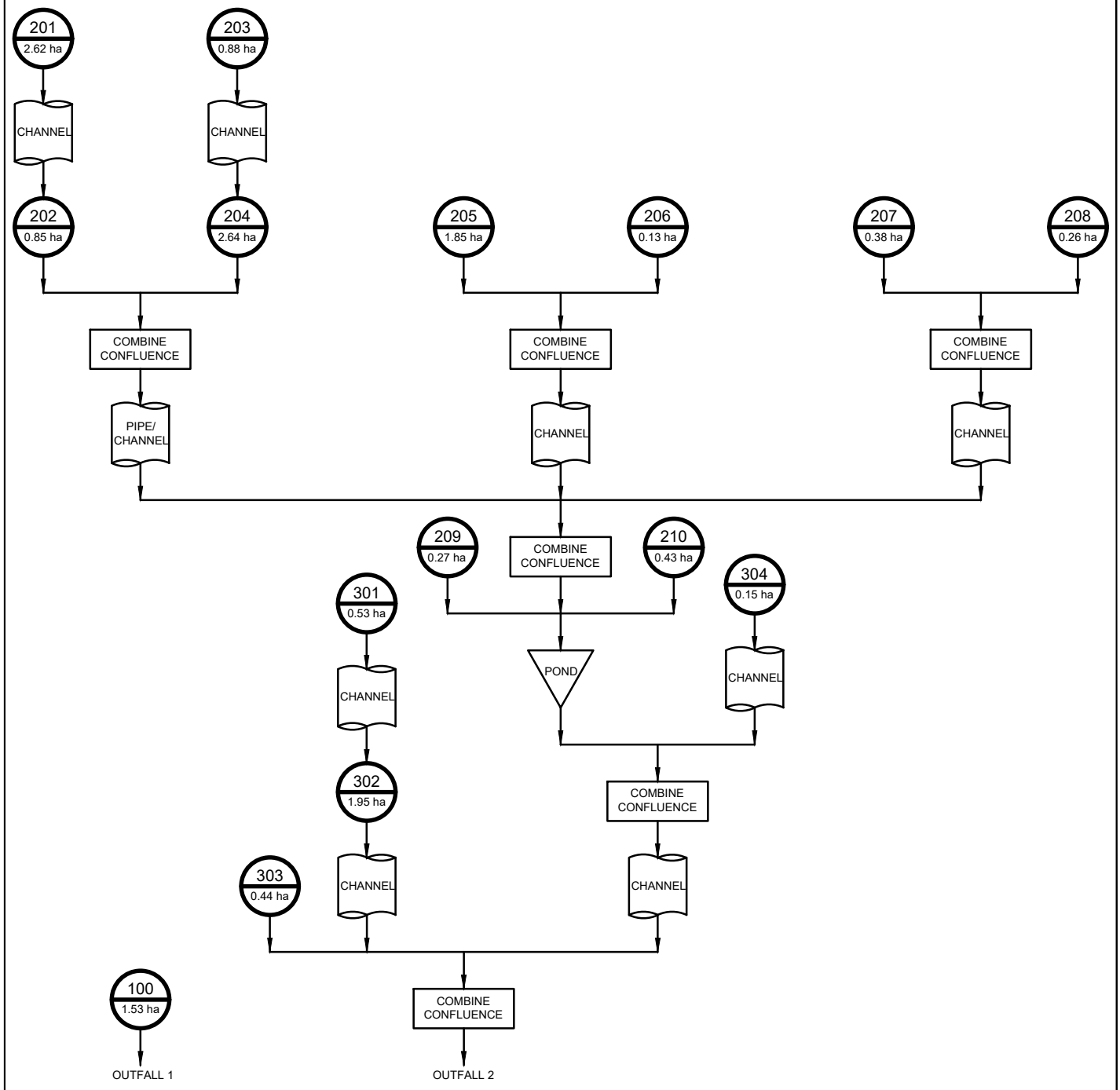
CRA (Conestoga-Rovers & Associates), September 2013. *Stormwater Management Plan*.

GHD (GHD Limited), July 2016. *Surface Water Resources Assessment Report for the Brooks Road Landfill Site, Vertical Capacity Expansion Environmental Assessment*

GHD (GHD Limited), March 2022. *2021 Operations and Monitoring (O & M) Report, Brooks Road Landfill Site*

GHD (GHD Limited), June 2021. *Design and Operations Report Landfill Expansion. Report 81_Revision 1*

Figures



BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA ONTARIO
SURFACE WATER RESOURCES ASSESSMENT REPORT

POST CLOSURE CONDITIONS FLOW SCHEMATIC

Project No. **12561524**
Date **October 2022**

FIGURE 2

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Plot Date: 13 October 2022 3:17 PM

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LEGEND

PROPERTY LINE

SW5 SURFACE WATER MONITORING LOCATION

TEMPORARY DEWATERING SEDIMENTATION POND

GHD

BROOKS ROAD LANDFILL SITE
SURFACE WATER RESOURCES ASSESSMENT REPORT

SURFACE WATER MONITORING LOCATIONS

Project No. **12561524**
Date **October, 2022**

Figure 3

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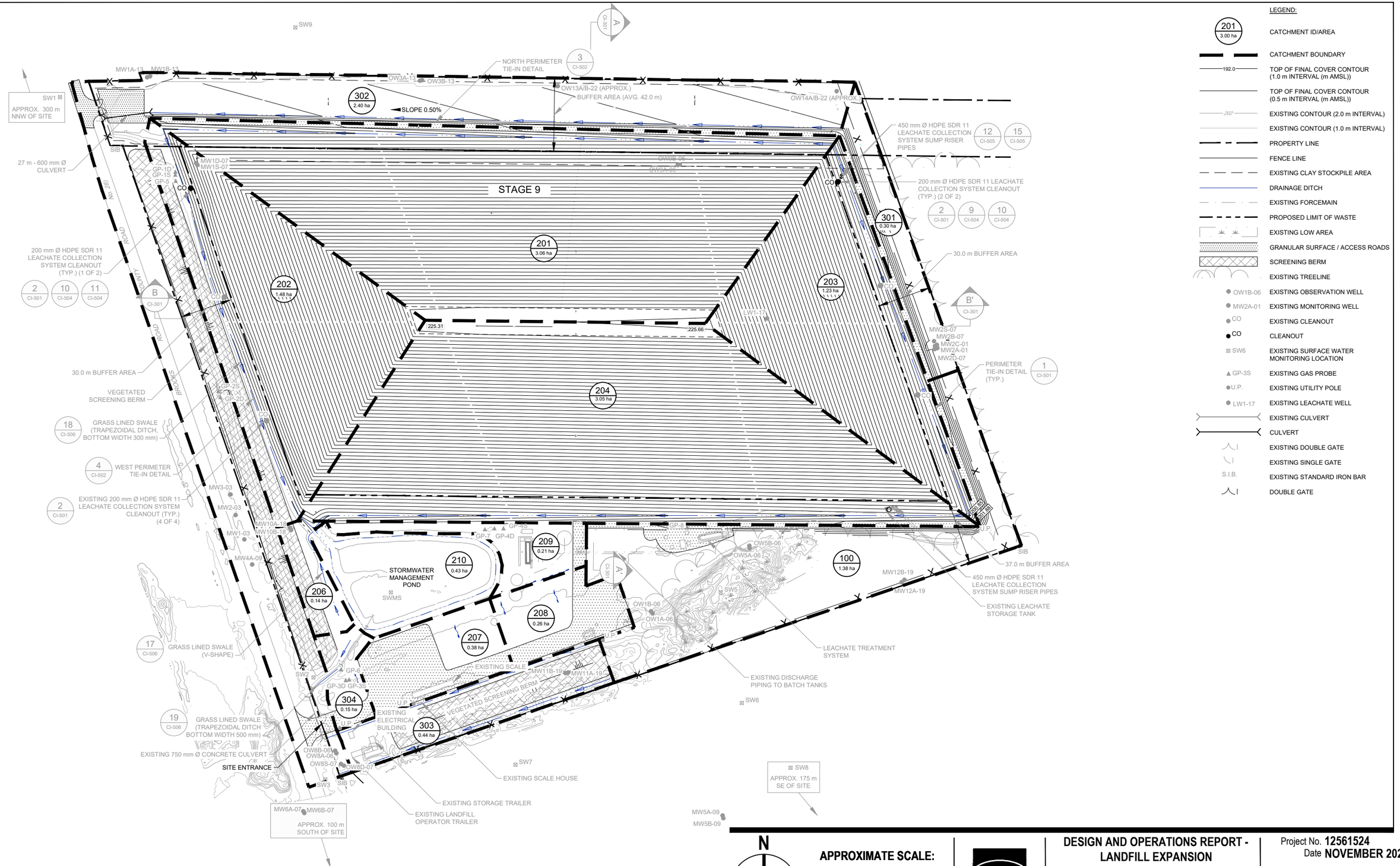

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APPROXIMATE SCALE:

0 200 400 600m

GHD

DESIGN AND OPERATIONS REPORT - LANDFILL EXPANSION
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario
PROPOSED CONDITIONS CATCHMENT DELINEATION

Project No. **12561524**
Date **NOVEMBER 2023**

FIGURE 4

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Plot Date: 14 November 2023 12:16 PM

Appendices

Appendix A

Environmental Compliance Approval

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 1122-BKUPSM
Issue Date: February 3, 2020

2270386 Ontario Limited
162 Cumberland St
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd, Lot 24, Concession 1 North of Talbot Road
County of Haldimand

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

A stormwater management facility and a leachate collection, treatment, and disposal system to service the Brooks Road Landfill Site (formerly Edwards Landfill Site), located in Part of Lot 24, Concession 1, North of Talbot Road, Haldimand County, discharging to a roadside ditch along the east side of Brooks Road, consisting of the following:

Leachate Treatment System

A leachate treatment system designed and installed for a Rated Capacity of 200 m³/day to service the Brooks Landfill Site, located at the south-central side of the landfill site, with an effluent discharge system to discharge effluent to a roadside ditch along Brooks Road with a Rated Capacity of 45 m^3 /day, with a Peak Daily Flow of 60 m^3/day and such other removal of effluent from the Landfill Site in compliance with law, including Ontario Regulation 347, and consisting of the following:

- One (1) leachate collection sump located in the south-east corner of Stage One part of the landfill, equipped with one (1) 6.3 L/sec at 14 m TDH pump discharging through one (1) approximately 35 m long 76.2 mm diameter forcemain into the primary settling tank described below.

- One (1) 28 m³ **Primary Settling Tank** receiving leachate from the existing leachate collection sump, equipped with baffle walls and one (1) 7 L/sec at 9.0 m TDH PST pump, three (3) level floats, and pH monitor, discharging through one (1) 500 micron opening strainer installed on the

feed line to an aeration system described below.

- One (1) **Aeration System** comprising of two (2) 114 m³ capacity concrete tanks in series each aeration tank equipped with 1" lateral air diffusers, two (2) air blowers each with 910 m³/hr (530 cfm) capacity at 13 psi head loss, and the second aeration tank fitted with three (3) level floats, discharging via one (1) 66 m³/hr capacity at 106 m TDH feed pump to the Membrane Biofiltration Reactor (MBR) treatment system described below.

- One (1) 200 m³/day Rated Capacity **Membrane Biofiltration Reactor (MBR) Treatment System** consisting 8 mm diameter membranes housed in four (4) 200 mm diameter tubular modules installed in series and providing a filtration surface area of 36.7 m² per module, designed to operate at maximum pressure of 8 Bar (116 psi) at 40º C with a circulation velocity of 3 m/sec, providing a total filtration area of 146.8 m², equipped with one (1) 200 m³/hr capacity MBR recirculation pump to be used to recirculate activated sludge across the membranes, discharging to a UV disinfection system described below.

- Two (2) **UV Disinfection Units** operating in parallel, each unit capable of providing minimum UV dosage of 40 mJ/cm² at a flow of 114 L/min, discharging by gravity to an effluent transfer tank described below.

- Effluent discharge system consisting of:
  - One (1) 12.5 m³ capacity **Effluent Transfer Tank** equipped with one (1) 7 L/sec at 11 m TDH capacity effluent pump and three (3) level floats, to be used as temporary storage tank to transfer effluent to the existing effluent discharge holding tanks described below.
  - Three (3) 150 m³ capacity **Effluent Discharge Holding Tanks.**
  - Discharge piping from the **Effluent Discharge Holding Tanks** and flow measuring device for a Rated Capacity of 45 m^3/day with a Peak Daily Flow of 60 m^3/day, discharging to the roadside ditch.
  - Discharge piping from the **Effluent Discharge Holding Tanks** and control valve for loading of haulage units for lawful removal of effluent from the Site

- One (1) 12.5 m³ capacity **Sludge Storage Tank**, providing approximately eight (8) days sludge storage capacity, equipped with one (1) 7 L/sec at 7 m TDH capacity sludge pump transferring sludge to the landfill for disposal.

- A chemical feed system consisting of:

  Nitrification
  - one (1) 9 L/hr at 44 psi capacity chemical metering pump dosing **magnesium hydroxide** from a dual wall storage tank to the aeration tank described above for alkalinity control.

  Phosphorus Removal
  - one (1) 9 L/hr at 44 psi capacity chemical metering pump dosing **alum** into the feed line of the aeration tank described above for phosphorus removal.

  Acid Cleaning

- one (1) 24 L/hr at 145 psi capacity chemical metering pump dosing **citric acid** into the MBR feed piping during an acid cleaning of the membranes to remove calcified minerals.

Oxidation Cleaning
- one (1) 78 L/hr at 145 psi capacity chemical metering pump dosing **sodium hypochlorite** into the MBR feed piping during a chlorine cleaning of the membranes to remove accumulated sludge.

Alkaline Cleaning
- one (1) 24 L/hr at 145 psi capacity chemical metering pump dosing **magnesium hydroxide** into the MBR feed piping during an alkaline cleaning of the membranes to remove accumulated fats, oil, and grease.

Leachate Collection System

- a leachate collection, transmission, and storage, designed to handle a maximum of 60 m³/day of leachate generated from the site, consisting of two (2) 75.7 L/min capacity leachate pumps and one (1) 50 mm diameter HDPE forcemain.

Stormwater Management System

A stormwater management facility to service the Brooks Road Landfill Site with a total drainage area of 14.91 ha and an approved landfill footprint of 6.07 ha, designed to provide quantity and quality control of stormwater runoff from storm events with up to 1:100 year return frequency, consisting of the following:

Stormwater Management System (SWMS)

A stormwater management system to provide quality and quantity control of stormwater runoff from the site during the active operation and post closure of the landfill site, consisting of the following:

- one (1) perimeter ditch running from the north-east corner of the landfill site along the east side and south side of the landfill foot print, having a 0.3 m bottom width, a minimum of 1.0 m depth, and 3H:1V side slopes on the road side, conveying collected stormwater runoff to a stormwater management pond described below.

- one (1) perimeter ditch running from the north-east corner of the landfill site along the north side and west side of the landfill foot print, having a 0.3 m bottom width, a minimum of 1.0 m depth, and 3H:1V side slopes on the road side, conveying collected stormwater runoff to a stormwater management pond described below.

- one (1) inlet structure including two (2) 600 mm diameter concrete culverts and an open swale covered with turf reinforcement mat discharging into a forebay described below.

- one (1) forebay with approximate length of 29 m, upstream width of 4 m and downstream width of 15 m, a permanent pool depth of 0.60 m, and side slopes of 4H:1V, equipped with a berm with top

elevation 197.85 m AMSL, discharging to a stormwater management pond described below.

- one (1) wet detention stormwater management pond **(SWMS Pond)** to be located on south west corner of the site providing a total storage capacity of 6,768 m³ consisting of a permanent pool storage volume of 1,266 m³ (at elevation 197.85 m AMSL) with a maximum depth of 0.60 m and an extended storage volume of 5,502 m³ with an extended storage depth of 0.34 m (at elevation of 198.19 m AMSL).

- one (1) outlet structure consisting of one (1) 150 mm diameter perforated PVC pipe with an invert elevation of 197.85 m AMSL, equipped with 75 mm orifice plate, an outlet control valve, and one (1) 600 mm x 1200 mm concrete catch basin, discharging to a roadside ditch along the east side of Brooks Road.

- one (1) emergency by-pass structure consisting of a 2.0 meter wide rip-rap spillway at invert elevation of 199.10 m AMSL discharging to a roadside ditch along Brooks Road,

Including all controls and associated appurtenances,

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document and any schedules attached to it, and the application;

"BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"CBOD5" means 5 day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in unfiltered sample;

"Daily Concentration" means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for purposes of Part II.1, EPA;

"District Manager" means the District Manager of the Hamilton District Office;

"EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

"Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of a named equipment;

"Limited Operational Flexibility" (LOF) means any modifications that the Owner is permitted to make to the Works under this Approval;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Monthly Average Concentration" means the arithmetic mean of all Daily Concentrations of a contaminant in the effluent sampled or measured, or both, during a calendar month;

"Monthly Average Daily Flow" means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month;

"Notice of Modifications" means the form entitled "Notice of Modifications to Sewage Works";

"Owner" means 2270386 Ontario Limited and its successors and assignees;

"OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

"Previous Works" means those portions of the sewage works previously constructed and approved under an Approval;

"Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this Approval;

"Rated Capacity" means the Monthly Average Daily Flow for which the Works are approved to handle;

"Works" means the sewage works described in the Owner's application, and this Approval, and includes Proposed Works, Previous Works, and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

I. GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(3) Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the documents listed in the Schedule submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner or operating authority, or both.

(b) change of address of Owner or operating authority or address of new owner or operating authority.

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Partnerships Registration Act.

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the Corporations Information Act shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this Condition will refer to this Approval's number.

II. LEACHATE COLLECTION AND TREATMENT FACILITY

3. LEACHATE MANAGEMENT

(1) Leachate generated at the landfill Site shall be collected, treated and disposed of using the on-site leachate treatment system

(a) Notwithstanding Condition 3(1), leachate generated at the landfill Site that is not treated using the on-site leachate treatment system shall be removed to an off-site facility that is approved by the Ministry to treat leachate generated at the landfill Site.

(b) In the event there is effluent from leachate that has been treated in the on-site leachate treatment system that cannot be disposed of to the roadside ditch, such effluent may be disposed of to an off-site facility provided such disposal is completed lawfully, including pursuant to Ontario Regulation 347.

(2) Leachate generated at the Landfill Site that is not treated using the on-site leachate treatment system shall not be discharged to the natural environment at any time.

4. OPERATIONS AND MAINTENANCE

(1) Within six (6) months of the issuance date of this Approval, the Owner shall prepare and submit for approval to the Director and a copy to the District Manager a "Contingency and Remedial Action Plan for the Works (**On-site leachate treatment system**)" which shall provide detailed action plans that will be implemented during any event when the effluent limits set under Condition 6(1) are not met;

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the works.

(b) inspection programs, including frequency of inspection, for the works and the methods or tests employed to detect when maintenance is necessary.

(c) repair and maintenance programs, including the frequency of repair and maintenance for the works.

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager, and

(e) complaint procedures for receiving and responding to public complaints.

(3) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

5. EFFLUENT OBJECTIVES

(1) The Owner shall use best efforts to design, construct and operate the works with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the Works.

Table 1 - Effluent Objectives	
Effluent Parameter	**Concentration Objective** (milligrams per litre unless otherwise indicated)
CBOD5	5.0
Total Suspended Solids (TSS)	5.0
Total Ammonia Nitrogen (TAN)	1.0
Total Phosphorus (TP)	0.2
Zinc	0.03
Phenols	0.005
Ethylbenzene	0.008

(2) As a further effluent objective, the Owner shall use best efforts to maintain the pH of the effluent from the works within the range of 6.5 to 8.5, inclusive, at all times.

(3) The Owner shall include in all reports submitted in accordance with Condition 12 a summary of the efforts made and results achieved under this Condition.

6. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the works such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the works.

Table 2 - Effluent Limits	
Effluent Parameter	**Concentration Limit** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
CBOD5	10.0
Total Suspended Solids (TSS)	10.0
Total Ammonia as Nitrogen (TAN)	3.0
Total Phosphorus (TP)	0.29
Toxicity (Daphnia magna)	Non-acutely lethal
Toxicity (Rainbow Trout)	Non-acutely lethal
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

(2) The Owner shall ensure that monitoring results for effluent discharge parameters outlined in Condition 9(3) meet the concentration limits set out in Column 2 of subsection (1).

(3) For the purposes of determining compliance with and enforcing subsection (1):

(a) The Concentration of a parameter named in Column 1 of subsection (1), sampled in accordance with Condition 9(3) shall not exceed the corresponding maximum concentration set out in Column 2 of subsection (1).

(b) The pH of the effluent shall be maintained within the limits outlined in subsection (1), at all times.

(4) In the event of any instance of non-compliance with the effluent limits stipulated under Condition 6(1), the Owner shall implement the "Contingency and Remedial Action Plan for the Works (**On-site leachate treatment system**)" prepared under Condition 3(1), and shall determine appropriate control measures to achieve effluent limits and the time lines for the implementation of identified control measures. The Owner shall submit the proposed control measures and implementation time lines for approval to the Director and a copy to the District Manager.

(5) If compliance with effluent limits are not met within the time lines approved under Condition 6(4), the Owner shall discontinue effluent discharge from the Works and implement off-site disposal of leachate for proper treatment.

(6) In the event that any of the control measures proposed under Condition 6(4) require the installation or an upgrade of the Works, the Owner shall submit an application to the Director for an amendment of this Approval.

7. EFFLUENT - VISUAL OBSERVATIONS

(1) Notwithstanding any other condition in this Approval, the Owner shall ensure that the effluent from the works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters.

8. SPECIAL CONDITION

(1) The Owner shall operate the roadside ditch discharge system for the On-Site Leachate Treatment System at the approved Rated Capacity of 45 m^3/day and Peak Daily Flow of 60 m^3/day until an approval is issued by the Director to operate the roadside ditch discharge system at a higher rated capacity. To obtain approval for using the roadside ditch discharge system at a higher rated capacity, the Owner shall complete a detailed receiving surface water assimilative capacity study and submit the study report along with a proposal for effluent limits to the Ministry's Regional Technical Support Section for review and recommendation. Upon receiving review comments and recommendation of the effluent limits from the Technical Support Section, the Owner shall submit to the Director an application for amendment of this Approval and a detailed design brief for approval of the higher rated capacity for the roadside ditch discharge system.

9. EFFLUENT MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the sewage works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Leachate grab samples shall be collected and analyzed at the following sampling point and at the sampling frequencies specified for each parameter listed:

Table 3 - Influent Leachate Monitoring
Sampling Point: Leachate Storage Tank

Parameters	Frequency	Parameter	Frequency
CBOD5	Monthly	Chlorides	Quarterly
Total Suspended Solids (TSS)	Monthly	Nitrate as Nitrogen	Quarterly
Total Ammonia as Nitrogen (TAN)	Monthly	Arsenic	Quarterly
Total Phosphorus (TP)	Monthly	Barium	Quarterly
pH	Monthly	Boron	Quarterly
Zinc	Monthly	Chromium	Quarterly
Phenols	Monthly	Copper	Quarterly
Ethylbenzene	Monthly	Iron	Quarterly
		Lead	Quarterly
		Benzo(a)pyrene	Quarterly
		Naphtalene	Quarterly
		Benzene	Quarterly
		Toluene	Quarterly

(3) Effluent samples shall be collected and analyzed at the following sampling point, at the sampling frequencies and using the sample type specified for each parameter listed:

Table 4 - Effluent Monitoring
Sampling Point: Effluent Discharge Pipe
Discharge to Brooks Road Ditch

Parameters	Sample Type	Frequency
CBOD5	Grab	Monthly
Total Suspended Solids (TSS)	Grab	Monthly
Total Ammonia as Nitrogen (TAN)	Grab	Monthly
Total Phosphorus (TP)	Grab	Monthly
pH	Grab	Monthly
Zinc	Grab	Monthly
Phenols	Grab	Monthly
Ethylbenzene	Grab	Monthly
Chlorides	Grab	Quarterly
Nitrate as Nitrogen	Grab	Quarterly
Arsenic	Grab	Quarterly
Barium	Grab	Quarterly
Boron	Grab	Quarterly
Chromium	Grab	Quarterly
Copper	Grab	Quarterly
Iron	Grab	Quarterly
Lead	Grab	Quarterly
Benzo(a)pyrene	Grab	Quarterly
Naphtalene	Grab	Quarterly
Benzene	Grab	Quarterly
Toluene	Grab	Quarterly
Acute Lethality Test (Rainbow Trout and Daphnia magna)	Grab	Quarterly

(4) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended from time to time by more recently published editions.
(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions, and
(c) the Environment Canada publications "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" (EPS 1/RM/13 Second Edition - December 2000)

and "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna" (EPS 1/RM/14 Second Edition - December 2000), as amended from time to time by more recently published editions.

(5) The measurement frequencies specified in subsections (2) and (3) in respect of any parameter are minimum requirements which may, after one (1) year of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(6) The owner shall install and maintain (a) continuous flow measuring device(s) to measure the flow rate of the effluent discharged from the sewage works, with an accuracy to within plus or minus fifteen (15) per cent of the actual flow rate for the entire design range of the flow measuring device and record the flow rate at a daily frequency..

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

III - STORMWATER MANAGEMENT FACILITY

10. MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following stormwater monitoring program. Stormwater grab samples shall be collected from the Stormwater Management System **(SWMS) Pond** at a **quarterly frequency** (Spring, Summer, Fall, and Winter) and analysed for the following parameters:

Table 5 - Stormwater Monitoring
Sampling Point: **SWMS Pond**

General Parameters	Metals	Field Parameters
Alkalinity	Arsenic	Conductivity
Conductivity	Barium	Dissolved Oxygen
Hardness	Boron	pH
pH	Cadmium	Temperature
Chloride	Chromium	
Sulphate	Copper	
Nitrate as Nitrogen	Iron	
Nitrite as Nitrogen	Lead	
Total Ammonia as Nitrogen (TAN)	Mercury	
Total Suspended Solids	Zinc	
Total Dissolved Solids		
Chemical Oxygen Demand	**Organics**	
Total Phosphorus	Benzo(a)pyrene	
Total Kjeldahl Nitrogen	Ethylbenzene	
Biological Oxygen Demand (BOD5)	Naphthalene	
Phenols		

(2) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions.

11. OPERATION AND MAINTENANCE

(1) The stormwater run-off generated from the active waste fill area shall be considered contaminated and treated as leachate. The Owner shall ensure that any precipitation falling unto active waste fill areas, not under interim cover, shall be directed to the leachate collection system.

(2) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(3) The Owner shall prepare an operations manual within six (6) months of Substantial Completion of the Works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works.

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary for operational efficiency and environmental protection of the receiving body.

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works.

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager, and

(e) complaint procedures for receiving and responding to public complaints.

(4) The Owner shall maintain the operations manual current and retain a copy at the location of the Works or operational office of the Owner for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(5) The Owner shall undertake an inspection of the condition of the stormwater management ponds and ditches, at least once a year, and undertake any necessary cleaning and maintenance to prevent the

excessive build-up of sediment and/or decaying vegetation.

(6) The Owner shall undertake an inspection and necessary maintenance of the SWMS pond and associated erosion controls including temporary berms, silt fences, rocks and straw bale check dams at least once a year to ensure that the Works are effectively protecting the environment.

(7) The Owner shall maintain a logbook to record the results of the stormwater management pond inspections and any cleaning and maintenance operations undertaken and shall keep the logbook at the site or operational office of the Owner for inspection by the Ministry.

Stormwater Management System (SWMS)

(8) Before the commencement of operation of the Works, the Owner shall prepare a "Stormwater Contingency and Remedial Action Plan" for the Works and provide a copy to the District Manager.

(9) The Owner shall operate the Works in a **normally open position**. The Owner shall compare monitoring results obtained from the Works under Condition 10(1) with the trigger levels of the selected trigger parameters listed in Table 7 to identify any potential leachate impact to stormwater discharged from the ponds.

Table 7 - Trigger Parameters

Parameter	Trigger Level (mg/L)
Un-ionized Ammonia	0.02
Arsenic	0.005
Boron	1.5
pH (unitless)	6.5 to 8.5

(10) In the event that a monitoring result for any of the parameters listed in Table 7 exceeds its corresponding trigger level concentration, the Owner shall re-sample within two weeks period to confirm the trigger level concentration exceedance for that parameter.

(11) In the event that the trigger level concentration exceedance of any parameter of concern is not confirmed after the second round of sampling conducted under Condition 11(10), then, normal stormwater monitoring shall be resumed.

(12) In the event that the trigger level concentration exceedance of any parameter of concern is confirmed after the second round of sampling conducted under Condition 11(10), the Owner shall operate the Works in a **normally closed position** and notify the District Manager forthwith.

(13) While operating the Works in a **normally closed position**, the Owner shall implement the "Stormwater Contingency and Remedial Action Plan" prepared under Condition 11(8) and collect a grab sample and analyze for the trigger parameters listed under Condition 11(9) at a **weekly frequency** preferably after a rainfall event.

(14) The Owner shall resume operating the Works in a **normally open position** if monitoring results for all

trigger parameters from three (3) consecutive sampling events conducted under Condition 11(13) are less than their respective trigger level concentrations.

(15) Discharge of contaminated stormwater from the Works to storm sewer/surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

IV - GENERAL

12. REPORTING

(1) One week prior to the start up of the operation of the works, the Owner shall notify the District Manager (in writing) of the pending start up date.

(2) The Owner shall report to the District Manager or designate, any exceedance of any parameter specified in Condition 6 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedance.

(3) In addition to the obligations under Part X of the Environmental Protection Act, the Owner shall, within ten (10) working days of the occurrence of any reportable spill as defined on Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(4) The Owner shall prepare and submit a performance report to the District Manager on an annual basis by April 30th. The first such report shall cover the first annual period following the commencement of operation of the works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 6, including an overview of the success and adequacy of the sewage works.

(b) a description of any operating problems encountered and corrective actions taken.

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works.

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period.

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment, and

(f) a description of efforts made and results achieved in meeting the effluent objectives outlined in Condition 5.

13. LIMITED OPERATIONAL FLEXIBILITY

(1) The Owner may make modifications to the Works in accordance with the Terms and Conditions of this Approval and subject to the Ministry's "Limited Operational Flexibility Criteria for Modifications to Sewage Works", included under Schedule B of this Approval, as amended.

(2) Sewage works under Limited Operational Flexibility shall adhere to the design guidelines contained within the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended.

(3) The Owner shall ensure at all times, that the Works, related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this Approval.

(4) For greater certainty, the following are not permitted as part of Limited Operational Flexibility:

(a) Modifications to the Works that result in an increase of the approved Rated Capacity of the Works.

(b) Modifications to the Works that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall.

(c) Modifications to the treatment process technology of the Works, or modifications that involve construction of new reactors (tanks) or alter the treatment train process design.

(d) Modifications to the Works approved under s.9 of the EPA, and

(e) Modifications to the Works pursuant to an order issued by the Ministry.

(5) Implementation of Limited Operational Flexibility is not intended to be used for piecemeal measures that result in major alterations or expansions.

(6) If the implementation of Limited Operational Flexibility requires changes to be made to the Emergency Response, Spill Reporting and Contingency Plan, the Owner shall, provide a revised copy of this plan for approval to the local fire services authority prior to implementing Limited Operational Flexibility.

(7) For greater certainty, any modification made under the Limited Operational Flexibility may only be carried out after other legal obligations have been complied with, including those arising from the *Environmental Protection Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, Lake Simcoe Protection Act* and *Greenbelt Act.*

(8) At least thirty (30) days prior to implementing Limited Operational Flexibility, the Owner shall complete a Notice of Modifications describing any proposed modifications to the Works and submit it to the District Manager.

(9) The Owner shall not proceed with implementation of Limited Operational Flexibility until the District Manager has provided written acceptance of the Notice of Modifications or a minimum of thirty (30) days have passed since the day the District Manager acknowledged the receipt of the Notice of Modifications.

Schedule A

1. Application for Approval of Industrial Sewage Works submitted by Mr. Richard Weldon, Managing Partner, 2270386 Ontario Inc., dated September 9, 2019 and supporting information prepared by GHD Consulting Engineers.

2. Letter from GHD to Mr. Paul Widmeyer, Ministry of Environment, Conservation and Parks, Re: Permanent Stormwater Management System ECA No. 4142-ASEKJ2 dated September 17, 2019.

3. Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated September 11, 2013 and design specifications and drawings Prepared by Conestoga-Rovers & Associates Ltd., Waterloo, Ontario.

4. Letter from Peter Kemp, B. Eng., Conestoga-Rovers & Associates Ltd., to Stefanos Habtom, P. Eng., dated May 31, 2014 in response to an additional information request dated April 10, 2014.
5. Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated May 15, 2015 and design specifications and drawings for the leachate treatment system prepared by KOESTER CANADA, Brantford, Ontario.

6. Revised Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated December 15, 2017 but received on January 8, 2018 and revised design specifications and drawings for the leachate treatment system prepared by KOESTER CANADA, Brantford, Ontario.

Schedule B

Limited Operational Flexibility Criteria for Modifications to Industrial Sewage Works

1. The modifications to sewage works approved under an Environmental Compliance Approval (Approval) that are permitted under the Limited Operational Flexibility (LOF), are outlined below and are subject to the LOF conditions in the Approval, and require the submission of the Notice of Modifications. If there is a conflict between the sewage works listed below and the Terms and Conditions in the Approval, the Terms and Conditions in the Approval shall take precedence.

1.1 Sewage Pumping Stations

a. Alter pumping capacity by adding or replacing equipment where new equipment is located within an existing sewage treatment plant site or an existing sewage pumping station site, provided that the modifications do not result in an increase of the sewage treatment plant Rated Capacity and the existing flow process and/or treatment train are maintained, as applicable.

1.2 Sewage Treatment Process

a. Installing additional chemical dosage equipment including replacing with alternative chemicals for pH adjustment or coagulants (non-toxic polymers) provided that there are no modifications of treatment processes or other modifications that may alter the intent of operations and may have negative impacts on the effluent quantity and quality.

b. Expanding the buffer zone between a sanitary sewage lagoon facility or land treatment area and adjacent uses provided that the buffer zone is entirely on the proponent's land.

c. Optimizing existing sanitary sewage lagoons with the purpose to increase efficiency of treatment operations provided that existing sewage treatment plant rated capacity is not exceeded and where no land acquisition is required.

d. Optimizing existing sewage treatment plant equipment with the purpose to increase the efficiency of the existing treatment operations, provided that there are no modifications to the works that result in an increase of the Rated Capacity, and may have adverse effects to the effluent quality or location of the discharge.

e. Replacement, refurbishment of previously approved equipment in whole or in part with Equivalent Equipment, like-for-like of different make and model, provided that the firm capacity, reliability, performance standard, level of quality and redundancy of the group of equipment is kept the same. For clarity purposes, the following equipment can be considered under this provision: screens, grit separators, blowers, aeration equipment, sludge thickeners, dewatering equipment, UV systems, chlorine contact equipment, bio-disks, and sludge digester systems.

1.3 Sewage Treatment Plant Outfall

a. Replacement of discharge pipe with similar pipe size provided that the outfall location is not changed.

1.4 Sanitary Sewers

a. Pipe relining and replacement with similar pipe size within the Sewage Treatment Plant site, where the nominal diameter is not greater than 1,200 mm.

1.5 Pilot Systems

a. Installation of pilot systems for new or existing technologies provided that:

i. any effluent from the pilot system is discharged to the inlet of the sewage treatment plant or hauled off-site for proper disposal,
ii. any effluent from the pilot system discharged to the inlet of the sewage treatment plant or sewage conveyance system does not significantly alter the composition/concentration of the influent sewage to be treated in the downstream process; and that it does not add any inhibiting substances to the downstream process, and
iii. the pilot system's duration does not exceed a maximum of two years; and a report with results is submitted to the Director and District Manager three months after completion of the pilot project.

2. Sewage works that are exempt from section 53 of the OWRA by O. Reg. 525/98 continue to be exempt and are not required to follow the notification process under this Limited Operational Flexibility.

3. Normal or emergency operational modifications, such as repairs, reconstructions, or other improvements that are part of maintenance activities, including cleaning, renovations to existing approved sewage works equipment, provided that the modification is made with Equivalent Equipment, are considered pre-approved.

4. The modifications noted in section (3) above are <u>not</u> required to follow the notification protocols under Limited Operational Flexibility, provided that the number of pieces and description of the equipment as described in the Approval does not change.

Ontario
Ministry of
the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:
1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Conforms with the Limited Operational Flexibility as per the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name (Print)	PEO License Number

Signature	Date (mm/dd/yy)

Name of Employer

Part 4 – Declaration by Owner

I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name of Owner Representative (Print)	Owner representative's title (Print)

Owner Representative's Signature	Date (mm/dd/yy)

Notice of Modifications Dec-2013.pdf

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent Owners of the works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is imposed to ensure consistency between approvals granted by the Ministry.

4. Conditions 4 and 11 are included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the works.

5. Condition 5 is imposed to establish non-enforceable effluent quality objectives which the Owner is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 5 are exceeded.

6. Conditions 6 and 7 are imposed to ensure that the effluent discharged from the Works to the Brooks Road side ditch meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.

7. Condition 8 is included to ensure that treatment capacity for the leachate treatment system is established based on proper receiving surface water assimilative capacity assessment and effluent limits requirements.

8. Conditions 9 and 10 are included to require the Owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved Works is consistent with the (design objectives and) effluent limits specified in the Approval and that the approved works does not cause any impairment to the receiving watercourse.

9. Condition 12 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

10. Condition 13 is included to ensure that the Works are operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider. These Conditions are also included to ensure that a Professional Engineer has reviewed the proposed modifications and attests that the modifications are in line with that of Limited Operational Flexibility, and provide assurance that the proposed modifications comply with the Ministry's requirements stipulated in the Terms and Conditions of this Approval, Ministry policies, guidelines, and industry engineering standards and best management practices.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4142-ASEKJ2 issued on January 29, 2018.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 3rd day of February, 2020

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

HV/

c: District Manager, MECP Hamilton - District
Greg Ferraro, GHD

Notice of Modifications Dec-2013.pdf

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A110302
Issue Date: October 1, 2021

2270386 Ontario Limited
162 Cumberland St
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd North Cayuga
Haldimand County,
N0A 1E0

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

a waste disposal site (landfill) with a total site area of 14.3 hectares of which 6 hectares is approved for landfilling.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" or "ECA" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A";
"Contaminating Life Span" means contaminating life span as defined in Ontario Regulation 232/98;
"Design and Operations Report" means the Design and Operations Report Vertical Expansion – Rev. 1, Brooks Road Landfill Site, Prepared by GHD, June 14, 2021 that was submitted in support of the Approval
"Director" means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part II.1 of the EPA;
"District Manager" means the District Manager of the local district office of the Ministry in which the Site is geographically located;
"EPA" means Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended;
"Improvement Area" means the area of Brooks Road, between Highway #3 (also known as Talbot Road) and Townline Road;
"Ministry" means the Ontario Ministry of the Environment, Conservation and Parks;
"NMA" means Nutrient Management Act, 2002, S.O. 2002, c. 4, as amended;
"Odour Management Plan" means a document which describes the measures to minimize odour emissions from the Site;
"Operator" means any person, other than the Owner's employees, authorized by the

Owner as having the charge, management or control of any aspect of the Site and includes its successors or assigns;
"Owner" means any person that is responsible for the establishment or operation of the Site being approved by this Approval, and includes 2270386 Ontario Limited and its successors and assigns;
“OWRA” means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
“PA” means the Pesticides Act, R.S.O. 1990, c. P-11, as amended;
"Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the OWRA, Section 5 of the EPA, Section 17 of the PA, Section 4 of the NMA, or Section 8 of the SDWA;
"Refrigerant Appliances" means household appliances which use, or may use refrigerants, and which include, but is not restricted to, refrigerators, freezers and air-conditioning systems;
"Regional Director" means the Regional Director of the local Regional Office of the Ministry in which the Site is located;
"Regulation 232" means Ontario Regulation 232/98 - Landfilling Sites made under the EPA, as amended;
"Regulation 347" or "Reg. 347" means means Regulation 347, R.R.O. 1990, General - Waste Management, made under the EPA, as amended;
"Regulation 406" means means Regulation 406/19, R.S.O. 1990, On-site and Excess Soil Management, made under the EPA, as amended;
"Regulation 558" means Ontario Regulation 558/00 - General Waste Management, made under the EPA, as amended;
"Regulation 903" means Regulation 903 - Wells, R.R.O. 1990, made under the OWRA, as amended;
"SDWA" means Safe Drinking Water Act, 2002, S.O. 2002, c. 32, as amended;
“Site" means the entire waste disposal site, including the buffer lands, at the Brooks Road Landfill Site, Lot 24, Concession 1 North, Haldimand County; and
“Trained Personnel” means personnel knowledgeable in the following through instruction and/or practice:
a. relevant waste management legislation, regulations and guidelines;
b. major environmental concerns pertaining to the waste to be handled;
c. occupational health and safety concerns pertaining to the processes and wastes to be handled;
d. management procedures including the use and operation of equipment for the processes and wastes to be handled;
e. emergency response procedures;
f. specific written procedures for the control of nuisance conditions;
g. specific written procedures for refusal of unacceptable waste loads; and
h. the requirements of this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

Compliance

(1) This Approval revokes all previous Approvals and Notices of Amendment issued under Part V of the Environmental Protection Act for this Site. The approval given herein, including the terms and conditions set out, replaces all previously issued Approvals and related terms and conditions under Part V of the Act for this Site.
(2) The Owner and Operator shall ensure compliance with all the conditions of this Approval and shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
(3) Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Approval.

In Accordance

(4) Except as otherwise provided by this Approval, the Site shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule “A”.
(5) 1. Construction and installation of aspects described in Schedule "A" must be completed within 5 years of the later of:
(a) the date this Approval is issued; or
(b) if there is a hearing or other litigation in respect of the issuance of this Approval, the date that this hearing or litigation is disposed of, including all appeals.
2. This Approval ceases to apply in respect of the aspects of the Site noted above that have not been constructed or installed before the later of the dates identified in Condition 1(5)1.

Interpretation

(6) Where there is a conflict between a provision of any document listed in Schedule "A" in this Approval, and the conditions of this Approval, the conditions in this Approval shall take precedence.
(7) Where there is a conflict between the application and a provision in any document listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and the Ministry approved the amendment.
(8) Where there is a conflict between any two documents listed in Schedule "A", the document bearing the most recent date shall take precedence.
(9) The conditions of this Approval are severable. If any condition of this Approval, or the application of any condition of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

Other Legal Obligations

(10) The issuance of, and compliance with, this Approval does not:
(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; and

(b) limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner and Operator to furnish any further information related to compliance with this Approval.

Adverse Effect

(11) The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the present, past and historical operations at the Site. Such steps may include accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

(12) Despite an Owner, Operator, or any other person fulfilling any obligations imposed by this Approval, the person remains responsible for any contravention of any other condition of this Approval or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

(13) At no time shall the Owner or Operator allow the discharge of a contaminant that causes or is likely to cause an adverse effect.

Change of Ownership

(14) The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:

(a) the ownership of the Site;

(b) the Operator of the Site;

(c) the address of the Owner or Operator; and

(d) the partners, where the Owner or Operator is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R. S. O. 1990, c. B.17, shall be included in the notification.

(15) No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

(16) In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Approval, and the Owner shall provide a copy of the notification to the District Manager and the Director.

Registration on Title Requirement

(17) Prior to dealing with the property in any way, the Owner shall provide a copy of this Approval and any amendments, to any person who acquires an interest in the property as a result of the dealing.

(18) (a) If not already completed, within ninety (90) calendar days from the date of issuance of this Approval, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:

(i) a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the Site where waste has been and is to

be deposited at the Site;
(ii) proof of ownership of the Site;
(iii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director, verifying the legal description provided in the Certificate of Requirement;
(iv) the legal abstract of the property; and
(v) any supporting documents including a registerable description of the Site.

(b) If not already completed, within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the Director, the Owner shall:

(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and the District Manager, written verification that the Certificate of Requirement has been registered on title.

Registration on Title Requirement - Contaminant Attenuation Zone (CAZ)
(19) Within thirty (30) calendar days from the date of establishing a contaminant attenuation zone (CAZ) (overburden and/or bedrock aquifers) in either fee simple or by way of a groundwater easement, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:
(a) If rights are obtained in fee simple, the Owner shall provide:

(i) documentation evidencing ownership of the CAZ obtained in compliance with Regulation 232, as amended;
(ii) a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and
(iii) a letter signed by a member of the Law Society of Upper Canada; or other qualified legal practitioner acceptable to the Director, verifying the legal description of the CAZ.

(b) within fifteen (15) calendar days of receiving a Certificate of Requirement signed or authorized by the Director,the Owner shall:

(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and the District Manager, a written verification that the Certificate of Requirement has been registered on title.

(c) If rights are obtained by way of a groundwater easement, the Applicant shall:

(i) provide a copy of the agreement for the easement;
(ii) provide a plan of survey signed and sealed by an Ontario Land Surveyor

for the CAZ; and
(iii) submit proof of registration on title of the groundwater easement to the Director and District Manager;

(d) The Owner shall not amend, or remove, or consent to the removal of the easement or CAZ from title without the prior written consent of the Director.

Inspections by the Ministry

(20) No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the OWRA, the EPA, the PA, the SDWA or the NMA, of any place to which this Approval relates, and without limiting the foregoing:
(a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept;
(b) to have access to, inspect, and copy any records required to be kept by the conditions of this Approval;
(c) to inspect the Site, related equipment and appurtenances;
(d) to inspect the practices, procedures, or operations required by the conditions of this Approval; and
(e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the EPA, the OWRA, the PA, the SDWA or the NMA.

Information and Record Retention

(21) (a) Except as authorized in writing by the Director, all records required by this Approval shall be retained at the Site for a minimum of two (2) years from their date of creation.
(b) The Owner shall retain all documentation listed in Schedule “A” for as long as this Approval is valid.
(c) All information and logs required in Conditions 9(1), 10(1), 11(3), 11(4), 12(3), and 12(4) shall be kept at the Site until they are included in the Annual Report.
(d) The Owner shall retain employee training records as long as the employee is working at the Site.
(e) The Owner shall make all of the above documents available for inspection upon request of Ministry staff.
(22) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action under this Approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
(a) an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Approval or any statute, regulation or other legal requirement; or
(b) acceptance by the Ministry of the information’s completeness or accuracy.
(23) The Owner shall ensure that a copy of this Approval, in its entirety and including all its Notices of Amendment, and documentation listed in Schedule "A", are retained at the Site at all times.
(24) Any information related to this Approval and contained in Ministry files may be

made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

2. FINANCIAL ASSURANCE

(1) (a) Within twenty (20) days of issuance of this Notice, the Owner shall submit to the Director, Financial Assurance as defined in Section 131 of the Environmental Protection Act, in the amount of **$8,371,282.00.** This Financial Assurance shall provide sufficient funds for the closure and post-closure care/monitoring of the Site.

(i) The total amount of financial assurance specified in Condition 2(1)(a) shall be updated by the Owner, as follows, by the specified dates:

i. October 1, 2021 - **$9,956,333.00**
ii. October 1, 2022 - **$11,541,383.00**
iii. October 1, 2023 - **$10,424,285.00**
iv. October 1, 2024 - **$10,097,075.00**

(b) Commencing on October 1, 2023 and on a three (3) year basis thereafter, the Owner shall provide to the Director a re-evaluation of the amount of the Financial Assurance to facilitate the actions required under Condition 2(1)(a). The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of alternative measures required by the Director upon review of the annual reports. The Financial Assurance must be submitted to the Director within twenty (20) days of written acceptance of the re-evaluation by the Director;

(c) The amount of Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is received, indicating Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial Assurance at least sixty (60) days before the Financial Assurance terminates, the Owner shall forthwith replace the Financial Assurance with cash.

3. SITE OPERATION

Operation

(1) The Site shall be operated and maintained at all times including management and disposal of all waste, in accordance with the EPA, Regulation 347, Regulation 232, and the conditions of this Approval.

Service Area

(2) Waste categories of Industrial, Commercial and Institutional ("ICI waste"), generated from within the geographic boundaries of the Province of Ontario may be received for disposal at this Site.

Waste Types

(3) Only solid non-hazardous ICI waste, including contaminated soils, and processed

organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), shall be received for disposal at this Site. No hazardous waste or liquid industrial waste , as defined in Reg. 347, as amended by Reg. 558/00, shall be disposed at this Site.
(4) The Owner shall develop and implement a program to inspect waste to ensure that the waste received at the Site is of a type approved for acceptance under this Approval.
(5) The Owner shall ensure that all loads of waste are properly inspected by Trained Personnel prior to acceptance at the Site and that the waste vehicles are directed to the appropriate areas for disposal or transfer of the waste. The Owner shall notify the District Manager, in writing, of load rejections at the Site within one (1) business day from their occurrence.

Approved Waste Quantities

(6) The maximum volumetric capacity for the Site including waste and daily cover shall not exceed 1,045,065 cubic metres.
(7) The Owner shall ensure that the waste received at the Site does not exceed:
(a) a total of 250,000 tonnes in any calendar year; and
(b) the daily maximum received at the site does not exceed 1,000 tonnes.

Waste Placement

(8) No waste shall be landfilled outside of the approved six (6) hectare footprint fill area. The site shall be developed, maintain established buffer areas, and adhere to final contours for waste and final cover material in accordance with the design drawings provided in Appendix L of the Design and Operations Report.
(a) The maximum elevation of the fill zone, including final cover, shall be 221.50 metres above mean sea level.

Signage

(9) A sign shall be installed and maintained at the main entrance/exit to the Site on which is legibly displayed the following information:
(a) the name of the Site and Owner;
(b) the number of the Approval;
(c) the name of the Operator;
(d) the normal hours of operation;
(e) the allowable and prohibited waste types;
(f) the telephone number to which complaints may be directed;
(g) a warning against unauthorized access;
(h) a twenty-four (24) hour emergency telephone number (if different from above); and
(i) a warning against dumping outside the Site.
(10) All landfill signs shall be kept legible, in good repair, and cleaned when required.

Nuisance Control (Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic)

(11) The Site shall be operated and maintained such that vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.
(12) The Owner/Operator shall install visual screening berms, in accordance with the Design and Operations Report and shall inspect and maintain them as required, during the operating life of the landfill Site.

(13) The Owner/Operator shall conduct inspections and ensure that appropriate controls are in place to prevent the acceptance of liquid industrial waste and hazardous waste and to prevent the acceptance of waste from outside the approved service area. Records of violations by haulers or waste generators shall be maintained in the daily records for the Site operations. The Owner/Operator shall ensure that any waste refused for disposal leaves the Site immediately, and the District Manager is notified forthwith, of all waste load refusals at the Site related to requirements in this Certificate, including service area and waste types.
(14) The Owner/Operator shall ensure that the leachate collection system piping in the fill area and the connecting forcemain piping which leads to the leachate holding tank, shall be cleaned out at least once per year with a high pressure wash, and video inspections conducted, as necessary, to confirm that the pipes are clean and to determine the need for more frequent cleaning. Assessment of the need to amend the cleaning frequency shall be based on regular inspections of the leachate collection system and monitoring results.
(15) A thickness of at least 5 metres of compacted waste and cover material shall be maintained between any landfilled sludge (solid non-hazardous as per Reg. 347) and the granular leachate collection layer and leachate monitoring wells.
(16) The Owner/Operator shall take all reasonable steps to prevent off-site nuisance impacts, including visual impacts, transfer of waste, mud, or dust from the Site onto public roads due to landfill operations.

Burning of Waste

(17) Burning of waste at the Site is prohibited.

Scavenging

(18) Scavenging (as defined in Reg. 347) of deposited and/or stockpiled waste is prohibited at the Site. Controlled removal of recycleable/reusable material from the Site may only occur in a designated paved area on the Site, and shall be supervised by Trained Personnel.

Hours of Operation

(19) The permitted hours of operation for the site are from 6:00 a.m. to 6:00 p.m., Monday to Friday, and from 6:00 a.m. to 2:00 p.m. on Saturdays, for site preparation, site maintenance and daily cover activities. The operating hours for receipt of waste for disposal at the Site shall be from 7:00 a.m. to 5:00 p.m., Monday to Friday, and from 7:00 a.m. to 1:00 p.m., on Saturdays. No operations shall take place at the Site outside of the stated hours and the Site shall be closed on statutory holidays.
(20) The hours of operation may be amended from time to time to accommodate seasonal or unusual demand, based on prior consultation with the PLC and written concurrence from the District Manager.

Site Security

(21) No waste shall be received, landfilled or removed from the Site unless a site supervisor or other Trained Personnel are present to supervise the operations during operating hours. The Site shall be closed when a supervisor or Trained Personnel are not present to supervise operations at the Site.

(22) The Site shall be operated and maintained in a safe and secure manner. During non-operating hours, the Site entrance and exit gates shall be locked and the Site shall be secured against access by unauthorized persons.

Cover Material

(23) Alternative materials to soil may be used as weekly and interim cover material, based on an application with supporting information and applicable fee for a trial use or permanent use, submitted by the Owner to the Director, copied to the District Manager and as approved by the Director via an amendment to this Approval. The alternative material shall be non-hazardous according to Regulation 347 and will be expected to perform at least as well as soil in relation to the following functions:

(a) control of blowing litter, odours, dust, landfill gas, gulls, vectors, vermin and fires;

(b) provision for an aesthetic condition of the landfill during the active life of the Site;

(c) provision for vehicle access to the active tipping face; and

(d) compatibility with the design of the Site for groundwater protection, leachate management and landfill gas management.

(24) Daily, interim and final cover material shall be shall be applied as follows:

a. Daily Cover - At the end of each working day, the entire working face shall be compacted and covered with a minimum thickness of 150 mm of soil cover, compost, wood chips, or other approved daily cover material. Prior to placing waste at the start of the next operating day, the existing daily cover material shall be scarified or removed to the extent practical, to ensure vertical hydraulic connection is maintained between layers of waste and to promote percolation of leachate downwards to the leachate collection system.

b. Interim Cover - In areas where landfilling ceases temporarily for a period of 6 months or more, a minimum thickness of 300 mm of soil shall be placed as interim cover and graded to promote surface water runoff. The quality of soil for use as interim cover shall, as a minimum, meet the standards specified in Table 3 of Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Prior to the use of interim cover soil, representative samples shall be taken and analysed for metals, Volatile Organic Compounds (VOCs) and PAHs, to confirm the soil meets the above-mentioned standards.

c. Final Cover - Final cover shall be applied progressively as areas of the landfill reach final waste elevations within the fill area. Prior to placement of final cover, the Owner/Operator shall submit for the approval of the Director, a report detailing the specifications, including particle size distribution of the final cover soil which shall confirm the designed infiltration rate of 0.15 m/year, as well as the protocols for testing and acceptance for on-site and off-site final cover soils. All areas of final cover shall be graded and vegetated as soon as practically possible. The final soil cap shall be regularly inspected and maintained after the installation and during the post-closure period. Without limiting the above, the Owner/Operator shall ensure for a minimum of five years after completion of the cap that the Site shall be inspected at least on a quarterly basis to ensure that there is positive drainage along the cap and that during the frost free period of the first two years following completion, such inspections shall

be monthly. If any inspection indicates that there is an area of ponding or zero slope, the Owner/Operator shall take all steps necessary to provide positive drainage and rehabilitate the final cover as soon as practically possible.
d. All on-site and excess soil used for daily, interim, and final cover shall be managed in accordance with Regulation 406.

Traffic Control

(25) The Owner/Operator shall ensure that vehicles carrying waste or materials to and from the Site shall only enter the Site from Highway #3 and Brooks Road. At no time shall any vehicle carrying waste or materials to and from the Site travel along Townline Road to access the Site.
(26) The Owner/Operator shall be responsible for maintenance and remedial work to the Improvement Area. The Improvement Area shall be maintained to the following minimum requirements:
(a) 300 mm thick granular "A" layer of gravel, meeting all applicable Haldimand County and Ontario Provincial Standards Specification (OPSS) to the Improvement Area; and
(b) Maintain asphalt on the entranceway/exit to the landfill and the parking area for the landfill Site, as well as 30 metres of the road approach on Brooks Road to the entranceway/exit to the Site, extending both north and south of the entranceway/exit, in base asphalt and top coat. The thickness of asphalt shall be a base coarse of 60 mm (HL8), and a surface coarse of 50 mm (HL3).

4. GROUNDWATER AND SURFACE WATER MONITORING

Compliance

(1) The Site shall be operated in such a way as to ensure compliance with the following:
(a) Reasonable Use Guideline B-7 for the protection of the groundwater at the Site; and
(b) Provincial Water Quality Objectives included in the July 1994 publication entitled Water Management Policies, Guidelines, Provincial Water Quality Objectives, as amended from time to time, or limits set by the Regional Director, or the Canadian Water Quality Guidelines published by the Canadian Council of Ministers of the Environment, 1999 for the protection of the surface water at and off the Site.

Surface Water and Groundwater

(2) The Owner shall monitor surface water and groundwater in accordance with the environmental monitoring program outlined in Schedule "B".
(3) A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic and hydrologic training and experience shall execute or directly supervise the execution of the environmental monitoring and reporting program.

Groundwater Wells and Monitors

(4) The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage and maintained in accordance with Regulation 903.
(5) Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.
(6) Any groundwater monitoring well included in the on-going monitoring program that

is damaged shall be assessed, repaired, replaced or decommissioned by the Owner, as required.

(a) The Owner shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed.

(b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the Director or the District Manager for abandonment, shall be decommissioned by the Owner, as required, in accordance with Regulation 903, to prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

Trigger Mechanisms and Contingency Plans

(7) In the event of a confirmed exceedance of a site-specific trigger level relating to groundwater or surface water impacts due to leachate, the Owner shall immediately notify the District Manager, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the Owner in accordance with the approved trigger mechanisms and associated contingency plans provided in Appendix J of the Design and Operations Report.

(8) If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the Owner shall ensure that the following steps are taken:

(a) the Owner shall notify the District Manager, in writing of the need to implement contingency measures, no later than seven (7) days after confirmation of the exceedances;

(b) within thirty (30) days from the date of confirming the need to implement contingency measures, detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the Owner to the Director for approval; and

(c) the contingency measures shall be implemented by the Owner upon approval by the Director.

(9) The Owner shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to surface water or groundwater, are approved in advance by the Director via an amendment to this Approval.

Changes to the Monitoring Plan, Trigger Mechanism and Contingency Plan

(10) The Owner may request to make changes to the environmental monitoring program, Trigger Mechanism and Contingency Plan to the District Manager in accordance with the recommendations of the annual report. The Owner shall make clear reference to the proposed changes in a separate letter that shall accompany the annual report.

(11) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the environmental monitoring program, the Owner shall forward a letter

identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to the changes to the monitoring program, to the Director requesting the Approval be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

(12) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the Owner shall follow current Ministry procedures for seeking approval for amending the Approval.

5. LEACHATE MANAGEMENT AND DISPOSAL

(1) Leachate generated at the landfill Site shall be collected, treated and disposed of using the on-site Leachate Treatment System, in accordance with the terms and conditions of the Industrial Sewage Works Approval No. 1122-BKUPSM dated February 3, 2020, as amended.

(a) Notwithstanding Condition 5(1), leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall be removed to an off-site facility that is approved by the Ministry to treat leachate generated at the landfill Site.

(2) Leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall not be discharged to the natural environment at any time.

(3) Any alternative proposal for leachate management and disposal must receive prior written approval of the District Manager.

(4) The Owner shall reduce the level of leachate within the landfill to an elevation 191 metres above mean sea level (AMSL), which equates to an average leachate depth of no greater than 0.3 metres, by the earlier of:

(a) five (5) years from the issuance date of this ECA; or

(b) the date the landfill reaches capacity.

(5) In addition to the requirements of Condition 5(4), the interim annual leachate elevation levels and interim landfill capacity-based leachate elevations shall be adhered to pursuant to Schedules "C" and "D" respectively.

(a) The leachate elevation, as determined by the pressure transducer located in the leachate collection sump riser pipe shall be used to establish the landfill leachate elevation. The leachate elevation will be considered in compliance with the target leachate elevations if the measurement meets the elevations stated in Schedules "C" and "D" within fifteen (15) days of the compliance date.

(6) The Owner shall implement the leachate management contingency measures in the report titled "Leachate Removal Plan – Revision 2, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited", prepared June 1, 2021, as amended, as necessary to meet the leachate elevations in Schedules "C" and "D".

(a) if the leachate elevations in Schedules "C" and "D" are not met within 105 days of the anniversary date of the issuance of this Approval the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below the leachate elevation in Schedules "C" and "D":

(i) notify the District Manager;
(ii) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site;
(iii) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site;
(iv) install interim cover to cells that have not reached final waste contours and to the working face;
(v) install final cover to cells that have reached final waste contours;
(vi) establish vegetation on installed cover material where appropriate and weather permitting; and
(vii) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate.

(b) landfilling activities may commence again when the compliance leachate elevation has been attained; and
(c) prior to amending the Leachate Removal Plan proposed amendments shall be submitted to the District Manager for approval.
(7) If the leachate elevation in the landfill reaches 199.0 metres AMSL, the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below 199.0 metres AMSL:
(a) notify the District Manager;
(b) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site;
(c) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site;
(d) install interim cover to cells that have not reached final waste contours and to the working face;
(e) install final cover to cells that have reached final waste contours;
(f) establish vegetation on installed cover material where appropriate and weather permitting; and
(g) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate.
(8) The Owner shall monitor leachate in accordance with the monitoring program outlined in Schedule "B".

6. LANDFILL GAS MANAGEMENT

(1) The Owner/Operator shall ensure that all buildings and structures containing enclosed spaces at the Site, shall be situated, constructed and monitored in a manner which minimizes the potential for explosive hazards due to landfill gas. The Owner/Operator shall install and maintain in good working condition, methane detection

and alarm equipment (with active venting or with an effective passive venting system to relieve any possible landfill gas accumulation) for all enclosed buildings at the Site.
(2) The Owner/Operator shall ensure that site design plans, specifications and descriptions for the control of landfill gas are such that the subsurface migration of landfill gas meets the requirements of the Ministry's Landfill Standards Guideline, Section 4.10, including but not limited to the following:
(a) the concentration of methane gas below the ground surface at the Site boundary must be less than 2.5 per cent by volume;
(b) the concentration of methane gas in any on-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition, must be less than 1.0 per cent by volume;
(c) sub-condition (b) does not apply to a leachate collection, storage or treatment facility or a landfill gas collection or treatment facility for which specific health and safety measures and procedures are in place relating to the risk of asphyxiation and the risk of explosion; and
(d) the concentration of methane gas from the Site in any off-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, must be less than 0.05 per cent by volume (i.e. not present).
(3) If the measured gas concentration at a gas probe exceeds the applicable limit listed in Condition 6(2) above, the District Manager shall be notified immediately. The gas concentrations shall be re-measured immediately and daily for a period of up to three
(3) consecutive days. If these readings confirm that the applicable limit has been exceeded, the Owner/Operator shall forthwith, implement appropriate control measures.
(4) The Owner shall monitor landfill gas in accordance with the monitoring program outlined in Schedule "B".

7. STORMWATER MANAGEMENT

(1) Stormwater runoff generated from the active waste fill area shall be treated by the Owner/Operator as leachate. The Owner/Operator shall ensure that any precipitation falling unto active waste fill areas, not under interim cover, shall be directed to the leachate collection system. If necessary, granular sumps shall be dug into the waste to facilitate drainage of contaminated stormwater towards the leachate collection system.
(2) The Owner shall monitor the stormwater management pond in accordance with the monitoring program outlined in Schedule "B".

8. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the Owner or the Operator. Only Trained Personnel shall operate any aspect of the Site or carry out any activity required under this Approval.
(2) The Owner shall ensure that all site operations employees have been adequately trained and received on-going training with respect to the following, but not limited to:
(a) terms, conditions and operating requirements of this Approval for the Site;

(b) the operation, inspection, and maintenance of the Site with respect to the approved design and operations documents;
(c) relevant waste management legislation and regulations;
(d) environmental concerns related to waste management at the Site;
(e) occupational Health and Safety concerns related to waste management at the Site; and
(f) emergency procedures and contingency plans in case of fire, spills, off-site impacts and any other emergency situations.

9. COMPLAINTS RESPONSE PROCEDURE

(1) If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:
(a) The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;
(b) The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a written reply to the complainant; and
(c) The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and recommendations, if any, for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

10. EMERGENCY AND SPILL RESPONSE

(1) All Spills as defined in the EPA occurring at or from the Site shall be immediately reported to the **Ministry's Spills Action Centre at 1-800-268-6060** and shall be recorded in the log book. The Owner/Operator shall record for each Spill event the contaminant(s) spilled, the quantity or volume of contaminants spilled, the spatial distribution of the area impacted by the Spill, a root cause analysis of the events leading up to the Spill and a list of actions designed to prevent similar Spill events.
(2) In addition, the Owner shall submit, to the District Manager a written report within three (3) business days of the Spill event, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the Site.
(3) All wastes resulting from a Spill event shall be managed and disposed of in accordance with the EPA and Regulation 347.
(4) All equipment and materials required to handle the Spill event shall be:
(a) kept on hand at all times that waste landfilling and/or handling is undertaken at the Site; and
(b) adequately maintained and kept in good repair.
(5) The Owner shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).

11. PUBLIC LIAISON COMMITTEE (PLC)

(1) The Owner or Operator shall maintain and participate in a landfill PLC, which shall

function in accordance with the Terms of Reference for the PLC, as amended from time to time. Any amendment to the Terms of Reference must be approved by the District Manager. The PLC shall serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the landfill Site, including environmental monitoring, maintenance, complaint resolution, and new approvals or amendments to existing approvals related to the operation of this landfill Site.
(2) The Owner/Operator shall invite representation from the following groups to participate on the PLC:
(a) the County of Haldimand;
(b) Six Nations of the Grand River;
(c) landowners within a minimum 500 metre distance of the Site;
(d) residents of Haldimand County; and
(e) Lower Grand River Land Trust.
The number of representatives from each group shall be as specified in the Terms of Reference approved by the District Manager.
(3) Copies of all reports or other submissions required by the conditions of this Approval shall be made available to the PLC and the County of Haldimand, in accordance with the deadlines specified in the Conditions.
(4) The Owner or Operator shall provide to the PLC and the County of Haldimand, reasonable notice and opportunities to make comments regarding any proposed amendment to this Approval. The Owner or Operator shall forward to the Director for consideration any written comments received by the Owner or Operator and advise the Director of the essence of any verbal comments received by the Owner or Operator regarding the proposed amendment.

12. INSPECTIONS, RECORD KEEPING AND REPORTING

Daily Inspections and Inspection Log

(1) A visual inspection of the entire Site and all equipment on the Site shall be conducted each day the Site is open to ensure that:
(a) the Site is secure;
(b) the operation of the Site is not causing any nuisances;
(c) the operation of the Site is not causing any adverse effects on the environment or impairing water quality; and
(d) the Site is being operated in compliance with this Approval.
(2) Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the Site if needed **.**
(3) An electronic or written record of the inspections shall be maintained and shall include the following:
(a) the name and signature of person that conducted the inspection;
(b) the date and time of the inspection;
(c) the list of all deficiencies discovered during the inspections, including but not limited to:

(i) the presence of any leachate seeps;
(ii) the condition of the methane venting system;
(iii) poor drainage conditions and ponding of surface water; and
(iv) the presence of waste outside of the approved fill area;

(d) the recommendations for remedial action to address the identified deficiencies; and
(e) the date, time and description of the remedial actions taken.

Daily Waste Log

(4) A daily log shall be maintained in written or electronic format and shall include the following information:
(a) the type, date and estimated quantity (tonnes) of all waste, including non-landfilled waste received at the Site;
(b) the type, date and estimated quantity (tonnes) of cover material applied at the Site;
(c) the area of the Site in which waste disposal operations are taking place;
(d) a record of litter collection activities and the application of any dust suppressants;
(e) a record of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known; and
(f) a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service.

Other Information

(5) Any information requested, by the Director, the District Manager or a Provincial Officer, concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided to the Ministry, upon request.

Annual Report

(6) A written report on the development, operation and monitoring of the Site, shall be completed annually (the “Annual Report”). The Annual Report shall be submitted to the District Manager, by March 31st of the year following the period being reported upon.
(7) The Annual Report shall include but not be limited to the following information:
(a) the results and an interpretive analysis of the results of all leachate, groundwater surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
(b) an assessment on the Site’s compliance with Guideline B7;
(c) an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the Ministry approved contingency plans;
(d) site plans showing the existing contours of the Site; areas of landfilling operation during the reporting period; areas of intended operation during the next reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; facilities existing, added or

removed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;
(e) summaries of any actions taken for the odour management plan and compliance with the leachate removal plan;
(f) summaries of any actions taken for the compliance with the leachate removal plan;
(g) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;
(h) a calculation of the remaining capacity of the Site or an estimate of the remaining Site life;
(i) summary of total annual quantity (tonnes) of waste received at the Site;
(j) a summary of any complaints received and the responses made;
(k) a summary of the information included in the logs required by Conditions 9(1), 10(1), 11(3), 11(4), 11(5), and 12(2);
(l) a summary of the daily waste log;
(m) a discussion of any operational problems encountered at the Site and corrective action taken;
(n) any changes to the Ministry approved Design and Operations Report and the Closure Plan that have been approved by the Director since the last Annual Report;
(o) a report on the status of all monitoring wells and a statement as to compliance with Regulation 903;
(p) a description and location of any leachate seeps identified during the daily inspection of the Site and the mitigative measures taken to address the presence of seeps;
(q) a summary of the daily inspections conducted over the monitoring period;
(r) any other information with respect to the Site which the District Manager may require from time to time;
(s) a copy of the most current ministry approved monitoring programs in table format;
(t) compliance status with all conditions of the Approval and the approved Design and Operations Plan;
(u) a "Monitoring and Screening Checklist" completed and signed by a Qualified Professional; and
(v) items identified in Section 7.7 Annual Progress Report of the Design and Operations Report;

13. CLOSURE PLAN

(1) At least two (2) years prior to the anticipated date of closure of this Site, or when the Site reaches 90% capacity, whichever comes first, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site closure plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring, and end use. The plan shall include but not be limited to the following information:
(a) A plan showing Site appearance after closure;
(b) A description of the proposed end-use of the Site;

(c) Description of the procedures for closure of the Site, including:

i. advance notification of the public of the landfill closure;
ii. posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
iii. completion, inspection and maintenance of the final cover and landscaping;
iv. site security;
v. removal of unnecessary landfill-related structures, buildings and facilities;
vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
vii. a schedule indicating the time-period for implementing sub-conditions (i) to (vi) above.

(d) Description of the procedures for post-closure care of the Site, including:

i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
ii. record keeping and reporting; and
iii. complaint contact and response procedures;

(e) An assessment of the adequacy of and need to implement the contingency plans for leachate and landfill gas;
(f) An updated estimate of the contaminating life span of the Site, based on the results of the monitoring programs to date; and
(g) An update of the cost estimate for financial assurance and the amount which has been provided to the Director.
(2) The Site shall be closed in accordance with the closure plan as approved by the Director.
The following Schedule "A" forms part of this Approval

Schedule "A"

1. Application for an amendment to ECA No. A110302 for a vertical expansion. Signed by Richard Weldon, Managing Partner, 2270386 Ontario Limited. Dated April 26, 2019. The application includes all supporting documentation and consists of the following:

i. Design and Operations Report Vertical Expansion, Brooks Road Landfill Site, 2270386 Ontario Inc., Prepared by GHD, April 18, 2019;
ii. Appendix A - Provisional CofA No. A110302 and Amendments;
iii. Appendix B - Site Preparation Reports;
iv. Appendix C - Site Legal Surveys;
v. Appendix D - Geotechnical Assessment;
vi. Appendix E - HELP Model Outputs;
vii. Appendix F - Hydrologic Modeling;
vii. Appendix G - Surface Water Supporting Engineering Calculations;
viii. Appendix H - Landfill Gas Production and Air Dispersion Modeling Results;
ix. Appendix I - Fugitive Odour Best Management Practices Plan and BRE Odour Complaint Response Procedure;
ix. Appendix J - Trigger Level Program;
ix. Appendix K - Financial Assurance Plan; and
ix. Appendix L - Design and Operations Report Drawings.

2. Leachate Removal Plan, Brooks Road landfill Site Haldimand County, 2270386 Ontario Limited. Report No 90. Prepared by GHD, February 7, 2020.
3. Environmental Compliance Approval Application. Signed by Richard Weldon, Managing Partner, 2270386 Ontario Limited. Dated June 1, 2021.
4. Design and Operations Report, Vertical Expansion – Rev. 1, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited. Prepared by GHD, Signed/stamped and dated June 14, 2021.

5. Leachate Removal Plan - Revision 2, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited. Prepared by GHD, June 1, 2021.

The following Schedule "B" forms part of this Approval

Schedule "B"

Table B1: Groundwater, Surface Water, Leachate and Landfill Gas Monitoring Programs

	Location	March	May	August	November
Groundwater	OW1A-06	-	B [4]	-	A [3]

1	OW1B-06	-	B	-	A
	OW3A-07	-	B	-	A
	OW3B-07	-	B	-	A
	OW5A-06	-	B	-	A
	OW5B-07	-	B	-	A
	OW8A-06	-	B	-	A
	OW8B-06	-	B	-	A
	OW8D-07 (Gypsum Mine)	-	B	-	WL - only [6]
	OW8S-07 (Gypsum Mine)	-	B	-	WL - only
	OW9A-06	-	B	-	A
	OW9B-06	-	B	-	A
	MW1-03	-	WL - only	-	WL - only
	MW1A-07	-	B	-	A
	MW1B-07	-	B	-	A
	MW1D-07 (Gypsum Mine)	-	B	-	WL - only
	MW1S-07 (Gypsum Mine)	-	B	-	WL - only
	MW2-03	-	WL - only	-	WL - only
	MW2A-01	-	B	-	A
	MW2B-07	-	B	-	A
	MW2D-07 (Gypsum Mine)	-	B	-	WL - only
	MW2S-07 (Gypsum Mine)	-	B	-	WL - only
	MW3-03	-	WL - only	-	WL - only
	MW4A-09	-	WL - only	-	WL - only
	MW5A-09	-	B	-	A
	MW5B-09	-	B	-	A
	MW6A-07	-	B	-	A
	MW6B-07	-	B	-	A
	MW10A-18	-	B	-	A

	MW10B-18	-	B	-	A
	MW11A	-	B	-	A
	MW11B	-	B	-	A
	MW12A	-	B	-	A
	MW12B	-	B	-	A
Surface Water [2]	SW1	C [5]	B	C	B
	SW3	C	B	C	B
	SW4	C	B	C	B
	SW5	C	B	C	B
	SW6	C	B	C	B
	SW7	C	B	C	B
	SW8	C	B	C	B
	SW9	C	B	C	B
Leachate [7]	Leachate Collection System Sump Riser Pipe	See Note #7	B	-	-
	LW1-17		-	-	-
Landfill Gas [8]	GP-1A	See Note #8			
	GP-1B				
	GP-2A				
	GP-2B				
	GP-3A				
	GP-3B				
	GP-4A				
	GP-4B				
	GP-5				
	GP-6				
	GP-7				
	GP-8				
QA/QC	Groundwater Duplicate	-	B	-	A
	Surface Water Duplicate	C	B	C	B
	Field Blank	C	B	C	B

Notes:

1. Groundwater levels will be measured during May and November sampling events.
2. Surface water levels and flows will be measured for all sampling events.
3. **A - Indicator parameters (groundwater):** alkalinity, ammonia, barium, boron,

calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, and DOC.

4. **B - Metals:** aluminum, arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, nickel.

B - PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, benzo(ghi)perylene.

B - VOCs: chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, acetone, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, methyl-t-butyl ether, 1,1-dichloroethane, methyl ethyl ketone, cis-1,2-dichloroethene, chloroform, 1,2-dichloroethane, 1,1,1-trichloroethane, carbon tetrachloride, benzene, 1,2-dichloropropane trichloroethene, bromodichloromethane, cis-1,3-dichloropropene, methyl isobutyl ketone, trans-1,3-dichloropropene, 1,1,2-trichloroethane, toluene, 2-hexanone, dibromochloromethane, 1,2-dibromoethane, tetrachloroethene, 1,1,1,2-tetrachloroethane, chlorobenzene, ethylbenzene, m,p,o-xylenes, bromoform, styrene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene.

B - Inorganic chemistry parameters: alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulfates, DOC, TDS, suspended solids, phenol, BOD5, COD, pH, total phosphorus, potassium, conductivity, calcium.

5. **C - Indicator parameters (surface water):** alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, pH, total phosphorus, TDS, suspended solids, sulphate, BOD5, COD, phenol, temperature, and dissolved oxygen.

6. **WL - only:** water level or leachate level only.

7. **Leachate:** Leachate water levels shall be collected on a monthly basis at leachate monitoring well LW1-17 and the inclined leachate collection sump riser pipe, while an annual leachate chemistry sample is required to be collected in May from the collection sump. Compliance with the leachate level elevation shall be determined by the pressure transducer that is located in the leachate collection sump riser pipe.

8. **Landfill Gas:** Sampling is to occur monthly from December 1 to April 30 and quarterly from May through November for % lower explosive limit methane concentration of combustible gas, carbon dioxide, oxygen and balance gases, gas pressure, and water level.

The following Schedule "C" forms part of this Approval

Schedule "C"

Table C1: Target leachate elevations to reach leachate elevation 191 m AMSL based on the date of March 27, 2020.

Date	Required Leachate Elevation	Estimated Leachate Volume in	Volume Removed in Excess of	Forecasted Leachate Generation	LTS Discharge to Ditch (m	Required Average Excess

	(m AMSL)	Landfill (m^3)	Generation (m^3)	Rate (m^3 /day)	^{3} /day)	Leachate Removal (m^3 /day)
March 27, 2020	198.5	40,000	-	44	45	0
March 27, 2021	196	28,000	12,000	44	45	32
March 27, 2022	193.8	18,000	10,000	42	45	24
March 27, 2023	192.1	10,000	8,000	44	45	21
March 27, 2024	191.3	4,000	6,000	45	45	16
March 27, 2025	191	2,000	2,000	49	45	9.5
March 27, 2026	191	2,000	0	33	45	0

The following Schedule "D" forms part of this Approval

Schedule "D"

Table D1: Capacity-Based Target Leachate Elevations

Estimated Landfilled Volume (m^3)	Required Leachate Elevation (m AMSL)
680,000	197.9
710,000	197.4
740,000	196.8
770,000	196.2
800,000	195.7
830,000	195.1
860,000	194.5
890,000	193.9
920,000	193.4
950,000	192.8
980,000	192.2
1,010,000	191.7
1,040,000	191.1
1,045,065	191.0

The reasons for the imposition of these terms and conditions are as follows:

Conditions 1(1), 1(2), 1(4), 1(5), 1(6), 1(7), 1(8), 1(9), 1(10), 1(11), 1(13), 1(20), 1(21), 1(22), and 1(23) are to clarify the legal rights and responsibilities of the Owner and Operator under this Approval.
Conditions 1(3) and 7(4) are to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.
Condition 1(12) is to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.
Condition 1(14) is to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Approval.
Condition 1(15) is to ensure that the successor is aware of its legal responsibilities.
Conditions 1(16), 1(17) and 1(18) clarify that the Part II.1 Director is an individual with authority pursuant to Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the Approval to any person who will acquire an interest in the property as a result of the dealing.
Condition 1(19) is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Approval. This Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Act, the OWRA, the PA, the NMA and the SDWA.
Condition 1(24) clarifies what information may be subject to the Freedom of Information Act.
Condition 2(1) is to ensure that sufficient funds are available to the Ministry for closure and post-closure activities at the Site in the event that the Owner is unable or unwilling to do so.
Conditions 3(1), 3(11), 3(12), 3(13), 3(14), 3(15), 3(16), 12(1) and 12(2) are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.
Conditions 3(2), 3(3), 3(4), and 3(5) are to specify the approved area from which waste may be accepted at the Site, and the types of waste that may be accepted for disposal at the Site based on the Owner's application and supporting documentation.
Conditions 3(6), 3(7), and 3(8) are to specify restrictions on the extent of landfilling and the maximum rates to be accepted for disposal at the Site based on the Owner's application and supporting documentation. These limits define the approved volumetric capacity of the site.
Conditions 3(9) and 3(10) are to ensure that users of the Site are fully aware of important information and restrictions related to Site operations and access under this Approval.

Condition 3(17) is to ensure open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance effects, and the potential fire hazard.
Condition 3(18) is to ensure that uncontrolled removal of material from waste at the Site is avoided. Scavenging of deposited waste can be detrimental to the public health and safety and cause damage to the natural environment.
Conditions 3(19) and 3(20) are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.
Conditions 3(21) and 3(22) are to ensure that the Site is supervised by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.
Condition 3(23) is to specify the approval requirements for use of alternative cover material at the Site.
Condition 3(24) is to ensure that daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the site.
Condition 3(25) is to ensure that potential truck traffic impacts on the immediate local community is limited to the existing main roads.
Condition 3(26) is to ensure that public road servicing the Site (described as "Improvement Area") meets the applicable standards. Condition 3(26) also ensures that the Improvement Area is maintained regularly as per agreement between the Owner/Operator of the Site and Haldimand County.
Condition 4(1) is to provide the groundwater and surface water limits to prevent water pollution at the Site
Conditions 4(2), 4(3), 5(2), 6(4), and 7(2) are included to require the Owner to demonstrate that the Site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
Conditions 4(4), 4(5), and 4(6) are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.
Conditions 4(7), 4(8), and 4(9) are added to ensure the Owner has a plan with an organized set of procedures for identifying and responding to potential issues relating to groundwater and surface water contamination at the Site's compliance point.
Conditions 4(10), 4(11), and 4(12) are included to streamline the approval of the changes to the monitoring plan.
Condition 5(1) is added to ensure that leachate generated at this Site is disposed of in an environmentally acceptable manner.

Conditions 6(1), 6(2), 6(3), and 6(5) are to ensure that off-site migration of landfill gas is monitored and all buildings at the Site are free of any landfill gas accumulation, which due to a methane gas component may be explosive and thus create a danger to any persons at the Site.
Condition 7(1) is added to ensure to ensure that both surface water and stormwater is managed in an environmentally acceptable manner.
Conditions 8(1) and 8(2) are to ensure that the Site is operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.
Condition 9(1) is added to ensure that any complaints regarding landfill operations at this Site are responded to in a timely and efficient manner.
Condition 10(1) is to ensure the Owner immediately responds to a spill.
Conditions 10(2), 10(3), 10(4), and 10(5) are to ensure that the Owner notifies the Ministry forthwith of any spills so that an appropriate response can be determined.
Conditions 11(1), 11(2), 11(3), and 11(4) are added to establish a forum for the exchange of information and public dialogue on activities carried out at the landfill Site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and protection of the natural environment.
Condition 12(3) is to ensure that detailed records of Site inspections are recorded and maintained for inspection and information purposes.
Condition 12(4) and 12(5) are added to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.
Conditions 12(6) and 12(7) are added to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.
Condition 13(1) is added to ensure that final closure of the Site is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A110302 issued on March 27, 2020

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;

b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of October, 2021

Mohsen Keyvani, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

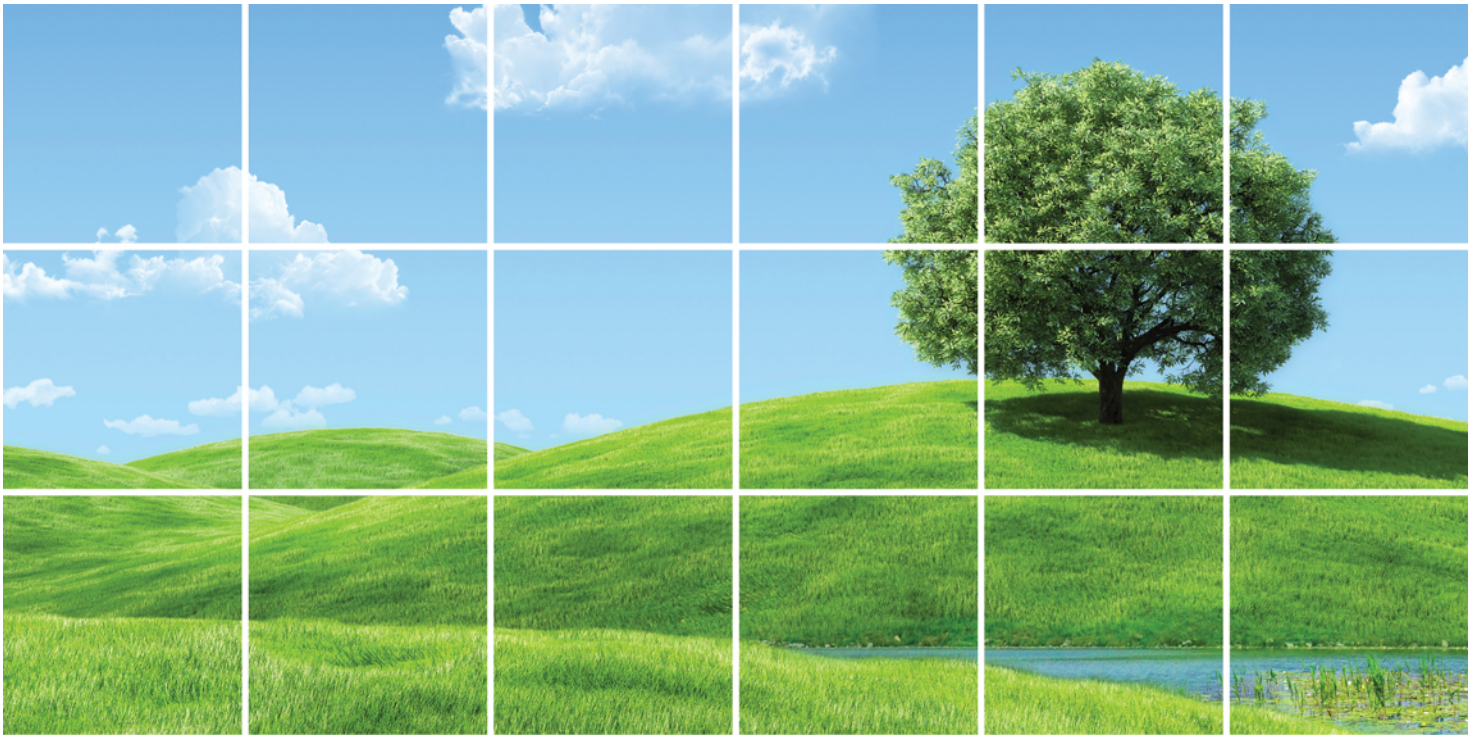
CM/
c: District Manager, MECP Hamilton - District
DAN TURNER P.Eng.

Matthew Griffin
Mike Masschaele - Air, GHD Limited

Appendix B

Stormwater Management Plan

www.CRAworld.com



FINAL REPORT

STORMWATER MANAGEMENT PLAN

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Prepared for: 2270386 Ontario Limited

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

September 2013 • #018235
Report Number:40

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF TABLES
(Following Text)

LIST OF APPENDICES

LIST OF DRAWINGS

(Entire Drawing Package Not Provided, Bound Separately)

1.0 INTRODUCTION

This report, prepared by Conestoga-Rovers & Associates Limited (CRA) on behalf of Brooks Road Environmental c/o 2270386 Ontario Limited (BRE) (Owner, Proponent), presents the Stormwater Management Plan (SWM Plan) for the Brooks Road Landfill (Site) located at 160 Brooks Road in Cayuga, Haldimand County, Ontario. The Site is legally described as Part of Lot 24, Concession I-N.T.R., of the former North Cayuga Township, former Regional Municipality of Haldimand-Norfolk, and now Haldimand County. A Site location map is provided on Figure 1.

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302 (dated May 5, 2004), has an approved fill rate of 500 tonnes per day and a capacity of 624,065 m^3 (including waste, daily cover and interim cover). The Site was originally approved as a local landfill site in 1971, with amendments approved by the Ministry of the Environment (MOE) in 1974, 1979, 2002, 2004, 2005, 2007, 2011, 2012, and 2013.

The Site also operates under an amended Industrial Sewage Works Certificate of Approval Number 8371-6X9L6B (dated February 20, 2007) for the conveyance and discharge of stormwater runoff and leachate collection and disposal system.

The purpose of this report is to present an updated SWM Plan for the Site that is consistent with the current landfill design. The SWM Plan has been completed to support an application for an amended ECA for Industrial Sewage Works for the Site. CRA has reviewed the available background information, current landfill design, and conducted consultation with the MOE to obtain a full understanding of the work required.

This report does not address any changes to the leachate collection and disposal system. The Owner submitted an application to amend the design and operation of the leachate collection and disposal system. This application was submitted on March 16, 2013 (MOE Reference #5565-967NGT).

The SWM Plan was developed with reference to the Ontario Ministry of the Environment (MOE) Storm Water Management Planning and Design Manual (dated March 2003) and other applicable guidance documents.

1.1 PRELIMINARY CONSULTATION

Prior to the completion of the designs for SWM works on Site, CRA met with the MOE for pre-application consultation at a number of on-Site biweekly progress meetings for the Site Decommissioning and Stage 2A Construction project. Copies of the meeting minutes are included in Appendix A.

2.0 SITE BACKGROUND

2.1 SITE LOCATION

The Site is licensed to receive waste from all of Ontario but receives most of its post-diversion Industrial, Commercial, Institutional (IC&I) solid non-hazardous waste from within Haldimand County. The 12.4 hectares (ha) Site contains an approved fill area of approximately 6.07 ha.

The Site is irregular in shape and is located in a predominantly undeveloped area. The Site is currently surrounded by:

- Undeveloped land to the north. The former Canadian Southern Railway right-of-way directly to the north was purchased by the Owner in 2003 and has been utilized as a clean clay stockpile area since 2005
- Brooks Road to the west, and beyond by undeveloped and cultivated land
- Undeveloped and cultivated land to the south and east

This Site is not located in an area of development as defined by the Niagara Escarpment Planning and Development Act (NEPDA) and is not located on the Oak Ridges Moraine Conservation Area as defined by the Oak Ridges Moraine Conservation Plan (ORMCP).

2.2 SITE SETTING

The geographic, geologic, and hydrogeologic framework for the Site and surrounding area have been previously described in a report entitled Hydrogeologic Performance Assessment (dated October 2002), prepared by CRA. The previously reported information regarding the Site setting is summarized in the following sections.

Site Topography and Drainage

The Site is located within the Haldimand Clay Plain which is characterized by level topography and relatively poor drainage. The Site is located within jurisdiction of the Grand River Conservation Authority. The Site ultimately discharges runoff to the roadside ditch along the east side of Brooks Road which drains in a southerly direction through a culvert under the Canadian National Railway rail bed and empties into a small apparently natural stream channel which is the head waters of Norton Creek. Other drainage from adjacent lands to the west of Brooks Road also flows in culverts under Brooks Road to provide surface runoff to Norton Creek. Other surface runoff contributions include ephemeral streams on lands south of the Site that enter Norton Creek via culverts under the CNR rail bed. Norton Creek discharges directly to the Grand River.

Site Geology

The overburden geology is relatively uniform beneath the Site. In general the Site is characterized by a thick (14 to 18 m) glaciolacustrine layer of stratified silty clay, silty clay till and varied clays, underlain by a thin (1 to 3 m) discontinuous layer of silty sand till with varying concentrations of gravel and clay. The bedrock is encountered at depths varying from 15.2 to 20.2 m bgs. A thin surficial deposit of topsoil is generally observed at the surface of the Site, with the exception of the southwestern portion, where refuse associated with historical waste disposal activities in the original landfill area (OLA) was observed.

The decommissioning of the OLA commenced in August 2012 and was completed in early July 2013. The decommissioned area was backfilled using on-Site native silty clay and graded to facilitate drainage.

The silty clay deposits are described as being locally fractured (weathered) from the surface down to depths varying from 3 to 5 m bgs, and are characterized as a very stiff to hard unit with low plasticity. At depths in excess of 5 m, the silty clay deposits have little to no fracturing and the consistency of the units decrease to stiff to very stiff.

Underlying the silty clay deposits, a thin discontinuous silty sand till with varying concentration of clay and gravel is encountered across the Site. The silty sand till ranges in thickness from 1 to 3 m and often contains cobbles and/or broken angular bedrock fragments. This deposit is usually well graded with fine to medium grained sand, minor silt and trace clay, and is described as dense to compact, grey and saturated. The silty sand till rests directly over the bedrock.

Bedrock underlying the Site has been described as a fractured shale, dolostone and gypsum of the Salina Formation. The top of bedrock elevation ranges from 180.80 to 185.73 m above mean sea level (AMSL), and forms a small bedrock valley from northwest to southeast across the Site. The small depression is characterized by the thicker silty sand till deposit. Regionally the bedrock topography dips to the south.

Site Hydrogeology

In general, the geologic units identified at the Site have been grouped into two main hydrogeologic units, as follows:

i) An unconfined water table (shallow overburden) unit within the permeable refuse in the OLA and the shallow fractured silty clay (weathered) unit

ii) A confined deep overburden/shallow bedrock aquifer

The shallow overburden unit is essentially a perched water table resting on the impermeable un-weathered clay units. The large variation in hydraulic conductivity between the refuse material and the surrounding silty clay explains the groundwater mounding effect historically observed in the OLA. Now that the waste within the OLA has been decommissioned and the area has been backfilled with silty clay, the shallow overburden unit mound has been effectively removed from the Site. Historically, these two hydrogeological units were separated by a thick (between 9 and 12 m) layer of stratified silty clay, silty clay till, and varied clays which forms an aquitard of very low hydraulic conductivity. Groundwater level data historically gathered from the shallow overburden unit and deeper overburden/shallow bedrock aquifer indicate that the presence of the clay aquitard results in hydraulic separation of the two units. A water head varying from 9.5 to 15 m has been historically measured at the location of nested wells.

Underlying the silty clay aquitard, a confined deep overburden/shallow bedrock aquifer was observed within the lower portion of the silty sand till unit and the shallow fractured bedrock. Groundwater quality and water level data historically gathered from monitoring wells screened within the lower silty sand till unit exhibited similar hydrostatic levels and hydrochemical characteristics which are not substantially different from samples obtained from well nests screened solely with the shallow bedrock. Therefore these two geological units have been generally considered to form one aquifer.

Based on the groundwater data obtained to date, the deep overburden/shallow bedrock aquifer is generally encountered at depths varying from 14 to 17 m bgs. The groundwater flow pattern of this aquifer is generally characterized by a weak gradient and a southerly flow.

2.3 EXISTING SITE CONDITIONS

The existing Site topography (based on the March 2013 topographical survey data) and ancillary features are presented on Drawing 2. The Site works and development currently consists of the following:

- Site Support and Staging Area with a scale and multiple trailers for office staff and storage.
- The landfill is being constructed in three distinct stages named as: Stage 1, Stage 2, Stage 3 and are described as follows:
  - Stage 1 cell construction commenced in December 2006 and was completed in October 2007. The Stage 1 landfill area has an interim cap constructed as per the approved Design and Operations Report (D&O), dated November 2003.
  - Currently Stage 2 has been excavated and approximately 2/3 of the cell has been constructed and lined. The completed portion has been designated as Stage 2A. Stage 2A is currently accepting landfill waste and Stage 2B/3A will be constructed in the future.
  - The Site design provides for three disposal stages that will be constructed in a progressive manner from east (Stage 1) to west (Stage 3). Further information concerning the detailed design of the landfill is provided within the approved D&O.
- The decommissioning of the OLA was completed in early July 2013. This included:
  - The removal of all refuse within the OLA
  - The removal of all impounded water and leachate within the OLA
  - Backfilling of the OLA to match adjacent topography
  - Grading of the OLA to provide adequate drainage
- A series of temporary dewatering sedimentation ponds (TDS Ponds) have been constructed to collect existing Site runoff. The ponds operate in a closed position whereby stormwater is pumped from the ponds to the roadside ditch after water samples meet the trigger parameter requirements detailed in the current Industrial Sewage C of A number 8371-6X9L6B

- A swampy area is located in the south-east corner of the Site. No work is proposed within this area. The area has a relatively small contributing drainage area with no apparent discharge location.
- A series of visual screening berms which also serve to divide site runoff constructed as per the approved D&O Plan

Stormwater runoff from the active landfilling area is collected within the landfill cell as leachate where it is eventually pumped into tankers for off-Site disposal. Stormwater runoff from the capped portion of the Stage 1 landfill cell is directed to the TDS ponds. Stormwater collected to the west of Stage 2A, within the future landfill cell excavation, is manually pumped to the TDS ponds. The surrounding area sheet flows from the Site, ultimately discharging to the east ditch along Brooks Road which forms the headwaters of four areas, identified as Outfall 1 and 2 on Drawing 2.

2.4 REGULATORY SETTING

The landfill currently operates as a waste disposal facility under Permit Number A110302. The D&O for the landfill was originally completed in November 2003. The approved final contours presented in the D&O were updated by Genivar Inc. and approved by the MOE in June 2012.

The Site also operates under an amended Industrial Sewage Works Certificate of Approval Number 8371-6X9L6B (dated February 20, 2007) for the conveyance and discharge of stormwater runoff and leachate collection and disposal system. The Permit is based upon a SWM Plan and subsequent correspondence submitted by CRA in February 2004. This report formed the basis for establishing accepted limits for the total peak runoff discharge from the Site for various rainfall events identified as the Existing Conditions within the original Plan.

At the request of the MOE, an Interim Stormwater Management Plan (ISWMP) was prepared for the Site in January 2012. The purpose of the ISWMP was to improve the existing stormwater management system and increase the overall capacity of the temporary dewatering sedimentation pond (TDS pond). The ISWMP was approved by the MOE on January 3, 2013 and is scheduled for completion in 2013.

The Site is currently at the early stages of completing an individual Environmental Assessment (EA) related to a proposed vertical expansion of the landfill. The vertical capacity expansion being proposed will be for approximately 421,000 m^3 (including waste, daily cover and final cover) of additional capacity, which will be achieved

through a re-engineering of the Site's final contours. The revision of final contours proposed under the EA will also require some redesign of the approved on-Site stormwater management system (due to altered waste slopes). The proposed final contours were considered in this report to prevent the need to revise the stormwater works in the future should the final contours be approved. All changes considered herein will occur within the Site's existing waste footprint and Site boundaries.

3.0 PROPOSED SITE CONDITIONS

3.1 GENERAL DESCRIPTION

The Site development is generally consistent with the original D&O report with respect to the handling and discharge of runoff. The differences between the existing C of A and the Site conditions described below are due to changes in the final contours or topography of the landfill area.

This report provides an updated SWM Plan that considers recent changes to the landfill design. The following three conditions have been assessed:

1. Interim Condition which considers the most recent upgrades to the stormwater conveyance system (ditches, culverts) and modifications to the existing TDS pond.
2. Currently Approved Post Closure Condition which considers the most recently approved post-closure grading plan.
3. Proposed Vertical Expansion Condition which considers the proposed closure plan, currently undergoing an individual EA.

Design drawings have been prepared to support the stormwater management system for the Interim, Currently Approved, and Proposed Vertical Expansion Conditions. These design drawings have been bound separately to this report and comprise a select number of drawings of the larger Design and Operations Plans for the Site.

3.2 DESIGN CRITERIA

The stormwater management system for the Site was designed to provide water quality and water quantity control of surface water runoff. Water quality treatment will be provided through extended detention of the 4-hour duration 25 mm storm event. The stormwater management pond is proposed to provide water quantity control for all storm events up to the 100-year storm, via attenuation of peak flows to below the Existing Condition, as outlined within the original SWM Plan. Estimated runoff from the Regional Storm (Hurricane Hazel) has been assessed to demonstrate safe passage to downstream receivers.

At a minimum, internal drainage ditches were sized to accommodate the peak flow generated from the 3-hour duration 25-year storm, as required by the MOE Guidelines.

3.3 INTERIM CONDITION STORMWATER MANAGEMENT SYSTEM

The MOE requested the ISWMP be developed for the Site. This plan was developed within the CRA technical memo dated January 3, 2013 and consisted of improvements in collecting and routing runoff from the capped portion of the landfill, around the active landfill area, towards the TDS Pond. The ISWMP also consisted of an expansion to the TDS Pond. The ISWMP technical memo has been provided as Appendix B.

Construction activities associated with the ISWMP are scheduled to be completed in September 2013.

3.4 CURRENTLY APPROVED POST CLOSURE CONDITION

The currently approved post-closure Site plan is presented on Drawing 5. Site runoff is discharged from two outfalls located at the Site. Runoff discharging towards Outfall 1 is characterized as an undeveloped area of land in the south-east corner of the Site where no work or changes are being proposed. The remainder of the Site area is directed towards Outfall 2. This SWM Plan provides engineered design for stormwater runoff collected and discharged to Outfall 2, upon final closure of the landfill.

The proposed final layout includes a fully capped landfill with a final cover that consists of a 0.6 m thick soil cover overlain with a 0.15 m topsoil layer and a vegetative cover. The soil cover will consist of on-Site material and/or imported material to provide a cover that will allow a minimum infiltration rate of 0.15 m per year in accordance with O. Reg. 232/98 for an engineered site. The topsoil used in final cover construction will be obtained from on-Site areas stripped in preparation for landfill construction. Runoff generated from the landfill will be collected within a perimeter ditch and directed towards a stormwater management pond (SWM Pond). The SWM Pond has an outlet structure to attenuate peak flows and an emergency spillway to convey excess runoff off-Site during larger storm events. The SWM Pond ultimately discharges towards Outfall 2 which discharges into a roadside drainage ditch along the east side of Brooks Road.

The drainage boundaries for the currently approved post-closure condition are presented on Figure 2. Figure 3 presents the flow schematic for the proposed conditions and illustrates how each catchment is routed to Outfall 1 and Outfall 2.

Catchment 100 will remain undeveloped with the exception of a small portion of the access roads which bound the north and west part of this catchment. This catchment has

sufficient internal storage capacity to retain all surface water runoff resulting from the Regional storm event. Catchment 100 discharges towards Outfall 1 (the swampy area).

Catchments Series 200 (201 through to 210) discharge to the SWM Pond. Catchments 201, 202, 203 and 204 represent the currently approved post-closure landfill cap area. The landfill cap area is encompassed with a perimeter ditch that drains in two directions from the northeast corner of the landfill, to the southwest corner of the landfill. Catchments 201, 202, 203, and 204 drain to the north, west, east and south side perimeter ditches respectively. From the southwest corner of the landfill, the perimeter ditch drains through two 600 mm diameter culvert and an open ditch to the stormwater management pond. Catchment 205 and 206 encompass the area between the landfill perimeter access road and the visual screening berms to the north and west. Catchment 205 and 206 will drain directly to the stormwater management pond via perimeter ditches along the north and west side of the access road. Catchment 207 and 208 encompass the Segregated Recyclable Material Storage Area, Site trailers and scales. This area is a gravel parking lot with numerous bins, trailers, and a weigh scale. This area will sheet flow to the north and runoff will be collected by a drainage ditch that discharges to the SWM Pond. Catchment 209 and 210 encompass the SWM Pond and small undeveloped area east of the SWM Pond. The pond will discharge to the southwest and towards the drainage ditch along Brooks Road which outlets off-Site, known as Outfall 2.

Catchment 301 will also remain undeveloped with the exception of that portion of the visual screening berm that bounds the catchment to the west. Construction of the berm will have an insignificant impact on flows from this catchment.

Catchment 302 will remain largely undeveloped with the exception of a berm that will be constructed to the west of the landfill area. Surface water runoff from Catchment 302 will continue to drain south along the western ditch along Brooks Road to the Site outlet, as in existing conditions. Catchment 303 will be a small area at the southwest corner of the Site formed by a proposed berm and the Site boundary. Surface water runoff from this catchment will drain to the Site discharge point in the western ditch.

3.5 PROPOSED VERTICAL EXPANSION STORMWATER MANAGEMENT SYSTEM

The proposed vertical expansion post-closure Site plan is presented on Figure 4. The proposed vertical expansion condition stormwater conveyance system is very similar to the currently approved system with the exception that the overall landfill height has

increased. Increasing the vertical height of the landfill changes the overall catchment slope.

The drainage boundaries for the proposed vertical expansion condition are presented on Figure 5. Figure 6 presents the flow schematic of the proposed conditions and illustrates how each catchment is routed to Outfall 1 and Outfall 2.

3.6 PROPOSED STORMWATER MANAGEMENT MEASURES

Post-closure stormwater management controls are proposed for each condition to mitigate the effects of increased peak flows due to the landfill development. For the currently approved and proposed vertical expansion conditions these controls will include internal drainage ditches and a stormwater management pond.

A 1-metre deep drainage ditch will be constructed around the perimeter of the landfill area and will convey runoff from the landfill cap and access road to the stormwater management pond. The MOE Guidelines require that all internal drainage ditches have sufficient capacity to convey the peak flows generated from a 25-year design storm, with a continuous overland flow route to convey flows from the 100-year and Regional storm events. The proposed ditches will have capacity to convey flow in excess of that generated by the 100-year or Regional storm. The ditches are proposed to have 4:1 (horizontal:vertical) side slopes on the landfill side, and 3:1 side slopes on the perimeter access road side of the ditches.

The stormwater management pond is proposed in Catchment 210. A wet pond is proposed with a maximum permanent pool depth of 0.6 m. The pond is proposed with 4:1 side slopes, and a berm in the midsection of the pond that will create an extended flow path, which will allow for additional settling of suspended solids. A forebay at the pond inlet is proposed to enhance water quality and capture coarse grained sediments. The pond will receive the discharge from the landfill cap perimeter ditches through two 600 mm diameter concrete culverts and an open swale.

The pond outlet is proposed to consist of a perforated pipe with a 75 mm orifice plate at the permanent pool elevation, an overflow catchbasin located in the pond side slope with an inlet located at the 5-year ponding elevation, and an emergency overflow berm. Surface water runoff volumes up to the 5-year storm event will be discharged via the riser pipe outlet. The outlet structure design will provide 24 hours of extended detention for the 25 mm storm event runoff volume. The control structure will outlet via two 375 mm diameter concrete pipes at an invert of 197.77 m. The riser pipe outlet will be outfitted with a sluice gate to temporarily prevent discharge from the pond up to a

5-year storm event should concerns with stormwater quality arise. The gate will normally remain in the open position. In the event of a spill or if there is a potential to release impacted water (i.e., an oily sheen is visible in the pond), the gate shall be closed and the impacted waters shall be contained. The waters shall be tested and disposed of in accordance with the appropriate means and methods.

The proposed stormwater management pond will have a permanent pool volume of 1,266 m^3 and a total live storage volume in excess of 5,502 m^3. For the proposed vertical expansion conditions the pond will meet requirements for discharge with total off-Site discharge for the Regional storm event calculated to be 0.82 m^3/s. As outlined by the MOE Guidelines, the stormwater management pond will have sufficient capacity to detain the runoff from all storm events up to and including the Regional storm event. This volume is in excess of the MOE Draft Stormwater Management Planning and Design Manual (November, 1999) requirements for Level I (Enhanced) protection.

The proposed stormwater management construction details are presented on Drawings 12 and 13.

4.0 HYDROLOGIC ANALYSIS

The following hydrologic analysis was completed to calculate peak flows and runoff volumes from the Site under various storm event conditions. The computer model PCSWMM 2012 Version 5.0.022 was used to complete the analysis. Distinct design storm hyetographs were created in PCSWMM, based on the Environment Canada's Rainfall Intensity Duration Frequency (IDF) Values for the Hamilton Airport. The 2-, 5-, 10-, 25-, 50-, and 100-year 24-hour, SCS Type-2 distribution, storm events were considered in the hydrologic modelling to provide a design basis for on-Site SWM features (quantity control). The IDF Values for the each of these storm events are summarized in Table 1.

CRA also assessed the performance of the water quality management features using the 25-mm, 4-hour duration storm, consistent with MOE's "Storm Water Management Practices – Planning and Design Manual" (2003).

CRA has developed two model scenarios identified as follows:

1. The Currently Approved Post-Closure condition.
2. The Proposed Vertical Expansion condition

These modelling scenarios were compared to the results obtained from the original SWM Report for the Existing Condition and the Interim Condition (as presented within Appendix B).

4.1 MODELLING RESULTS

The stormwater management pond and drainage ditches were designed based on accepted methodologies, calculations, and analytical tools using the hydrologic model PCSWMM. Hydrologic modelling output for the currently approved condition is provided in Appendix C, and for the proposed vertical expansion is provided in Appendix D. Supporting engineering calculations are provided in Appendix E.

The hydrologic model was used to calculate the surface water runoff volumes for the Site under the various conditions.

Table 2 summarizes the model input parameters for the currently approved post-closure condition. Table 3 summarizes the model input parameters for the proposed vertical expansion condition.

Table 4 presents the calculated runoff peak flow rates for proposed vertical expansion conditions and compares them to the existing condition. The peak flows represent the overland runoff peak flows for the various catchments, with the off-site discharge peak flows presented as the Outlet peak flow values. The runoff peak flows for all storm events less than the 100-Year event decrease from existing to post-closure conditions, meeting the requirements set out in the MOE Guidelines. The Regional Storm Event generates a slightly higher peak flow as a result of the proposed development. The 75 mm-diameter orifice outlet provides in excess of 24 hours of extended detention of the 25 mm storm event runoff volume.

Table 5 summarizes the runoff volumes calculated for each catchment under the currently approved and proposed vertical expansion conditions and compares them to the existing condition. Because some surface water remains within certain catchments, the total Site runoff volume does not represent the total volume of surface water runoff actually discharged off site.

Table 6 summarizes pond performance showing peak inflows and outflows, maximum ponding elevations, and maximum storage volumes for the currently approved and proposed vertical expansion condition.

5.0 EROSION AND SEDIMENT CONTROL PLAN

The stormwater management pond was designed to promote settling of suspended particulate and to minimize re-suspension of the solid matter. The settling action will reduce suspended soil particles and other pollutants, which may be in particulate form and/or adhered to the soil particles.

The perimeter ditching network and stormwater management pond will be maintained by removal of collected sediment on an "as-required" basis to ensure that the ditching and pond continue to operate as designed. Accumulated sediment will be removed when the storage capacity of a channel or the pond is reduced by one third. All sediment removed during the operating life of the landfill will be returned to the active disposal area. Subsequent to landfill closure, all dredged sediments will be returned to the landfill and placed as final cover soil. Zones where sediments are placed as part of final cover activities shall be bounded by silt fence until such time as the vegetation has reached 70 percent of the native background density. Sediment transport from the landfill area will decrease as the vegetative cover over completed areas of the landfill is established.

Additional measures will also be employed to minimize sediment transport at the source and prevent runoff that has contacted landfilled waste, which may contain particulate and/or soluble pollutants, from migrating from the landfill area. These measures are as follows:

- temporary soil berms will be utilized throughout the active landfill disposal area to prevent runoff from leaving waste areas and to direct upgradient runoff around the active disposal area
- all water that has contacted landfilled waste will be treated as leachate and will be drained by a leachate system, pumped and transported off-Site for disposal
- rock and straw bale check dams and/or silt fences will be utilized in drainage swales and on slopes to enhance erosion and sedimentation control during and immediately after construction phases in locations where necessary

6.0 MONITORING PLANS

The Site is currently staffed full-time by landfill staff to oversee Site operations. Regular visual inspections shall be made on a monthly basis during active construction activities to assess the effectiveness of the erosion and sediment control measures implemented, and to conduct any required maintenance activities. After the period of active construction activities has been completed (final installation of the landfill cap), regular visual inspections shall be made on a bi-monthly basis until adequate Site stabilization is achieved.

Erosion and sediment controls shall be maintained until all disturbed areas of the Site, including the pond and swales, have fully stabilized and vegetated areas have achieved 70 percent of the native background density of growth.

The condition of all swales, culverts, vegetation, infiltration basin outlet, and outflow channels leading to the Brooks Road drainage ditch and off Site will be noted at regular intervals. Should any defects be identified, appropriate corrective actions will be scheduled and tracked. Regular maintenance of SWM Plan features and unscheduled corrective actions will be conducted during appropriate seasons and concurrent with other Site operations.

7.0 CONCLUSION

The proposed stormwater management measures meet the requirements set out by the MOE Guidelines.

The proposed stormwater management measures as described in this Stormwater Management Plan are based on the modeling and design calculations described in this report. These proposed measures consist of drainage ditches and a stormwater management pond. The internal drainage ditches and stormwater management pond are adequately sized to accommodate the peak flows and runoff volumes for the 25-year and Regional storm events respectively. The total off-site peak discharge rates for post-closure conditions will be less than existing conditions for all storm events.

Should you have any questions on the above, please do not hesitate to contact us.

All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

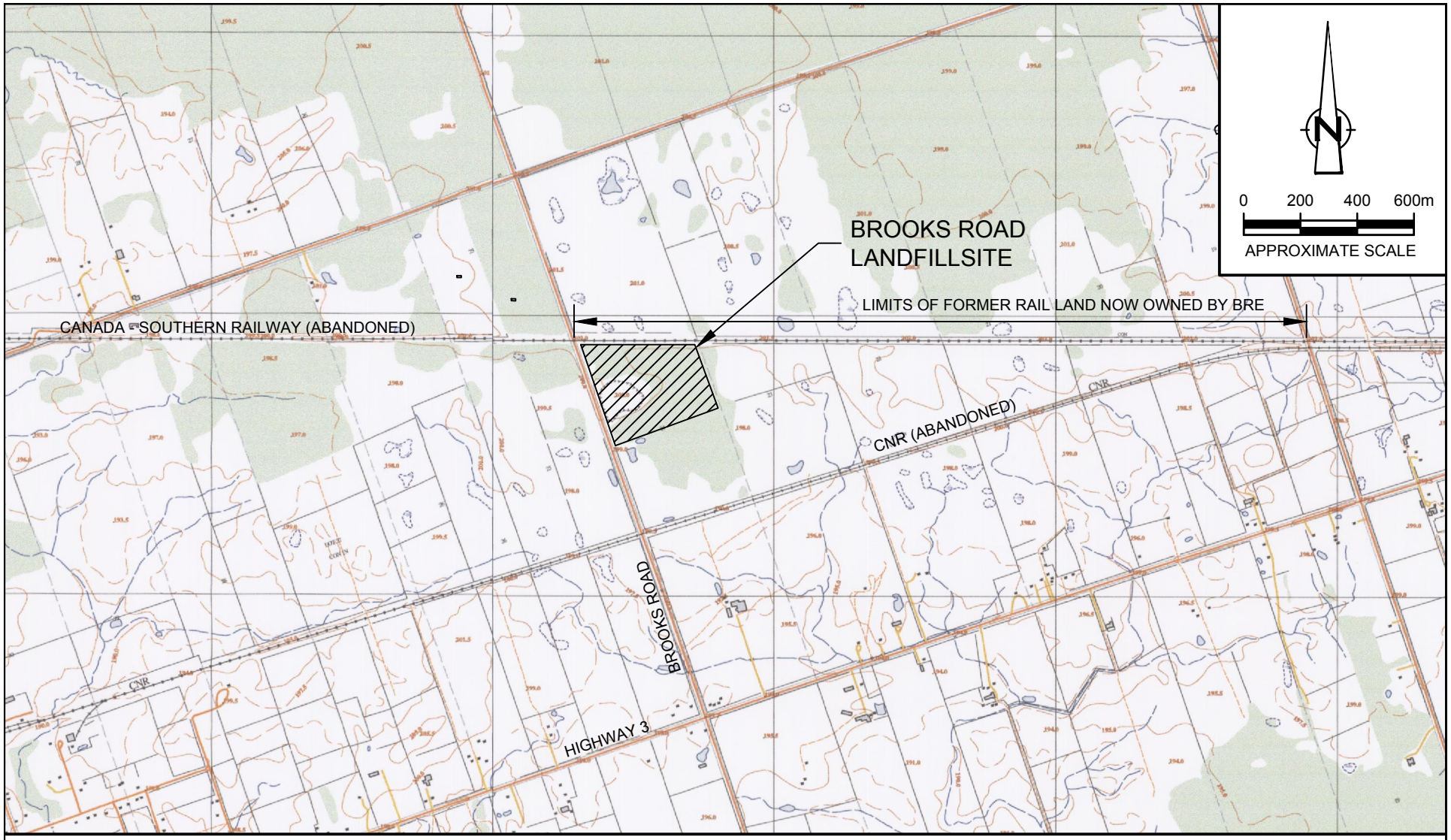
Gregory D. Ferraro, P. Eng.

Paul Farquarson, C.E.T.

8.0 REFERENCES

Conestoga-Rovers & Associates, "*Hydrogeologic Performance Assessment*" *dated October 2002*

Ontario Ministry of the Environment, "*Stormwater Management Planning and Design Manual*" dated March 2003.



SOURCE: MINISTRY OF NATURAL RESOURCES
SHEETS: 10 17 5900 47550 & 10 17 5950 47550

figure 1

SITE LOCATION MAP
BROOKS ROAD LANDFILL
Haldimand County, Ontario

18235-00(040)GN-WA001 SEP 10/2013

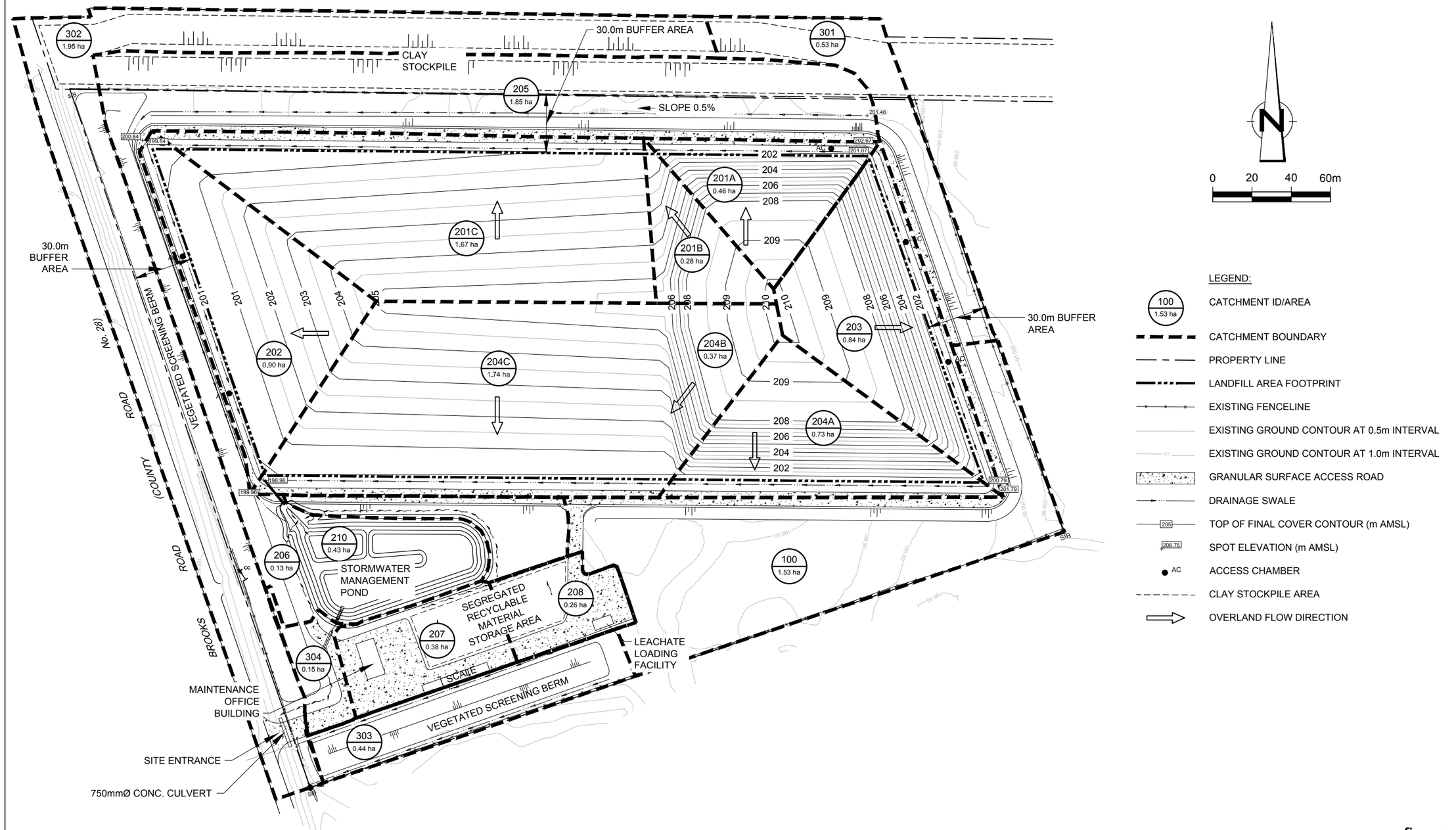


figure 2

CURRENTLY APPROVED POST CLOSURE CONDITION CATCHMENT DELINEATION
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

18235-00(040)GN-WA002 SEP 5/2013

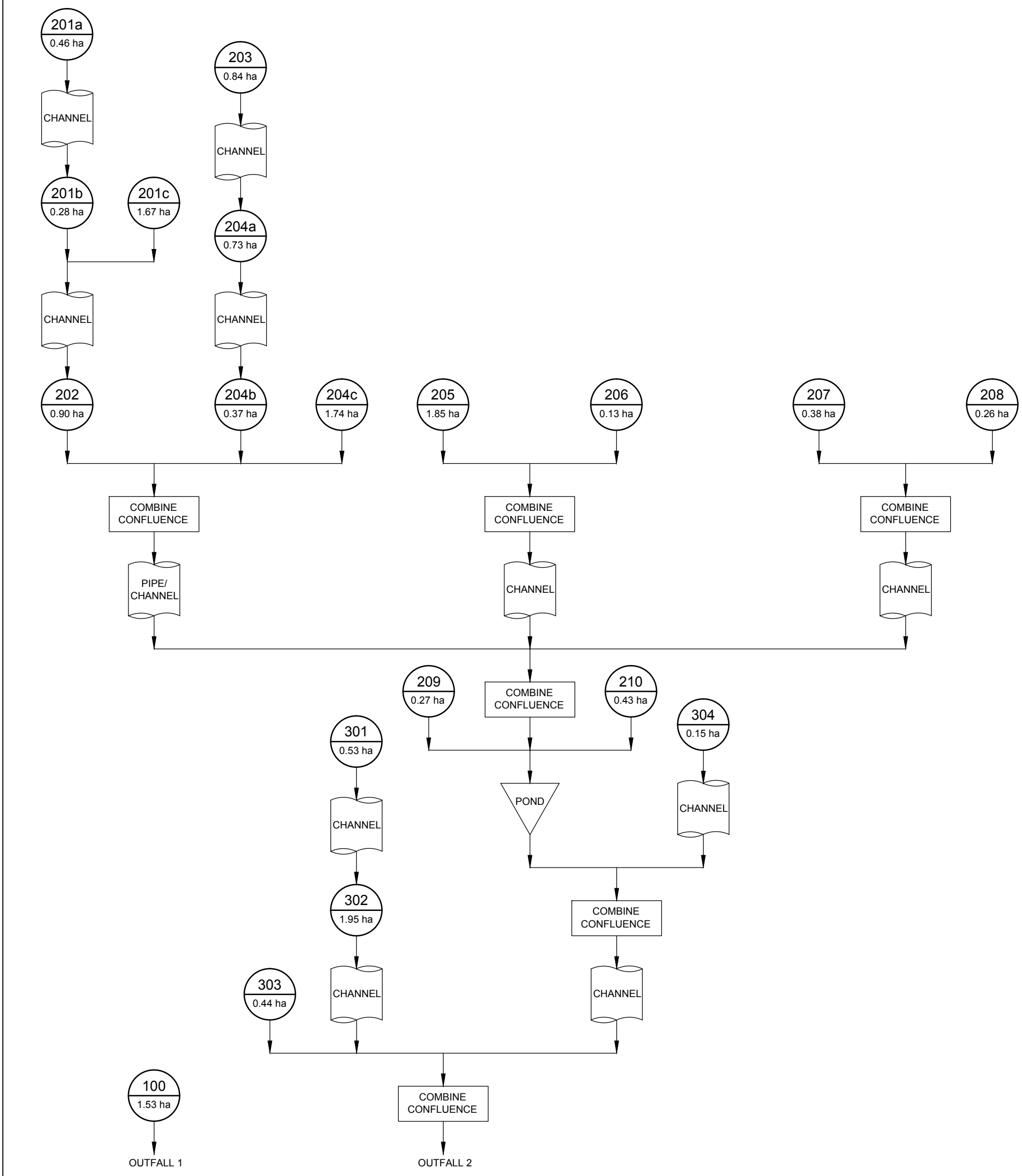


figure 3

CURRENTLY APPROVED POST CLOSURE CONDITION FLOW SCHEMATIC
BROOKS ROAD LANDFILL

Haldimand Country, Ontario

18235-00(040)GN-WA003 JUN 18/2013

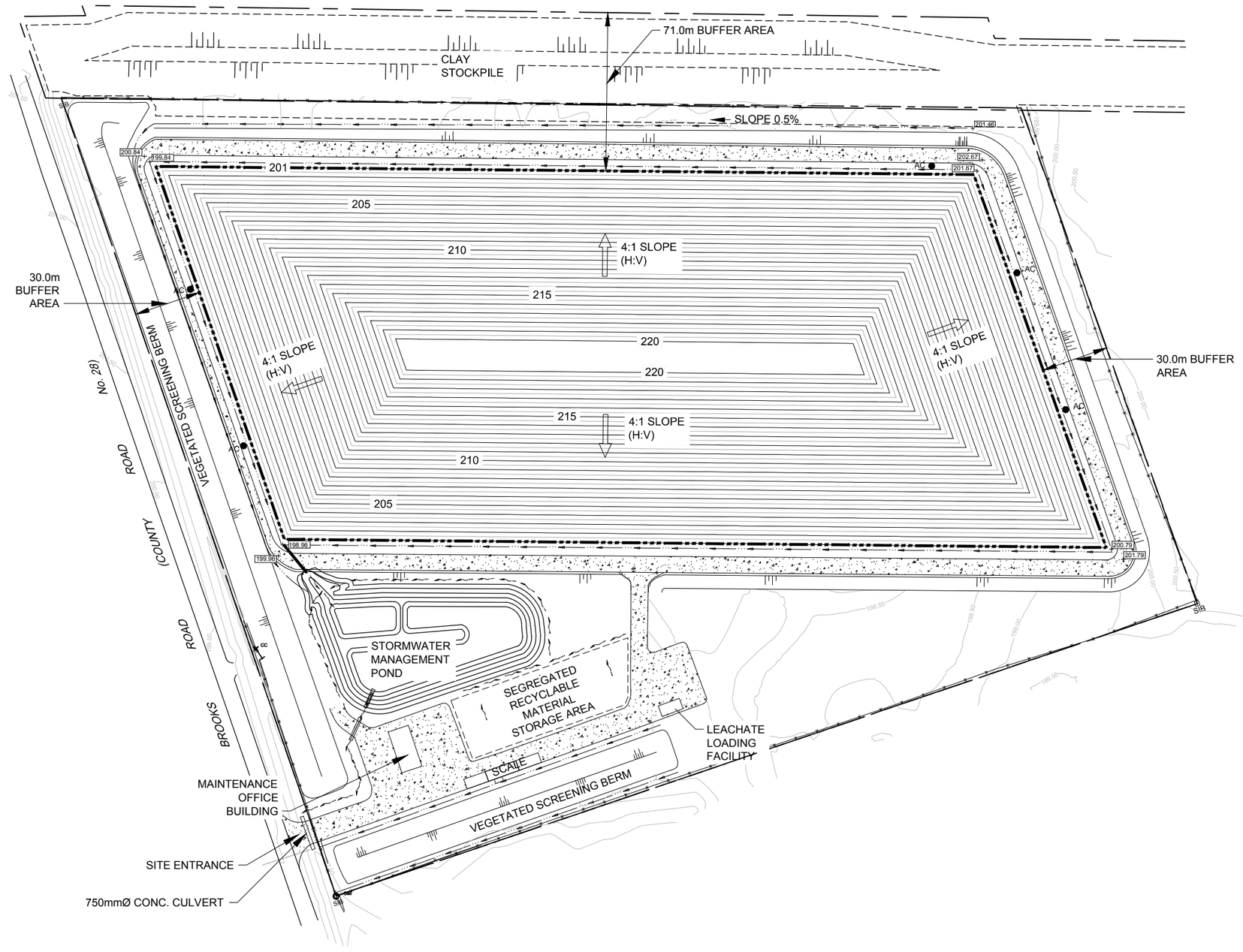


figure 4

PROPOSED FINAL CONTOURS
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

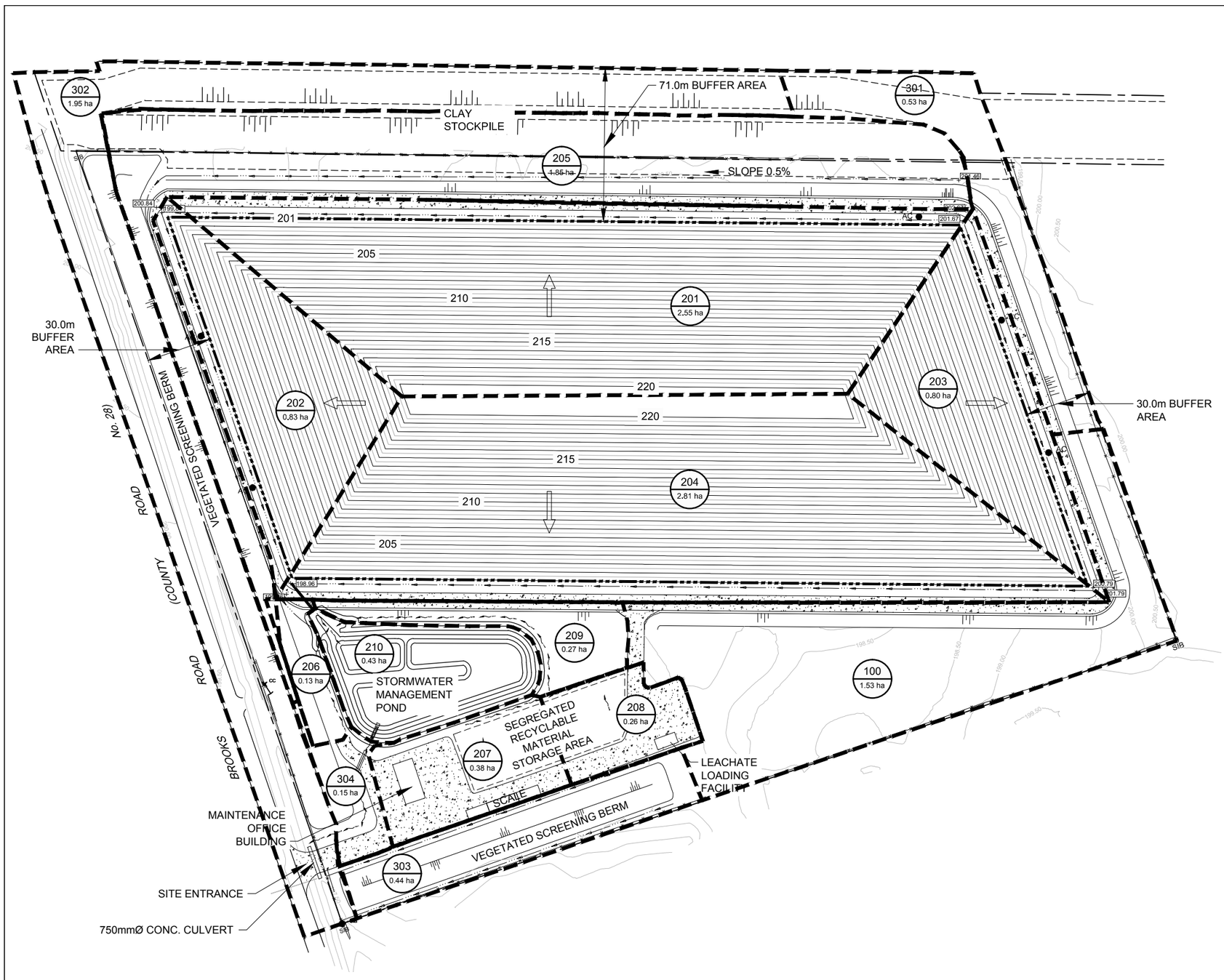


figure 5

PROPOSED VERTICAL EXPANSION CONDITION CATCHMENT DELINEATION
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

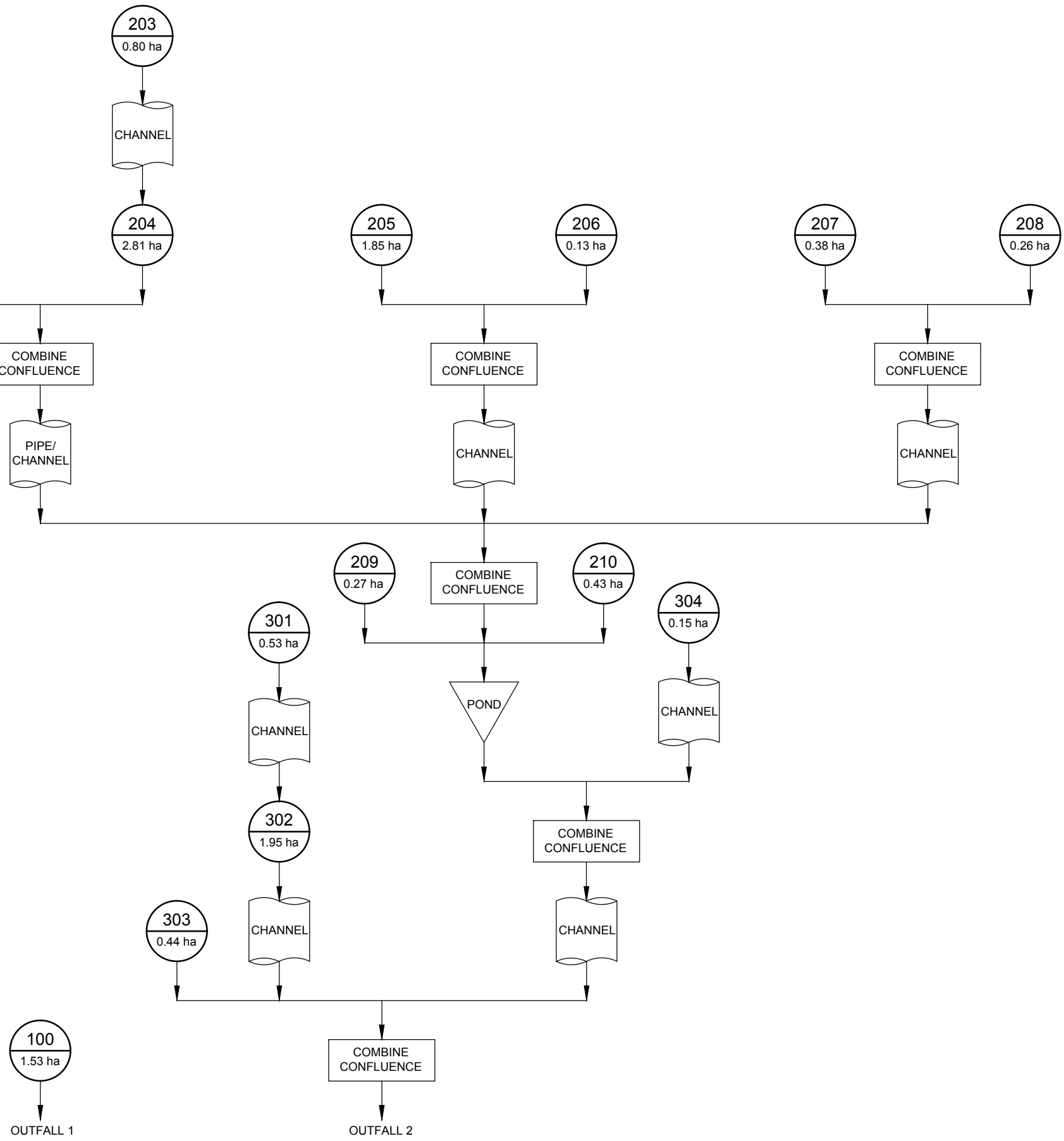


figure 6

PROPOSED VERTICAL EXPANSION CONDITION FLOW SCHEMATIC
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

18235-00(040)GN-WA006 JUN 18/2013

TABLE 1

CITY OF HAMILTON DESIGN STORM PARAMETERS
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Design Storm	*Depth (mm)*	*Duration (hours)*	*Timestep (min.)*
25 mm	25	4	5
2-Year	34.2	3	5
5-Year	50.2	3	5
10-Year	60.8	3	5
25-Year	74.2	3	5
50-Year	84.1	3	5
100-Year	124.7	24	15
Regional (Hurricane Hazel)	212	12	15

Notes:

1. Storms based on Hamilton Airport data - Environment Canada Atmospheric Environment Service.

TABLE 2

CURRENTLY APPROVED POST CLOSURE CONDITION SUBCATCHMENT PARAMETERS
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Catchment ID	*Area*	*Flow Length*	*Slope*	*Impervious Area*	*Manning's*		*Depression Storage*		*Zero Imperv*	*Infiltration Parameters*	
					Impervious	*Pervious*	*Impervious*	*Pervious*		*Drying Time*	*SCS Curve*
	(ha)	*(m)*	*(%)*	*(%)*			*(mm)*	*(mm)*	*(%)*	*(days)*	*Number*
100	1.53	31	2	0	0.015	0.4	2	7	0	7	79
201a	0.46	61	13	5	0.015	0.33	2	10	0	7	73
201b	0.28	37	13	5	0.015	0.33	2	10	0	7	73
201c	1.67	81	8	5	0.015	0.33	2	10	0	7	73
202	0.90	86	7	7	0.015	0.33	2	10	0	7	73
203	0.84	84	12	5	0.015	0.33	2	10	0	4	72
204a	0.73	61	13	8	0.015	0.33	2	10	0	7	73
204b	0.37	31	13	8	0.015	0.33	2	10	0	7	73
204c	1.74	88	7	8	0.015	0.33	2	10	0	7	73
205	1.85	41	50	0	0.015	0.35	2	10	0	7	74
206	0.13	38	2	5	0.015	0.4	2	10	0	7	72
207	0.38	60	2	95	0.015	0.27	2	10	0	7	98
208	0.26	52	2	95	0.015	0.27	2	10	0	7	98
209	0.27	40	2	5	0.015	0.27	2	10	0	7	72
210	0.43	9	10	100	0.015	0.33	2	10	0	7	98
301	0.53	15	4	0	0.015	0.35	2	7	0	7	79
302	1.95	25	1	0	0.015	0.4	2	7	0	7	79
303	0.44	110	50	0	0.015	0.4	2	6	0	7	74
304	0.15	16	3	20	0.015	0.27	2	10	0	7	84
Total	14.91										

TABLE 3

PROPOSED VERTICAL EXPANSION POST CLOSURE CONDITION SUBCATCHMENT PARAMETERS
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Catchment ID	*Area*	*Flow Length*	*Slope*	*Impervious Area*	*Manning's*		*Depression Storage*		*Zero Imperv*	*Infiltration Parameters*	
					Impervious	*Pervious*	*Impervious*	*Pervious*		*Drying Time*	*SCS Curve*
	(ha)	*(m)*	*(%)*	*(%)*			*(mm)*	*(mm)*	*(%)*	*(days)*	*Number*
100	1.53	31	2	0	0.015	0.4	2	7	0	7	79
201	2.62	85	25	5	0.015	0.33	2	10	0	7	73
202	0.85	89	25	7	0.015	0.33	2	10	0	7	73
203	0.88	84	25	5	0.015	0.33	2	10	0	4	72
204	2.64	83	25	8	0.015	0.33	2	10	0	7	73
205	1.85	41	50	0	0.015	0.35	2	10	0	7	74
206	0.13	38	2	5	0.015	0.4	2	10	0	7	72
207	0.38	60	2	95	0.015	0.27	2	10	0	7	98
208	0.26	52	2	95	0.015	0.27	2	10	0	7	98
209	0.27	40	2	5	0.015	0.27	2	10	0	7	72
210	0.43	9	10	100	0.015	0.33	2	10	0	7	98
301	0.53	15	4	0	0.015	0.35	2	7	0	7	79
302	1.95	25	1	0	0.015	0.4	2	7	0	7	79
303	0.44	110	50	0	0.015	0.4	2	6	0	7	74
304	0.15	16	3	20	0.015	0.27	2	10	0	7	84
Total	14.91										

TABLE 4

SUMMARY OF RUNOFF PEAK FLOWS RATES
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (3 hr) (m^3/s)	*5-Year (3 hr) (m^3/s)*	*10-Year (3 hr) (m^3/s)*	*25-Year (3 hr) (m^3/s)*	*50-Year (3 hr) (m^3/s)*	*100-Year (3 hr) (m^3/s)*	*Regional (m^3/s)*	*4hr-25mm (m^3/s)*
Existing Conditions								
Site Total	0.11	0.29	0.45	0.70	0.90	0.98	0.94	--
Catchment Name								
Currently Approved Condition								
100	0.01	0.04	0.09	0.17	0.24	0.32	0.20	0.000
201a	0.00	0.01	0.02	0.04	0.07	0.10	0.06	0.004
201b	0.00	0.00	0.02	0.04	0.05	0.07	0.04	0.002
201c	0.01	0.02	0.05	0.12	0.18	0.29	0.21	0.014
202	0.01	0.02	0.03	0.07	0.10	0.15	0.11	0.011
203	0.01	0.01	0.03	0.06	0.09	0.15	0.10	0.007
204a	0.01	0.02	0.04	0.08	0.11	0.16	0.09	0.010
204b	0.01	0.01	0.03	0.06	0.08	0.09	0.05	0.005
204c	0.02	0.04	0.07	0.13	0.19	0.30	0.22	0.024
205	0.00	0.03	0.13	0.29	0.40	0.47	0.24	0.000
206	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.001
207	0.07	0.10	0.12	0.14	0.16	0.15	0.06	0.062
208	0.05	0.07	0.08	0.10	0.11	0.10	0.04	0.042
209	0.00	0.00	0.01	0.02	0.03	0.05	0.03	0.002
210	0.08	0.11	0.13	0.16	0.18	0.16	0.06	0.074
301	0.00	0.03	0.07	0.11	0.14	0.15	0.07	0.000
302	0.01	0.05	0.10	0.19	0.27	0.39	0.25	0.000
303	0.00	0.01	0.03	0.05	0.07	0.09	0.06	0.000
304	0.01	0.02	0.03	0.04	0.05	0.05	0.02	0.005
Site Total	0.02	0.08	0.22	0.33	0.40	0.52	1.06	0.003
Proposed Vertical Expansion Condition								
100	0.01	0.040	0.09	0.17	0.24	0.32	0.20	0.000
201	0.02	0.039	0.11	0.25	0.38	0.56	0.33	0.022
202	0.01	0.017	0.04	0.09	0.13	0.18	0.11	0.010
203	0.01	0.012	0.03	0.08	0.12	0.18	0.11	0.008
204	0.04	0.060	0.14	0.29	0.42	0.59	0.34	0.036
205	0.00	0.033	0.13	0.29	0.40	0.47	0.24	0.000
206	0.00	0.002	0.00	0.01	0.01	0.02	0.02	0.001
207	0.07	0.097	0.12	0.14	0.16	0.15	0.06	0.062
208	0.05	0.067	0.08	0.10	0.11	0.10	0.04	0.042
209	0.00	0.004	0.01	0.02	0.03	0.05	0.03	0.002
210	0.08	0.110	0.13	0.16	0.18	0.16	0.06	0.074
301	0.00	0.035	0.07	0.11	0.14	0.15	0.07	0.000
302	0.01	0.046	0.10	0.19	0.27	0.39	0.25	0.000
303	0.00	0.011	0.03	0.05	0.07	0.09	0.06	0.000
304	0.01	0.018	0.03	0.04	0.05	0.05	0.02	0.005
Site Total	0.02	0.08	0.24	0.33	0.40	0.51	1.06	0.003

TABLE 5

SUMMARY OF RUNOFF VOLUMES
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (3 hr) (m^3)	*5-Year (3 hr)* (m^3)	*10-Year (3 hr)* (m^3)	*25-Year (3 hr)* (m^3)	*50-Year (3 hr)* (m^3)	*100-Year (3 hr)* (m^3)	*Regional* (m^3)	*4hr-25mm* (m^3)
Existing Conditions								
Site Total	1,119	2,375	3,340	4,659	5,697	10,232	20,999	--
Catchment Name								
Currently Approved Condition								
100	40	190	300	450	570	1100	2320	0
201a	10	40	70	110	140	290	640	10
201b	0	20	40	70	90	180	390	0
201c	30	120	230	380	500	1040	2300	20
202	20	70	130	210	280	570	1250	10
203	10	60	110	190	240	510	1140	10
204a	20	70	120	180	240	470	1030	10
204b	10	40	60	100	120	240	520	10
204c	50	150	260	420	540	1120	2440	30
205	0	130	260	430	560	1150	2560	0
206	0	10	20	30	40	80	180	0
207	120	180	220	270	310	460	800	90
208	80	120	150	190	210	320	540	60
209	0	20	40	60	80	170	370	0
210	140	210	250	310	350	530	900	100
301	20	70	110	160	210	390	810	0
302	50	230	370	570	720	1400	2950	0
303	10	50	70	110	140	290	620	0
304	10	30	50	60	80	130	260	10
Site Total	620	1,810	2,860	4,300	5,420	10,440	22,020	360
Proposed Vertical Expansion Condition								
100	40	190	300	450	570	1120	2320	0
201	40	210	380	620	800	1670	3630	30
202	20	70	130	210	270	550	1190	10
203	10	70	120	200	260	550	1200	10
204	70	250	420	660	850	1740	3720	50
205	0	130	260	430	560	1160	2560	0
206	0	10	20	30	40	80	180	0
207	120	180	220	270	310	470	800	90
208	80	120	150	190	210	320	540	60
209	0	20	40	60	80	170	370	0
210	140	210	250	310	350	530	900	100
301	20	70	110	160	210	390	810	0
302	50	230	370	570	720	1430	2950	0
303	10	50	70	110	140	290	620	0
304	10	30	50	60	80	130	260	10
Site Total	610	1,840	2,890	4,330	5,450	10,600	22,050	360

TABLE 6

SUMMARY OF STORMWATER MANAGEMENT POND PERFORMANCE
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Currently Approved Condition

Design Storm	*Peak Inflow (m^3/s)*	*Peak Outflow (m^3/s)*	*Maximum Depth (m)*	*Maximum Elevation (m AMSL)*	*Maximum Volume (m^3)*
2-Year (3 hr)	0.267	0.004	0.16	198.01	458
5-Year (3 hr)	0.342	0.052	0.34	198.19	1,040
10-Year (3 hr)	0.431	0.155	0.390	198.24	1,208
25-Year (3 hr)	0.589	0.229	0.510	198.36	1,631
50-Year (3 hr)	0.725	0.284	0.630	198.48	2,067
100-Year (3 hr)	1.100	0.362	0.850	198.70	2,885
Regional	1.167	0.832	1.500	199.35	5,657
4hr-25mm	0.258	0.003	0.110	197.96	319

Proposed Vertical Expansion

Design Storm	*Peak Inflow (m^3/s)*	*Peak Outflow (m^3/s)*	*Maximum Depth (m)*	*Maximum Elevation (m AMSL)*	*Maximum Volume (m^3)*
2-Year (3 hr)	0.260	0.004	0.16	198.01	451
5-Year (3 hr)	0.333	0.056	0.34	198.19	1,047
10-Year (3 hr)	0.416	0.172	0.390	198.24	1,208
25-Year (3 hr)	0.547	0.240	0.510	198.36	1,630
50-Year (3 hr)	0.682	0.287	0.640	198.49	2,091
100-Year (3 hr)	1.055	0.365	0.850	198.70	2,894
Regional	1.159	0.815	1.490	199.34	5,630
4hr-25mm	0.255	0.003	0.110	197.96	313

APPENDIX A

PRE-APPLICATION CONSULTATION RECORDS

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited CONTRACT NO.: 018235 (33)

RE: Progress Meeting No. 6

LOCATION: Brooks Road Landfill Site DATE: November 01, 2012 TIME: 1:00 pm

Participants:

Reid Robertson (BRE)	Allison Butcher (MOE)	Paul Zizek (Tervita)	Jordan Wilson (Tervita)
Dan Roberts (Tervita)	Peter Kemp (CRA)	Dan Turner (CRA)	

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	Richard Weldon (BRE)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the October 16, 2012 Progress Meeting No. 5 were reviewed. The following items were noted: • Drainage stone submittal has been submitted by Tervita and approved by CRA • Geotextile roll certificates have been submitted by Tervita and under review by CRA • Tervita to submit finalized Off-Site Transportation and Disposal Plan	 CRA Tervita
2.	**Work progress and Construction Progress Schedule** An updated construction schedule is provided as an attachment to the minutes. Key changes include: • HDPE liner installation anticipated to begin November 12, 2012 and complete November 21, 2012 • Current schedule anticipates cell completion on December 11, 2012	
3.	**Field Observations, Problems, and Decisions** Weather over the past week has caused significant delays due to high volumes of precipitation. Wet weather conditions have pushed the construction schedule back approximately 1 week. Accumulated water in the Stage 2A cell is being pumped to the TDS pond. The pond will be sampled this Friday and Reid will have a quicker turnaround time applied to the sample results in order to discharge water to the roadside ditch sooner.	

Item	*Description*	*Action By*
3.	**<u>Field Observations, Problems, and Decisions</u> (cont'd)** Zizek – Will look into bringing in a second packer to work on the south slope for the compacted clay liner (CCL). Using this approach would not reduce the working days necessary for cell completion, but would act as a contingency to ensure that there are no delays associated with subsequent HDPE liner installation. Approximately 2 to 3 days are required to decommission the estimated 1,500 cubic metres of waste in the Phase 1 Decommissioning Area that is above the remaining clay to be excavated for Stage 2A cell construction. This quantity is in addition to the estimated 10,000 cubic metres of waste in the Phase 1 area that is outside of the clay excavation area. The 1,500 cubic metres of waste will be directly hauled and disposed of in the Stage 1 cell. Kemp – Proposes to temporarily stockpile the remaining 10,000 cubic metres of waste in the Stage 1 cell, as opposed to the Phase 2 Decommissioning Area, with the intention of moving the waste into the Stage 2A cell when completed. Ideally, the waste would be moved into the Stage 2A cell after an appropriate lift of incoming waste were placed on the base of the cell in order to optimize the leachate collection system. The additional benefit would be significant time savings associated with decommissioning the Phase 2 area.	Tervita
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** If wet weather conditions persist, further delays can be expected. No other problems were identified at this time.	
5.	**<u>Submittals Schedule and Status of Submittals</u>** Tervita to submit finalized Off-Site Transportation and Disposal Plan	
6.	**<u>Health and Safety Concerns</u>** No health and safety concerns were identified at this time. Open excavation areas have been promptly taped off and appropriate signage has been set up.	
7.	**<u>Maintenance of Progress Schedule</u>** The construction schedule has been updated to reflect delays associated with unfavourable weather conditions. Zizek – A proposed shutdown has been built into the construction schedule at Christmas time. Actual days for shutdown will be contingent on work progress to date.	
8.	**<u>Effect of Proposed Changes on Progress Schedule and Coordination</u>** There are no proposed changes at this time.	

CONESTOGA-ROVERS & ASSOCIATES

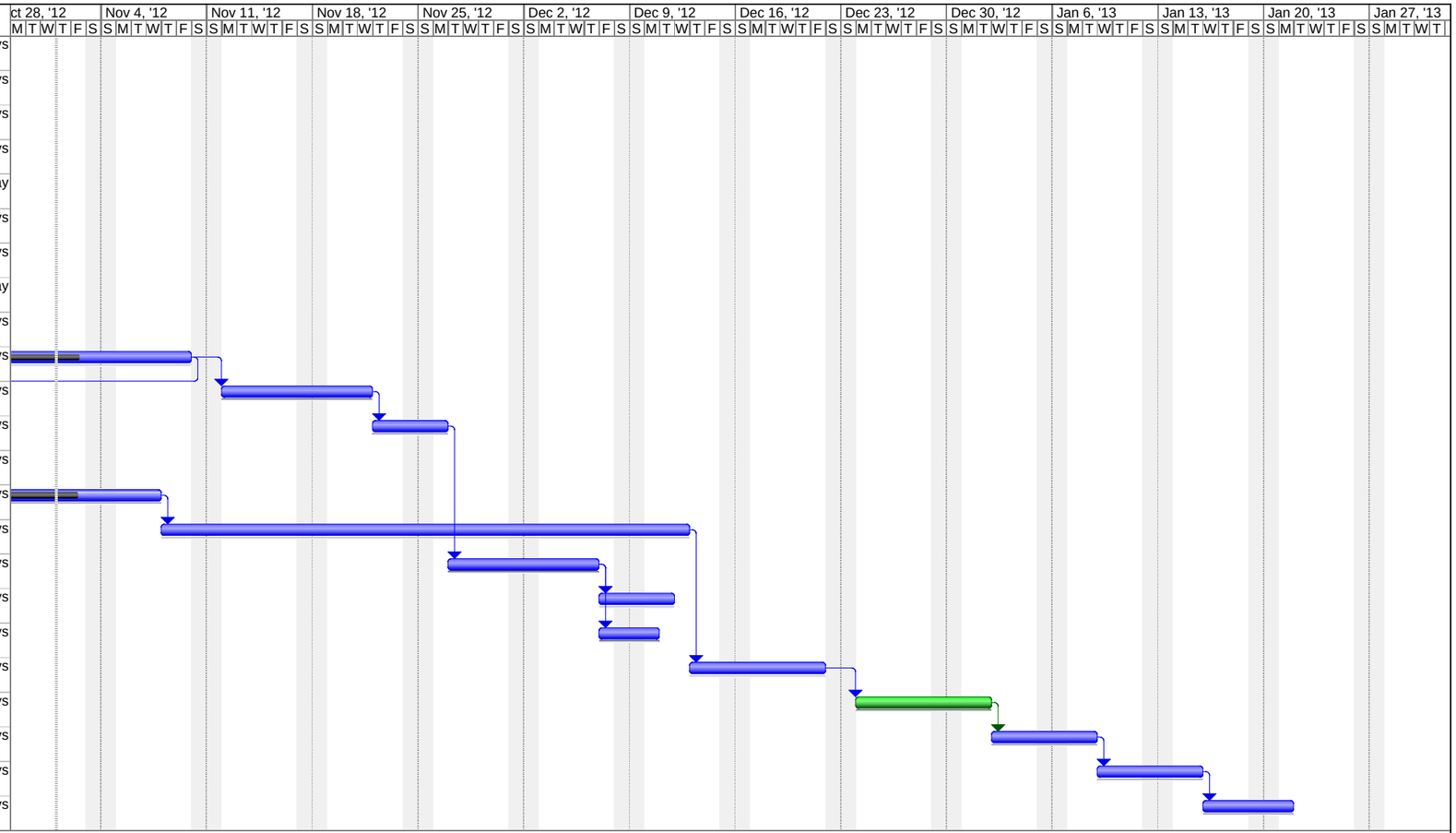
Item	*Description*	*Action By*
9.	**Contract Administration** Payment Certificate 3 has been executed. Tervita will provide Payment Certificate 4 for CRA review on Friday November 9, 2012.	
10.	**Other Business Relating to the Work** Butcher – Noted that groundwater sampling is to be completed this month at the Site. Asked whether any decision has been made regarding the damaged wells on the northern perimeter of the site. Also noted that there may be a damaged well at the southeastern portion of the Site. Kemp – The location of the damaged wells and the subsurface soil conditions in which they are installed needs to be assessed to determine whether the wells can be moved. The concern with reinstalling the wells in the same locations is that there is a risk of reoccurring damage. Butcher – A proposal may be submitted to the MOE detailing the reinstallation of the groundwater monitoring wells. Butcher – Noted some exposed waste at the north end of the Stage 1 cell due to heavy rainfall. Robertson – Has discussed the exposed waste with Tervita and cover material will be placed over the exposed area. Kemp – Due to weather conditions, the site survey required for the Interim Stormwater Management Plan has been delayed. Is it possible to adjust the submission time of the Interim Stormwater Management Plan? Butcher – May be able to adjust the submission time to accommodate the delay. Peter Kemp to send an email detailing the proposed delay.	CRA CRA

☒ Attachments: Updated Project Schedule

Prepared By: Dan Turner and Peter Kemp Date Issued: November 9, 2012

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

ID	Task Name	Duration
1	Notice to Proceed	0 days
2	Mobilization and Startup (includes silt fencing/straw bale check dams)	5 days
3	Clearing and grubbing	3 days
4	Set-up of staging and decon for first stage of waste excavation	2 days
5	Completion of east temporary berm	1 day
6	Bulk Clay Excavation (approximately 9,000 m3)	5 days
7	Direct haul of 9000 m3 of waste to Cell 1 (including 500 m3 of possible segregation)	7 days
8	Completion of temporary berm along west and south extents of waste removed	1 day
9	Excavate and stockpile on-site approximately 39,000 m3 of native clay	19 days
10	Construction of Compacted Clay Layer	27 days
11	HDPE liner	8 days
12	Non-woven geotextile	3 days
13	Completion of temporary divider berm as per drawing C-03	2 days
14	Excavate 5000 m3 of waste and stockpile on Phase 2	14 days
15	Excavate and stockpile on-site approximately 43,000 m3 of native clay	25 days
16	Drainage layer material/Leachate pipe installation	8 days
17	Woven geotextile	3 days
18	Video inspection of leachate collection system pipe	2 days
19	Excavate remaining 10000 m3 of waste and stockpile on Phase 2	7 days
20	Christmas Break	7 days
21	Backfill and grading of decommissioning areas	5 days
22	Hydroseeding	5 days
23	Demobilization and closeout	4 days



Project: Draft Brooks Actual Schedule
Date: Thu 11/1/12

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited CONTRACT NO.: 018235 (33)

RE: Progress Meeting No. 9

LOCATION: Brooks Road Landfill Site DATE: December 11, 2012 TIME: 9:30 am

Participants:

Richard Weldon (BRE)	Reid Robertson (BRE)	Paul Zizek (Tervita)	Dan Roberts (Tervita)
Allison Butcher (MOE)	Peter Kemp (CRA)	Dan Turner (CRA)	

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	John Beals (MOE)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the November 27, 2012 Progress Meeting No. 8 were reviewed. The following items were noted:	
	• Tervita to submit finalized Off-Site Transportation and Disposal Plan.	Tervita
	• CRA has received comments from the MOE regarding the Interim Stormwater Management Plan (ISWMP). CRA to address comments and resubmit to the MOE.	CRA
	• Tervita confirmed receipt of payment for Payment Certificate 4.	
	• MOE has provided a letter detailing an allowance for temporary stockpiling of historical waste on the Stage 1 cell.	
	• CRA and Tervita will discuss the required change order for removal of Phase II Decommissioning Area waste.	CRA/Tervita
	• CRA and Tervita have discussed the temporary separation berm design between Stage 2A and 2B. The berm will not be modified from the original design.	
	• The leachate collection pipes have been installed in Stage 2A. The northern pipe was installed at a modified slope due to the Stage 1 pipe being constructed at a higher elevation than designed.	
	• Tervita has submitted QA/QC information for HDPE liner installation from Terrafix to CRA with the exception of the required subgrade acceptance forms. Tervita to submit the remaining information from Terrafix.	Tervita
	• Tervita has submitted some gradation samples for the drainage stone and will continue to submit samples as they are received.	Tervita

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
1.	**<u>Review of Previous Meeting Minutes</u> (cont'd)**	
	• Payment Certificate 5 has been submitted to CRA and a recommendation for payment will be issued pending receipt of statutory declaration from Tervita.	Tervita
	• Tervita to submit costs for cleaning leachate collection system piping for CRA to develop a change order. Cleaning of leachate collection pipes to be done in conjunction with the video inspection of the leachate collection pipes.	Tervita
	• Six soil gas probes have been installed at the site. MOE requested a drawing showing the locations of the installed probes, as well as a letter detailing the reasoning for installing six probes instead of the eight stipulated in the approved Design and Operations Report (CRA, 2003). MOE also noted that the letter can contain a request for revised landfill gas monitoring frequency as was previously discussed by CRA.	CRA
2.	**<u>Work progress and Construction Progress Schedule</u>** Zizek – Detailed progress to date and expected completion times • The drainage stone in the base of the cell will be graded today and tomorrow • Leachate pipes have been installed • Drainage stone placement on sideslopes is taking longer than expected. • Cell completion is anticipated for mid next week • It will likely take 1 week to construct a ramp of waste into Stage 2A Weldon – Requested 3 days' notice of cell completion.	Tervita
3.	**<u>Field Observations, Problems, and Decisions</u>** Turner – While attempting to push stone up the northern sideslope, the non-woven geotextile pulled down and the HDPE liner was damaged. The damage has been repaired however Tervita will need a new method for stone placement to prevent further damage. Zizek/Roberts – The anchor trenches will be backfilled to prevent geotextile movement and the stone will be placed halfway up the slope in a 1-metre-thick lift before slowly pushing stone up the remaining portion of the slope. There is potential to bring in another dozer to expedite the process.	
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** No problems were identified at this time.	
5.	**<u>Submittals Schedule and Status of Submittals</u>**	
	• Tervita to submit finalized Off-Site Transportation and Disposal Plan	Tervita
	• Tervita to submit Terrafix subgrade acceptance forms to CRA	Tervita
	• Tervita to submit gradation testing for drainage stone to CRA	Tervita

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
6.	**Health and Safety Concerns** No health and safety concerns were identified at this time.	
7.	**Maintenance of Progress Schedule** No maintenance is required on the progress schedule at this time.	
8.	**Effect of Proposed Changes on Progress Schedule and Coordination** There are no proposed changes at this time.	
9.	**Contract Administration** Payment Certificate 5 statutory declaration will be submitted Wednesday, December 12. A change order will be developed for Phase II decommissioning. A change order will be developed for cleaning of leachate pipes concurrently with the video inspection.	Tervita CRA/Tervita CRA/Tervita
10.	**Other Business Relating to the Work** No other business was identified at this time	

☐ Attachments: _____

Prepared By: Dan Turner and Peter Kemp Date Issued: January 7, 2012

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited

CONTRACT NO.: 018235 (33)

RE: Construction Progress Meeting No. 12

LOCATION: Brooks Road Landfill Site

DATE: February 14, 2013

TIME: 11:00 AM

Participants:

Richard Weldon (BRE)	Reid Robertson (BRE)	Doug Robinson (BRE)	Paul Zizek (Tervita)
Jordan Wilson (Tervita)	Allison Butcher (MOE)	Peter Kemp (CRA)	Dan Turner (CRA)

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	Joel Rider (Tervita)
		John Beals (MOE)	Dan Roberts (Tervita)	Brad Farnand (MOE)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the January 30, 2013 Progress Meeting No. 11 were reviewed. The following items were noted:	
	• The MOE district office has received the letter application to revise the landfill gas monitoring frequency. Allison Butcher to check on status of request with Approvals Branch.	MOE
	• Tervita completed repairs upon returning to work after unfavourable weather conditions including: placing cover over exposed Phase II waste, reconstructing divider berm in the vicinity of the disposal trench, and completing the final panel of woven geotextile on the north sideslope.	
	• Tervita has provided an updated construction schedule	
	• CRA has developed a Change Order for Stage 1 grading of waste to final contours and interim cover application. Brooks Road to review and approve the Change Order.	BRE
	• Brooks Road to send PLC minutes to CRA and develop action item list for distribution to PLC prior to next meeting.	BRE
	• Brooks Road to develop Terms of Reference for PLC meeting	BRE
	• CRA requested MOE notes from PLC meeting. Butcher to send notes to Kemp	MOE
	• Robinson – Noted that the application for alternative daily cover is broad and may take more time to approve. Requested that Butcher look into the possibility of pre-approving tarps as an alternative daily cover in the interim.	

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
1.	**<u>Review of Previous Meeting Minutes</u> (cont'd)**	
	• Butcher – Will look into possibility of pre-approval	MOE
	• Three Baker tanks have arrived on-Site and Brooks Road intends to store leachate in the tanks until a leachate treatment system is installed on-Site. Brooks Road is looking into an insulation material for the tanks comprised of agricultural material.	
	• Butcher – Would like to talk to agricultural group of MOE about feasibility of using this material as insulation.	
	• Wilson – Could use submersible pumps to keep stored leachate from freezing.	
	• CRA estimated that approximately 1,000,000 litres of leachate is present in the landfill when the leachate level is at 60 cm.	
	• CRA requested information on leachate quantity trucked off-Site in order to estimate the leachate generation rate. BRE to supply trucking invoices.	BRE
2.	**<u>Work progress and Construction Progress Schedule</u>** Zizek – Detailed progress to date and expected completion times: • Phase I decommissioning will be completed today • Phase II decommissioning scheduled to begin Monday • Item 18 in the attached schedule (excavation of remaining Stage 2 clay) includes approximately 11,000 m^3. This material will be used to backfill decommissioned areas. • Contract Works, including Stage 1 waste grading/interim capping and ISWMP Works, are scheduled to be complete at the end of June Weldon – Wants interim capping works expedited to minimize leachate generation.	
3.	**<u>Field Observations, Problems, and Decisions</u>** Zizek – Weather conditions have prevented Tervita from working 7 out of 20 days in January. Turner – A small amount of exposed waste noted in Phase II has been covered. Area E and C wastes from drum staging pad have been relocated to the Stage 1 cell based on sample results characterizing the waste as non-hazardous. At the request of the MOE, the area where the waste was disposed of was measured out and logged in CRA field notes. Robinson – Requested Tervita leave a clay berm at the northern access point to Stage 1 to prevent runoff.	
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** No problems were identified at this time	

Item	*Description*	*Action By*
5.	**Submittals Schedule and Status of Submittals**	
	• Tervita to submit finalized Off-Site Transportation Plan (carry over)	Tervita
	• Tervita to submit remaining gradation test results for drainage stone	Tervita
	• Tervita to submit costs for cleaning leachate pipes for CRA to develop a change order.	Tervita
6.	**Health and Safety Concerns** No health and safety concerns were identified at this time.	
7.	**Maintenance of Progress Schedule** No maintenance is required on the progress schedule at this time	
8.	**Effect of Proposed Changes on Progress Schedule and Coordination** There are no proposed changes at this time	
9.	**Contract Administration**	
	• CRA to develop RFQ for ISWMP Works	CRA
	• CRA to review Payment Certificate 7 and provide recommendation for payment	CRA
	• Tervita to submit Payment Certificate 8 for CRA review	Tervita
10.	**Other Business Relating to the Work** Butcher – Inquired about the operational status of the wells on the northern Site boundary and the one well at the eastern boundary. Also inquired if there were plans for reinstallation. Kemp – Genivar would have determined if the eastern well is still useable during the previous sampling round. The wells in the north will be reinstalled prior to the next sampling event (May 2013). Butcher – Brooks Road requires approval if the wells are to move locations. Butcher – Inquired about the status of the fencing repairs. Robertson – Contractors were here to repair fencing and install gate but the weather prevented access to the northwest area of the site. They will be returning soon to complete the repairs. Butcher – The ISWMP Works and Stage 1 waste grading/interim capping was scheduled to start in February. Is this still the case? Kemp – Weather delays have pushed the schedule back for the ISWMP and Stage 1 Works. The Works are still scheduled to be completed following waste decommissioning.	

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
11.	**Next Meeting** Tuesday March 5, 2013 at 10:00 am.	

☐ Attachments: _____

Prepared By: Dan Turner and Peter Kemp Date Issued: March 4, 2013

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited CONTRACT NO.: 018235 (33)

RE: Construction Progress Meeting No. 14

LOCATION: Brooks Road Landfill Site DATE: March 21, 2013 TIME: 11:00 AM

Participants:

Mark Collins (BRE)	Brad Farnand (MOE)	Paul Zizek (Tervita)	Joel Rider (Tervita)
Peter Kemp (CRA)	Dan Turner (CRA)		

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	John Beals (MOE)
		Richard Weldon (BRE)	Dan Roberts (Tervita)	Jordan Wilson (Tervita)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the March 5, 2013 Progress Meeting No. 13 were reviewed. The following items were noted: • Brad Farnand spoke with Dickson regarding the letter application for alternative daily cover. Dickson confirmed that he has the application and is aware that the approval of tarps is considered a priority for Brooks Road. Brad suggested that BRE call Dickson for an update. • Tervita has submitted the remaining gradation test results for the drainage stone. • CRA will provide Tervita with the ISWMP request for quotation by end of day. • Paul Zizek confirmed that BRE has paid Payment Certificates 7 and 8. • CRA has revised the Payment Certificate template to incorporate Change Orders 5 and 6. • Tervita has submitted Payment Certificate 9 for CRA review. • CRA is currently reviewing historical monitoring data to update the Site Monitoring Plan. • The northwestern perimeter gate has been repaired and the fence repairs are underway. • MOE requested notice of confirmatory sampling in the vicinity of TP4-2 (where waste was characterized as hazardous for lead). The waste excavation and confirmatory sampling in this area is scheduled for Monday, March 25.	BRE

Item	*Description*	*Action By*
2.	**<u>Work progress and Construction Progress Schedule</u>** Zizek – Detailed progress to date and expected completion times: - The Phase II decommissioning is 90 percent complete. Estimated to be 3 days of waste excavation remaining. - Exposing 1-metre of woven geotextile around the perimeter of the Stage 1 cell will be completed today. - Cut and fill of Stage 1 waste will be completed tomorrow. - The interim capping of Stage 1 will commence Monday and is estimated to be complete in 1 week. The packer will arrive on Monday, March 25. - Backfilling of decommissioned areas will be completed between other tasks. Turner – Noted that a confirmatory soil sample did not pass O. Reg 511/09 Table 2 standards for hot water extractable boron. This area requires further excavation and re-sampling prior to backfilling. Kemp – There is a potential for waste to be present in the right of way in the northwest corner of the Phase II Decommissioning Area. CRA has an excavation/occupation permit form to be completed prior to work in the right of way. CRA will send information to Tervita.	CRA
3.	**<u>Field Observations, Problems, and Decisions</u>** Turner – After commencing the waste excavation in the vicinity of Area A, free product was observed and CRA determined that further waste characterization was required in this area. Tervita and CRA completed test pits in the area to collect samples for waste characterization in place to minimize the handling requirements. Sample results will determine the required end location for the waste streams. All liquid waste in this area will be pumped into tanks for off-Site disposal. Collins – Some exposed waste in the Stage 2A cell in the vicinity of Tervita's work area requires cover by end of day.	
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** No problems were identified at this time	
5.	**<u>Submittals Schedule and Status of Submittals</u>** • Tervita to submit finalized Off-Site Transportation Plan (Tervita currently in discussion with CRA) • Tervita to submit costs for cleaning leachate pipes for CRA to develop a change order. Zizek noted that the inspection could be moved to a later date if the Stage 2B cell is going to be lined.	Tervita Tervita

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
6.	**Health and Safety Concerns** Turner – Work in Area A requires Level C PPE. A JSA has been prepared by Tervita and reviewed by all parties involved in work in this area.	
7.	**Maintenance of Progress Schedule** No maintenance is required on the progress schedule at this time	
8.	**Effect of Proposed Changes on Progress Schedule and Coordination** The ISWMP work will require an updated schedule. To be completed once Tervita provides a quote.	
9.	**Contract Administration** • CRA to develop an RFQ for ISWMP Works by end of day • CRA to review Payment Certificate 9 • Zizek inquired about starting an RFQ for Stage 2B work to provide more time for pricing	 CRA CRA
10.	**Other Business Relating to the Work** Rider – The silt fencing along the western boundary of the Phase II Decommissioning Area will be moved to the property boundary Farnand – Inquired about the status of the secondary containment around the Baker tanks. Collins – Richard Weldon is considering the decision to keep the Baker tanks and complete the secondary containment or remove the tanks.	
11.	**Next Meeting** April 8, 2013 at 11:00 am.	

☐ Attachments: _____

Prepared By: Dan Turner, Peter Kemp Date Issued: April 1, 2013

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

APPENDIX B

TECHNICAL MEMO – UPDATED INTERIM STORMWATER MANAGMENT PLAN
(JANUARY 3, 2013)

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

TECHNICAL MEMORANDUM

TO:	Richard Weldon (Brooks Road Environmental c/o 2270386 Ontario Limited)	REF. NO.:	018235-10
FROM:	Peter Kemp/mg/82rev3 P.K.	DATE:	January 3, 2013
CC:	Greg Ferraro		
RE:	**Updated Interim Stormwater Management Plan Brooks Road Landfill Site Haldimand County, Ontario**		

1.0 INTRODUCTION

An interim stormwater management plan (ISWMP) has been developed for the Brooks Road Landfill (Site) in response to the Ministry of the Environment (MOE) request for an ISWMP to be implemented at the Site until the permanent stormwater management plan (PSWMP) is implemented. The ISWMP has been developed to manage surface water runoff discharging from the Site through use of the approved temporary dewatering sedimentation (TDS) pond. This memo presents the ISWMP as updated to address the MOE comments received on the initial ISWMP submitted on November 28, 2012, the revised ISWMP submitted on December 14, 2012, and the revised ISWMP submitted on December 20, 2012.

Upon completion of the OLA decommissioning work, the PSWMP will be implemented commencing with the stormwater management pond in the southwest corner of the Site. The PSWMP that was approved for the Site until June 9, 2009 is provided in the approved Design and Operations Report (CRA, 2003). An application to renew the approval for the PSWMP will be submitted to the MOE Approvals Branch by March 31, 2013.

2.0 OBJECTIVES

The ISWMP for the Site has been developed in accordance with the design requirements of O. Reg. 232/98. The primary objectives of the ISWMP are to:

- Ensure that no stormwater runoff will enter the Brooks Road ditch from the Site under the worst historic regional storm scenario (Hurricane Hazel)
- Control surface water runoff from the Site into active disposal areas in order to minimize surface water contacting refuse
- Minimize potential or on-Site and sediment loading to the downstream water course

The receiving off-Site drainage courses are described in Section 4.6.2 of the approved Design and Operation Report (CRA, 2003).

3.0 DESIGN CRITERIA

The ISWMP design consists of perimeter ditches, culverts, an upgraded TDS pond, and associated works to meet the requirements of the Amended Certificate of Approval Number 8371-6X9LB, issued on February 20, 2007 (C of A). The design basis is consistent with the PSWMP contained in the approved Design and Operations Report (CRA, 2003). In the Design and Operations Report, the runoff from the final post-closure catchment areas was calculated using the hydrological model MIDUSS 4.72. In the present design the latest PCSWMM Version 5.1.1279 Professional was used to calculate the runoff using the same catchment parameters as in MIDUSS, providing approximately the same unit peak runoff and total volume per area. The catchment parameters used in the model are the contributing drainage area, catchment slope, sheet flow, length, width, Manning's 'n', percent impervious, soil infiltration rates, depression storage and the weighted Curve Number (CN) infiltration method.

The ditches and four culverts were sized to accommodate the peak flow generated from the 3-hour-duration, 25-year storm, as required by the MOE Guidelines. All drainage ditches were sized to have a 0.3-m bottom width with a minimum of a 1-meter depth and 3:1 side slopes (horizontal:vertical). The proposed culverts are designed to have a 450-mm-internal-diameter HDPE pipe with smooth internal walls. Both the ditches and culverts have the capacity to pass the Regional Storm (Hurricane Hazel) without flooding. All culvert inlets, outlets and steeply sloping channels are adequately lined with riprap and turf reinforcement mats in one location to prevent erosion.

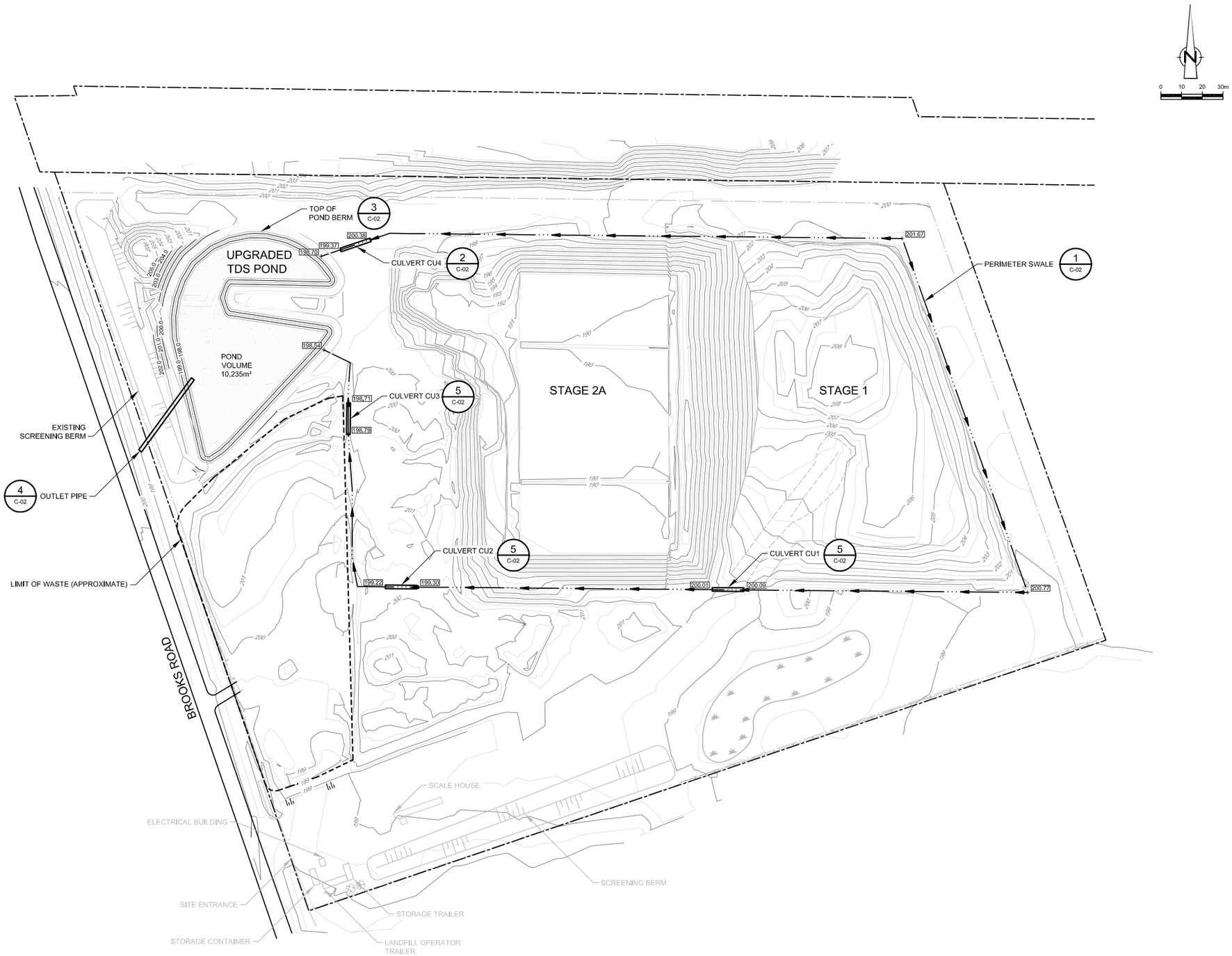
The upgraded TDS pond was designed to meet, or exceed the requirements of the above mentioned C of A. The required pond volume was calculated to be 10,235 m^3 in order to contain the total volume of stormwater runoff under the Regional Storm to prevent any flow discharging to the adjacent Brooks Road ditch shown in Drawing C-01. A 300-mm HDPE outlet pipe was selected as an emergency overflow spillway as an added factor of safety. The pond will be lined with riprap at the two inlets to prevent any erosion. The pond internal and external side slopes are designed to have a slope of 2:1 (horizontal: vertical).

4.0 MODELING RESULTS

The upgraded TDS pond, drainage ditches, and culverts were designed based on accepted methodologies, calculations and analytical tools using PCSWMM Professional. The outputs of the model for the 25-year storm and Regional Storm are provided in Attachment 1. Seven design storms were used in the hydrological modeling as shown in Table 1. These events were based on precipitation data as provided by the Atmospheric Environmental Service, Canada. The hydrologic model was used to calculate the surface water runoff volume and peak flows for the Site.

Table 2 summarizes the model input parameters and Tables 3 and 4 present the calculated runoff volumes and peak flow rates, respectively. Table 5 presents the calculated pond performance. Drawings C-01 and C-02 show the upgraded TDS pond, culverts, and ditch layout and design details, respectively.

We trust the design as presented herein is sufficient to satisfy the MOE's request. Should you have any questions on this design or require further information, please do not hesitate to contact us.



LEGEND

- DRAINAGE SWALE
- PROPOSED CULVERT
- POND CONTOUR - 0.5m INTERVAL
- 200.0 POND CONTOUR - 1.0m INTERVAL
- PROPERTY LINE
- LIMIT OF WASTE (APPROXIMATE)
- EXISTING POST AND WIRE FENCE
- GROUND CONTOUR - 0.5m INTERVAL
- 200.0 GROUND CONTOUR - 1.0m INTERVAL
- CHAINLINK FENCE
- GRAVEL ROADWAY
- CULVERT
- LOW AREA

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

INTERIM STORMWATER MANAGEMENT PLAN	14 DEC 2012	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

INTERIM STORMWATER MANAGEMENT PLAN

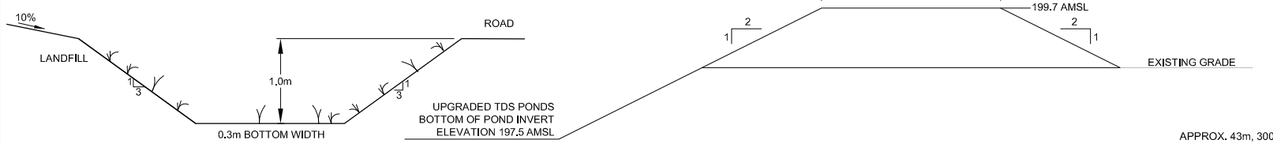
SITE DRAINAGE PLAN

CONESTOGA-ROVERS & ASSOCIATES

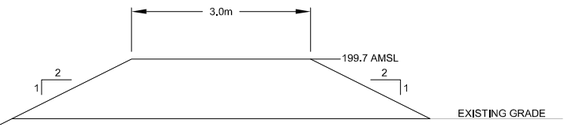
Source Reference:

Project Manager:	Reviewed By:	Date:	
G. FERRARO	G.FERRARO	DECEMBER 2012	
Scale: 1:1000	Project №: 18235-00	Report №: MEMO082	Drawing №: C-01

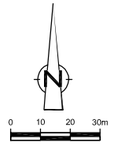
18235-00(MEMO082)CI-WA001 DEC 14/2012

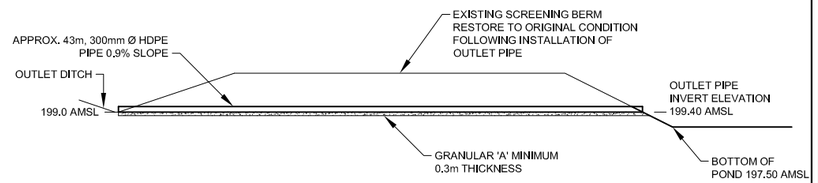


DETAIL 1 TYPICAL PERIMETER SWALE SECTION
NTS C-01

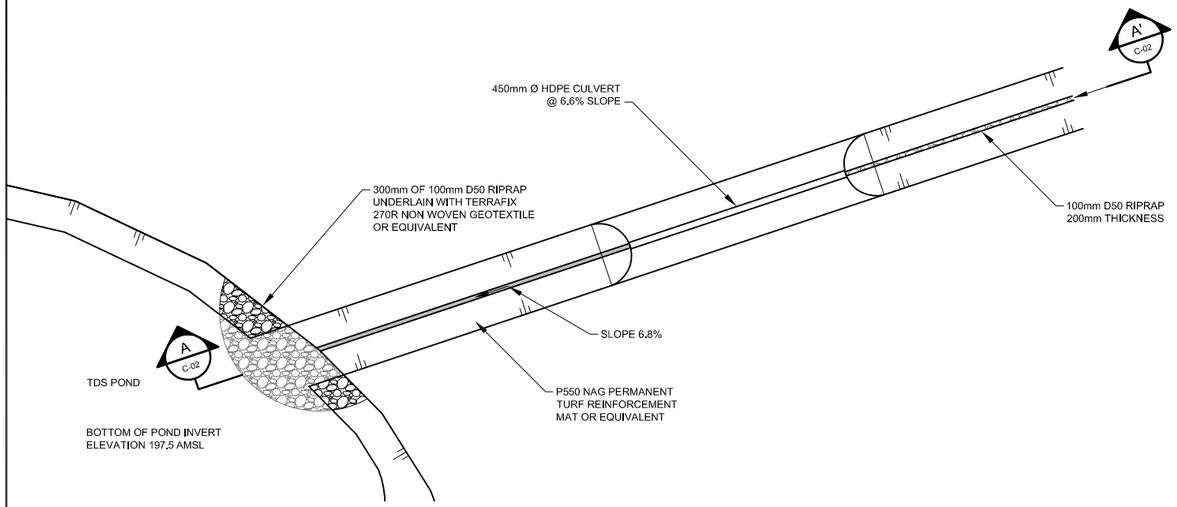


DETAIL 3 TOP OF POND BERM
NTS C-01

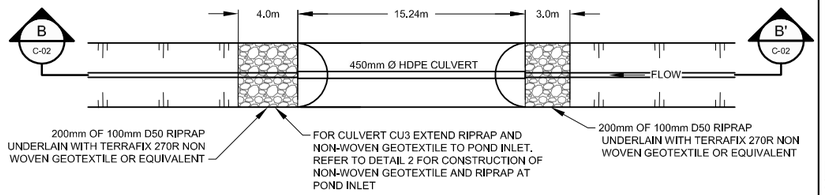




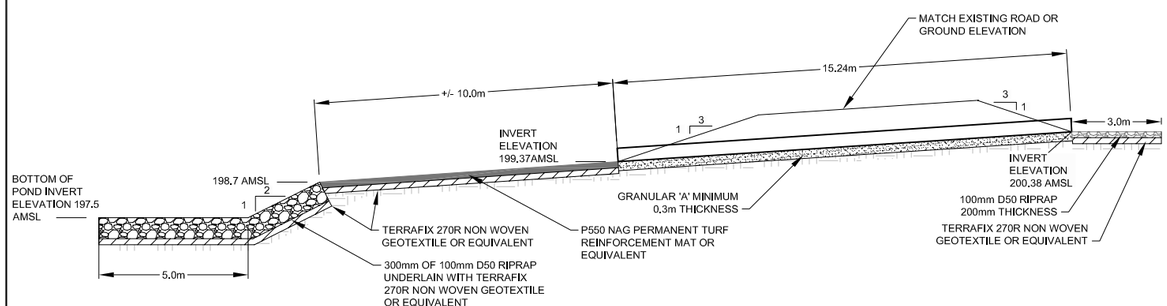
DETAIL 4 OUTLET PIPE
NTS C-01



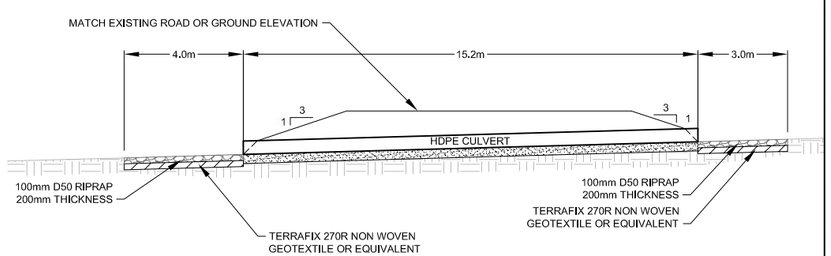
DETAIL 2 CULVERT 4 AND POND INLET
NTS C-01



DETAIL 5 CULVERTS CU1, CU2, & CU3
NTS C-01



SECTION A-A' CULVERT 4 AND POND INLET



SECTION B-B' CULVERTS CU1, CU2, & CU3

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

INTERIM STORMWATER MANAGEMENT PLAN	14 DEC 2012	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

INTERIM STORMWATER MANAGEMENT PLAN

SITE DRAINAGE PLAN DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G. FERRARO	G.FERRARO	DECEMBER 2012	
Scale: AS NOTED	Project No: 18235-00	Report No: MEMO082	Drawing No: C-02

TABLE 1

CITY OF HAMILTON DESIGN STORM PARAMETERS
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Design Storm	*Depth (mm)*	*Duration (hours)*	*Timestep (min.)*
2-Year	34.2	3	5
5-Year	50.2	3	5
10-Year	60.8	3	5
25-Year	74.2	3	5
50-Year	84.1	3	5
100-Year	124.7	24	15
Regional (Hurricane Hazel)	212	12	15

Notes:

1. Storms based on Hamilton Airport data - Environment Canada Atmospheric Environment Service.
2. Hyetographs created based on SCS Type II distribution.

TABLE 2

INTERIM CONDITIONS SUBCATCHMENT PARAMETERS
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Subcatchment	*Area (hectares)*	*Flow Length (metres)*	*Slope (%)*	*Impervious Area (%)*	*CN*[1]	*Manning's 'n'*	*Initial Abstraction (mm)*
201	2.13	67	10.0	5	71/98	0.33/0.015	10.37/2.00
203	0.81	48	10.0	5	71/98	0.33/0.015	10.37/2.00
204_1	1.02	65	10.0	8	71/98	0.33/0.015	10.37/2.00
204_2	1.500	50	10.0	8	71/98	0.33/0.015	10.37/2.00
100_Pond	0.56	-	-	100	-	-	-
Total	**6.02**						

Notes:

1. Soil Conservation Service (SCS) Curve Number.
2. 400/na denotes pervious/impervious area parameter.

TABLE 3

SUMMARY OF RUNOFF VOLUMES
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (m^3)	*5-Year* (m^3)	*10-Year* (m^3)	*25-Year* (m^3)	*50-Year* (m^3)	*100-Year* (m^3)	*Regional* (m^3)
201	30	150	290	470	620	1,310	2,910
203	10	60	110	180	240	500	1,110
204_1	30	90	160	250	320	660	1,440
204_2	40	140	240	370	480	970	2,120
100_Pond	190	280	340	420	470	700	1,190
Site Total	300	720	1,140	1,690	2,130	4,140	8,770

Notes:

1. Site Total runoff volume does not represent total volume of surface water discharged offsite.

TABLE 4

SUMMARY OF RUNOFF PEAK FLOW RATES
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (m^3/s)	*5-Year* (m^3/s)	*10-Year* (m^3/s)	*25-Year* (m^3/s)	*50-Year* (m^3/s)	*100-Year* (m^3/s)	*Regional* (m^3/s)
201	0.0186	0.0283	0.0769	0.1670	0.2570	0.4100	0.27
203	0.0070	0.0100	0.0320	0.0779	0.1180	0.1740	0.10
204_1	0.0142	0.0220	0.0463	0.0970	0.1420	0.2110	0.13
204_2	0.0209	0.0329	0.0763	0.1640	0.2390	0.3370	0.19
100_Pond	_	_	_	_	_	_	_
Pond Outlet	0	0	0	0	0	0	0

TABLE 5

SUMMARY OF POND PERFORMANCE
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Design Storm	*Inflow* (m^3/s)	*Outflow* (m^3/s)	*Maximum Elevation* (*m AMSL*)	*Storage* (m^3)
2-Year	0.17	0	197.57	304
5-Year	0.22	0	197.65	718
10-Year	0.28	0	197.74	1,131
25-Year	0.47	0	197.87	1,699
50-Year	0.57	0	197.96	2,140
100-Year	0.88	0	198.38	4,100
Regional	0.75	0	199.38	8,761

ATTACHMENT 1

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

****
Element Count
****
Number of rain gages 7
Number of subcatchments ... 5
Number of nodes 17
Number of links 16
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.81	170.00	5.00	10.0000	Huricane_Hazel	J9
201	2.13	320.00	5.00	10.0000	Huricane_Hazel	J1
100_Pond	0.56	600.00	100.00	50.0000	Huricane_Hazel	3
204_1	1.02	157.00	8.00	10.0000	Huricane_Hazel	J13
204_2	1.50	300.00	8.00	10.0000	Huricane_Hazel	J11

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	199.15	1.00	0.0	
J4	JUNCTION	198.62	1.00	0.0	
J5	JUNCTION	198.54	1.16	0.0	
J6	JUNCTION	199.37	1.00	0.0	
J7	JUNCTION	200.38	1.00	0.0	
J8	JUNCTION	198.70	1.00	0.0	
J9	JUNCTION	201.67	1.00	0.0	
J10	JUNCTION	198.79	1.00	0.0	
J11	JUNCTION	198.71	1.00	0.0	
J12	JUNCTION	200.09	1.00	0.0	
J13	JUNCTION	200.01	1.00	0.0	
J14	JUNCTION	199.30	1.00	0.0	
J15	JUNCTION	199.22	1.00	0.0	
J16	OUTFALL	199.00	0.30	0.0	
3	STORAGE	197.50	2.20	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2	J12	CONDUIT	136.6	0.4978	0.0500
C2	J12	J13	CONDUIT	15.2	0.5053	0.0130
C3	J13	J14	CONDUIT	142.2	0.5013	0.0500
C4	J14	J15	CONDUIT	15.2	0.5249	0.0130
C5	J15	J3	CONDUIT	13.1	0.5038	0.0500
C6	J3	J10	CONDUIT	73.1	0.4995	0.0500
C7	J10	J11	CONDUIT	15.2	0.4987	0.0130
C8	J11	J4	CONDUIT	19.4	0.5000	0.0500
C9	J4	J5	CONDUIT	14.3	0.5307	0.0500
C10	J9	J2	CONDUIT	179.8	0.5007	0.0500
C11	J1	J7	CONDUIT	257.4	0.5011	0.0500
C13	J6	J8	CONDUIT	9.9	6.7970	0.0500
C12	J7	J6	CONDUIT	15.2	6.6419	0.0130
C14	J8	3	CONDUIT	40.2	2.9842	0.0500
C15	J5	3	CONDUIT	35.0	2.9736	0.0500
C16	3	J16	CONDUIT	42.0	0.5000	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2926.34
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	202.67
C3	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.60
C4	CIRCULAR	0.45	0.16	0.11	0.45	1	206.58
C5	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2944.06
C6	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2931.29
C7	CIRCULAR	0.45	0.16	0.11	0.45	1	201.35
C8	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2932.89
C9	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	3021.67
C10	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2934.93
C11	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.19
C13	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	10813.53
C12	CIRCULAR	0.45	0.16	0.11	0.45	1	734.82
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C15	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C16	CIRCULAR	0.30	0.07	0.07	0.30	1	68.38

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.276	212.000
Evaporation Loss	0.000	0.000
Infiltration Loss	0.394	65.391
Surface Runoff	0.876	145.528
Final Surface Storage	0.007	1.138
Continuity Error (%)	-0.027	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.876	8.761
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.094	0.939
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.782	7.821
Continuity Error (%)	0.008	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C2 (3)
Link C4 (1)
Link C7 (1)

Routing Time Step Summary

Minimum Time Step	:	1.00 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS
203	212.00	0.00	0.00	73.79	137.07	1.11	101.87
201	212.00	0.00	0.00	74.20	136.65	2.91	266.10
100_Pond	212.00	0.00	0.00	0.00	212.02	1.19	82.44
204_1	212.00	0.00	0.00	69.94	140.80	1.44	129.37
204_2	212.00	0.00	0.00	69.66	141.10	2.12	191.14

Node Depth Summary

****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.13	0.54	202.21	0 10:15
J2	JUNCTION	0.06	0.25	201.02	0 10:16
J3	JUNCTION	0.09	0.35	199.51	0 10:19
J4	JUNCTION	0.11	0.39	199.01	0 10:15
J5	JUNCTION	0.00	0.01	198.55	0 10:15
J6	JUNCTION	0.06	0.26	199.63	0 10:16
J7	JUNCTION	0.04	0.19	200.57	0 10:16
J8	JUNCTION	0.00	0.01	198.71	0 10:16
J9	JUNCTION	0.06	0.25	201.92	0 10:15
J10	JUNCTION	0.10	0.52	199.31	0 10:22
J11	JUNCTION	0.11	0.45	199.16	0 10:15
J12	JUNCTION	0.06	0.31	200.40	0 10:19
J13	JUNCTION	0.09	0.36	200.37	0 10:15
J14	JUNCTION	0.10	0.52	199.82	0 10:18
J15	JUNCTION	0.08	0.35	199.57	0 10:18
J16	OUTFALL	0.06	0.18	199.18	0 12:54
3	STORAGE	1.14	1.95	199.45	0 12:54

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	266.10	266.10	0 10:14	2.911	2.911
J2	JUNCTION	0.00	101.52	0 10:15	0.000	1.112
J3	JUNCTION	0.00	224.32	0 10:18	0.000	2.546
J4	JUNCTION	0.00	409.26	0 10:15	0.000	4.663
J5	JUNCTION	0.00	409.10	0 10:15	0.000	4.663
J6	JUNCTION	0.00	263.12	0 10:16	0.000	2.911
J7	JUNCTION	0.00	263.64	0 10:15	0.000	2.911
J8	JUNCTION	0.00	263.12	0 10:16	0.000	2.911
J9	JUNCTION	101.87	101.87	0 10:14	1.110	1.110
J10	JUNCTION	0.00	224.10	0 10:19	0.000	2.547
J11	JUNCTION	191.14	409.47	0 10:14	2.117	4.663
J12	JUNCTION	0.00	100.80	0 10:16	0.000	1.111
J13	JUNCTION	129.37	228.86	0 10:14	1.436	2.546
J14	JUNCTION	0.00	227.90	0 10:15	0.000	2.548
J15	JUNCTION	0.00	224.35	0 10:18	0.000	2.546
J16	OUTFALL	0.00	44.96	0 12:54	0.000	0.939
3	STORAGE	82.44	753.68	0 10:14	1.187	8.761

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
3	5.006	52	0	8.527	89	0 12:54	44.96

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
J16	52.52	20.69	44.96	0.939
System	52.52	20.69	44.96	0.939

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	100.80	0 10:16	0.34	0.03	0.28
C2	CONDUIT	100.17	0 10:19	0.87	0.49	0.74
C3	CONDUIT	227.90	0 10:15	0.36	0.08	0.44
C4	CONDUIT	224.35	0 10:18	1.50	1.09	0.89
C5	CONDUIT	224.32	0 10:18	0.47	0.08	0.35
C6	CONDUIT	224.10	0 10:19	0.34	0.08	0.43
C7	CONDUIT	223.04	0 10:22	1.41	1.11	1.00
C8	CONDUIT	409.26	0 10:15	0.62	0.14	0.42
C9	CONDUIT	409.10	0 10:15	2.29	0.14	0.20
C10	CONDUIT	101.52	0 10:15	0.38	0.03	0.25
C11	CONDUIT	263.64	0 10:15	0.53	0.09	0.36
C13	CONDUIT	263.12	0 10:16	2.86	0.02	0.13
C12	CONDUIT	263.12	0 10:16	3.39	0.36	0.49
C14	DUMMY	263.12	0 10:16			
C15	DUMMY	409.10	0 10:15			
C16	CONDUIT	44.96	0 12:54	0.87	0.66	0.69

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C1	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.18	0.0000
C2	1.00	0.02	0.01	0.00	0.96	0.00	0.00	0.00	0.40	0.0005
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000
C4	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.56	0.0003
C5	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.22	0.0000
C6	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.18	0.0000
C7	1.00	0.02	0.02	0.00	0.96	0.00	0.00	0.00	0.46	0.0002
C8	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.20	0.0000
C9	1.00	0.03	0.00	0.00	0.64	0.34	0.00	0.00	0.71	0.0000
C10	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.16	0.0000
C11	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.23	0.0000

C13	1.00	0.03	0.00	0.00	0.24	0.73	0.00	0.00	1.60	0.0000
C12	1.00	0.03	0.00	0.00	0.23	0.74	0.00	0.00	1.81	0.0000
C16	1.00	0.47	0.00	0.00	0.53	0.00	0.00	0.00	0.38	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C4	0.01	0.01	0.01	0.53	0.01
C7	0.01	0.01	0.01	0.64	0.01
C14	24.00	24.00	24.00	24.00	0.01
C15	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Tue Nov 27 19:41:18 2012
Analysis ended on: Tue Nov 27 19:41:22 2012
Total elapsed time: 00:00:04

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

****
Element Count
****
Number of rain gages 7
Number of subcatchments ... 5
Number of nodes 17
Number of links 16
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.81	170.00	5.00	10.0000	25Yr	J9
201	2.13	320.00	5.00	10.0000	25Yr	J1
100_Pond	0.56	600.00	100.00	50.0000	25Yr	3
204_1	1.02	157.00	8.00	10.0000	25Yr	J13
204_2	1.50	300.00	8.00	10.0000	25Yr	J11

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	199.15	1.00	0.0	
J4	JUNCTION	198.62	1.00	0.0	
J5	JUNCTION	198.54	1.16	0.0	
J6	JUNCTION	199.37	1.00	0.0	
J7	JUNCTION	200.38	1.00	0.0	
J8	JUNCTION	198.70	1.00	0.0	
J9	JUNCTION	201.67	1.00	0.0	
J10	JUNCTION	198.79	1.00	0.0	
J11	JUNCTION	198.71	1.00	0.0	
J12	JUNCTION	200.09	1.00	0.0	
J13	JUNCTION	200.01	1.00	0.0	
J14	JUNCTION	199.30	1.00	0.0	
J15	JUNCTION	199.22	1.00	0.0	
J16	OUTFALL	199.00	0.30	0.0	
3	STORAGE	197.50	2.20	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2	J12	CONDUIT	136.6	0.4978	0.0500
C2	J12	J13	CONDUIT	15.2	0.5053	0.0130
C3	J13	J14	CONDUIT	142.2	0.5013	0.0500
C4	J14	J15	CONDUIT	15.2	0.5249	0.0130
C5	J15	J3	CONDUIT	13.1	0.5038	0.0500
C6	J3	J10	CONDUIT	73.1	0.4995	0.0500
C7	J10	J11	CONDUIT	15.2	0.4987	0.0130
C8	J11	J4	CONDUIT	19.4	0.5000	0.0500
C9	J4	J5	CONDUIT	14.3	0.5307	0.0500
C10	J9	J2	CONDUIT	179.8	0.5007	0.0500
C11	J1	J7	CONDUIT	257.4	0.5011	0.0500
C13	J6	J8	CONDUIT	9.9	6.7970	0.0500
C12	J7	J6	CONDUIT	15.2	6.6419	0.0130
C14	J8	3	CONDUIT	40.2	2.9842	0.0500
C15	J5	3	CONDUIT	35.0	2.9736	0.0500
C16	3	J16	CONDUIT	42.0	0.5000	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2926.34
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	202.67
C3	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.60
C4	CIRCULAR	0.45	0.16	0.11	0.45	1	206.58
C5	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2944.06
C6	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2931.29
C7	CIRCULAR	0.45	0.16	0.11	0.45	1	201.35
C8	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2932.89
C9	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	3021.67
C10	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2934.93
C11	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.19
C13	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	10813.53
C12	CIRCULAR	0.45	0.16	0.11	0.45	1	734.82
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C15	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C16	CIRCULAR	0.30	0.07	0.07	0.30	1	68.38

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.447	74.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.271	45.056
Surface Runoff	0.170	28.230
Final Surface Storage	0.007	1.103
Continuity Error (%)	-0.254	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.170	1.699
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.000	0.000
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.170	1.699
Continuity Error (%)	0.011	

Highest Continuity Errors

Node J2 (1.19%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C2 (1)

Routing Time Step Summary

Minimum Time Step	:	1.00 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS
203	74.20	0.00	0.00	50.43	22.73	0.18	77.85
201	74.20	0.00	0.00	50.92	22.24	0.47	167.38
100_Pond	74.20	0.00	0.00	0.00	74.22	0.42	212.02
204_1	74.20	0.00	0.00	48.56	24.62	0.25	96.95
204_2	74.20	0.00	0.00	48.26	24.99	0.37	163.81

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	hr:min
J1	JUNCTION	0.03	0.39	202.06	0	01:42
J2	JUNCTION	0.01	0.19	200.96	0	01:50
J3	JUNCTION	0.02	0.25	199.40	0	01:55
J4	JUNCTION	0.03	0.29	198.91	0	01:36
J5	JUNCTION	0.00	0.00	198.54	0	01:36
J6	JUNCTION	0.01	0.18	199.55	0	01:46
J7	JUNCTION	0.01	0.12	200.50	0	01:46
J8	JUNCTION	0.00	0.00	198.70	0	01:46
J9	JUNCTION	0.01	0.25	201.92	0	01:38
J10	JUNCTION	0.03	0.31	199.10	0	01:59
J11	JUNCTION	0.03	0.33	199.04	0	01:36
J12	JUNCTION	0.02	0.19	200.28	0	01:40
J13	JUNCTION	0.02	0.26	200.27	0	01:38
J14	JUNCTION	0.03	0.31	199.61	0	01:53
J15	JUNCTION	0.02	0.25	199.47	0	01:54
J16	OUTFALL	0.00	0.00	199.00	0	00:00
3	STORAGE	0.35	0.39	197.89	1	00:00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	167.30	167.30	0	01:35	0.474	0.474
J2	JUNCTION	0.00	62.96	0	01:42	0.000	0.186
J3	JUNCTION	0.00	100.03	0	01:53	0.000	0.435
J4	JUNCTION	0.00	186.47	0	01:36	0.000	0.810
J5	JUNCTION	0.00	185.70	0	01:37	0.000	0.810
J6	JUNCTION	0.00	112.44	0	01:46	0.000	0.474
J7	JUNCTION	0.00	113.25	0	01:44	0.000	0.475
J8	JUNCTION	0.00	112.44	0	01:46	0.000	0.474
J9	JUNCTION	77.81	77.81	0	01:35	0.184	0.184
J10	JUNCTION	0.00	99.73	0	01:55	0.000	0.435
J11	JUNCTION	163.71	187.20	0	01:36	0.375	0.810
J12	JUNCTION	0.00	50.85	0	01:50	0.000	0.187
J13	JUNCTION	96.89	104.89	0	01:45	0.251	0.438
J14	JUNCTION	0.00	107.50	0	01:41	0.000	0.437
J15	JUNCTION	0.00	100.07	0	01:53	0.000	0.435
J16	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
3	STORAGE	212.02	428.80	0	01:35	0.416	1.699

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
3	1.550	16	0	1.699	18	1 00:00	0.00

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
J16	0.00	0.00	0.00	0.000
System	0.00	0.00	0.00	0.000

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	50.85	0 01:50	0.32	0.02	0.18
C2	CONDUIT	51.41	0 01:52	0.68	0.25	0.50
C3	CONDUIT	107.50	0 01:41	0.39	0.04	0.28
C4	CONDUIT	100.07	0 01:53	1.07	0.48	0.62
C5	CONDUIT	100.03	0 01:53	0.41	0.03	0.25
C6	CONDUIT	99.73	0 01:55	0.35	0.03	0.28
C7	CONDUIT	98.01	0 01:53	0.95	0.49	0.68
C8	CONDUIT	186.47	0 01:36	0.49	0.06	0.31
C9	CONDUIT	185.70	0 01:37	1.68	0.06	0.15
C10	CONDUIT	62.96	0 01:42	0.35	0.02	0.20
C11	CONDUIT	113.25	0 01:44	0.42	0.04	0.25
C13	CONDUIT	112.44	0 01:46	2.16	0.01	0.09
C12	CONDUIT	112.44	0 01:46	2.47	0.15	0.33
C14	DUMMY	112.44	0 01:46			
C15	DUMMY	185.70	0 01:37			
C16	CONDUIT	0.00	0 00:00	0.00	0.00	0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C2	1.00	0.01	0.01	0.00	0.97	0.00	0.00	0.00	0.32	0.0001
C3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.0000
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.46	0.0001
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.15	0.0000
C6	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.01	0.01	0.00	0.97	0.00	0.00	0.00	0.46	0.0001

C8	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.12	0.0000
C9	1.00	0.01	0.00	0.00	0.89	0.10	0.00	0.00	0.30	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.07	0.0000
C11	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
C13	1.00	0.02	0.00	0.00	0.64	0.34	0.00	0.00	0.76	0.0000
C12	1.00	0.02	0.00	0.00	0.62	0.36	0.00	0.00	0.97	0.0000
C16	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C14	24.00	24.00	24.00	24.00	0.01
C15	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Wed Nov 28 13:54:49 2012
Analysis ended on: Wed Nov 28 13:54:53 2012
Total elapsed time: 00:00:04

APPENDIX C

CURRENTLY APPROVED FINAL CONTOURS CONDITION HYDROLOGIC MODEL INPUT AND OUTPUT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	2YR	J9
210	0.43	500.00	100.00	10.0000	2YR	SWM_Pond
201c	1.67	205.00	5.00	8.0000	2YR	J24
202	0.90	105.00	7.00	7.0000	2YR	J7
100	1.53	500.00	0.00	2.0000	2YR	Out1
208	0.26	50.00	95.00	2.0000	2YR	J8
207	0.38	63.00	95.00	2.0000	2YR	J8
206	0.13	34.00	5.00	2.0000	2YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	2YR	J10
205	1.85	450.00	0.00	50.0000	2YR	J20
303	0.44	40.00	0.00	50.0000	2YR	J21
304	0.15	95.00	20.00	3.0000	2YR	J13
301	0.53	350.00	0.00	4.0000	2YR	J4
302	1.95	770.00	0.00	1.0000	2YR	J6
201a	0.46	76.00	5.00	13.0000	2YR	J9
204c	1.74	198.00	8.00	7.0000	2YR	J25
204b	0.37	119.00	8.00	13.0000	2YR	J25
204a	0.73	119.00	8.00	13.0000	2YR	J2
201b	0.28	76.00	5.00	13.0000	2YR	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.510	34.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.428	28.692
Surface Runoff	0.063	4.244
Final Surface Storage	0.019	1.284
Continuity Error (%)	-0.061	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.063	0.633
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.039	0.389
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.024	0.244
Continuity Error (%)	0.010	

Highest Continuity Errors

Node J19 (2.43%)
Node J25 (-1.40%)
Node J5 (1.36%)
Node J24 (-1.08%)

Time-Step Critical Elements

Link P1 (2.31%)

Highest Flow Instability Indexes

Link C19 (10)

****
Routing Time Step Summary
****
Minimum Time Step   :   0.50 sec
Average Time Step   :   0.99 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	34.20	0.00	0.00	31.39	1.62	0.01	7.33	0.047
210	34.20	0.00	0.00	0.00	32.33	0.14	75.03	0.945
201c	34.20	0.00	0.00	31.39	1.62	0.03	14.57	0.047
202	34.20	0.00	0.00	30.73	2.26	0.02	10.99	0.066
100	34.20	0.00	0.00	30.22	2.80	0.04	7.86	0.082
208	34.20	0.00	0.00	0.26	31.83	0.08	45.23	0.931
207	34.20	0.00	0.00	0.26	31.82	0.12	66.05	0.930
206	34.20	0.00	0.00	31.39	1.62	0.00	1.13	0.047
209	34.20	0.00	0.00	31.39	1.62	0.00	2.36	0.047
205	34.20	0.00	0.00	32.99	0.00	0.00	0.00	0.000
303	34.20	0.00	0.00	30.92	2.12	0.01	1.91	0.062
304	34.20	0.00	0.00	23.64	9.25	0.01	5.24	0.270
301	34.20	0.00	0.00	29.34	3.66	0.02	4.03	0.107
302	34.20	0.00	0.00	30.32	2.66	0.05	9.45	0.078
201a	34.20	0.00	0.00	31.39	1.62	0.01	4.01	0.047
204c	34.20	0.00	0.00	30.40	2.59	0.05	24.29	0.076
204b	34.20	0.00	0.00	30.40	2.59	0.01	5.16	0.076
204a	34.20	0.00	0.00	30.40	2.59	0.02	10.19	0.076
201b	34.20	0.00	0.00	31.39	1.62	0.00	2.44	0.047

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min

J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.01	0.10	200.87	0	01:37
J3	JUNCTION	0.01	0.12	199.08	0	01:41
J6	JUNCTION	0.01	0.06	198.86	0	03:09
J10	JUNCTION	0.02	0.33	198.93	0	01:26
J4	JUNCTION	0.00	0.06	200.56	0	02:18
J7	JUNCTION	0.01	0.10	199.94	0	01:38
J11	JUNCTION	0.00	0.00	198.30	0	01:26
J9	JUNCTION	0.00	0.08	201.75	0	01:35
J5	JUNCTION	0.00	0.04	200.04	0	03:04
J8	JUNCTION	0.01	0.24	199.14	0	01:35
J18	JUNCTION	0.12	0.16	198.00	0	03:38
J12	JUNCTION	0.04	0.05	197.90	0	03:39
J13	JUNCTION	0.03	0.06	197.80	0	01:35
J14	JUNCTION	0.03	0.03	197.80	0	03:50
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.00	0.00	201.46	0	00:00
J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.05	0.11	197.72	0	03:23
J21	JUNCTION	0.03	0.07	197.52	0	03:17
J16	JUNCTION	0.05	0.05	198.37	0	02:09
J23	JUNCTION	0.03	0.06	197.60	0	03:23
J24	JUNCTION	0.00	0.09	201.16	0	01:36
J25	JUNCTION	0.01	0.16	200.11	0	01:36
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.03	197.38	0	03:17
SWM_Pond	STORAGE	0.11	0.16	198.01	0	03:38

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	10.19	20.90	0 01:34	0.019	0.040
J3	JUNCTION	0.00	55.38	0 01:38	0.000	0.148
J6	JUNCTION	9.45	12.65	0 03:00	0.052	0.071
J10	JUNCTION	2.36	113.35	0 01:35	0.004	0.208
J4	JUNCTION	4.03	4.03	0 02:19	0.019	0.019
J7	JUNCTION	10.99	24.86	0 01:34	0.020	0.052
J11	JUNCTION	0.00	178.13	0 01:26	0.000	0.208

J9	JUNCTION	11.34	11.34	0	01:34	0.021	0.021
J5	JUNCTION	0.00	4.41	0	02:31	0.000	0.020
J8	JUNCTION	111.28	111.28	0	01:34	0.204	0.204
J18	JUNCTION	0.00	3.87	0	03:38	0.000	0.262
J12	JUNCTION	0.00	3.87	0	03:38	0.000	0.262
J13	JUNCTION	5.24	6.59	0	01:34	0.014	0.275
J14	JUNCTION	0.00	3.87	0	03:39	0.000	0.262
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	15.88	0	03:06	0.000	0.346
J21	JUNCTION	1.91	15.23	0	03:16	0.009	0.346
J16	JUNCTION	0.00	51.79	0	01:41	0.000	0.146
J23	JUNCTION	0.00	14.39	0	03:23	0.000	0.337
J24	JUNCTION	17.01	17.01	0	01:25	0.032	0.032
J25	JUNCTION	29.46	45.16	0	01:34	0.055	0.094
Out1	OUTFALL	7.86	7.86	0	02:49	0.043	0.043
Out2	OUTFALL	0.00	15.22	0	03:17	0.000	0.346
SWM_Pond	STORAGE	76.17	266.74	0	01:26	0.141	0.495

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	5.28	0.014	1.486

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average Volume	Avg Pcnt	E&I Pcnt	Maximum Volume	Max Pcnt	Time of Max Occurrence	Maximum Outflow

Storage Unit	1000 m3	Full	Loss	1000 m3	Full	days	hr:min	LPS
SWM_Pond	0.326	5	0	0.458	7	0	03:38	3.87

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	11.78	4.27	7.86	0.043
Out2	94.23	4.26	15.22	0.346
System	53.00	8.53	22.33	0.389

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.24	0	01:26			
C3	CONDUIT	3.31	0	03:04	0.10	0.01	0.10
C1_1	CONDUIT	16.43	0	01:37	0.17	0.01	0.17
C5	CONDUIT	18.19	0	01:38	0.24	0.01	0.15
C7	CONDUIT	111.00	0	01:35	0.42	0.17	0.55
C10	CONDUIT	10.74	0	01:35	0.22	0.01	0.11
C6	CONDUIT	11.22	0	03:09	0.13	0.01	0.11
C8	CONDUIT	178.13	0	01:26	1.42	0.27	0.33
C15	CONDUIT	51.79	0	01:41	1.94	0.05	0.18
C2	CONDUIT	4.41	0	02:31	0.15	0.01	0.09
C12	CONDUIT	3.87	0	03:39	0.29	0.02	0.11
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.04
C14	CONDUIT	3.87	0	03:50	0.14	0.00	0.06
C17	CONDUIT	6.46	0	01:36	0.18	0.00	0.10
P1	CONDUIT	3.87	0	03:38	0.28	0.62	1.00
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	14.39	0	03:23	0.50	0.02	0.12
C20	CONDUIT	15.22	0	03:17	0.33	0.01	0.07

C16	DUMMY	51.79	0	01:41			
C22	CONDUIT	14.38	0	03:24	0.23	0.01	0.09
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C4_2	CONDUIT	14.06	0	01:36	0.24	0.01	0.13
C1_2	CONDUIT	37.21	0	01:37	0.34	0.02	0.19
C11	ORIFICE	3.87	0	03:38			1.00
2	ORIFICE	0.00	0	00:00			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.06	0.01	0.00	0.93	0.00	0.00	0.00	0.09	0.0000
C1_1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.16	0.0000
C7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.06	0.0000
C6	1.00	0.03	0.04	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.18	0.0000
C15	1.00	0.03	0.00	0.00	0.92	0.05	0.00	0.00	0.18	0.0000
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.05	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.03	0.00	0.95	0.00	0.00	0.00	0.23	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.16	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.68	0.0000
C20	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.40	0.0000
C22	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.25	0.0000
C4_1	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.08	0.0000
C1_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.0000

****
Conduit Surcharge Summary
****

	Hours	Hours

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Above Full Normal Flow	Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
P1	3.25	3.25	3.25	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:23:41 2013
Analysis ended on: Thu Jul 11 15:23:43 2013
Total elapsed time: 00:00:02

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	5YR	J9
210	0.43	500.00	100.00	10.0000	5YR	SWM_Pond
201c	1.67	205.00	5.00	8.0000	5YR	J24
202	0.90	105.00	7.00	7.0000	5YR	J7
100	1.53	500.00	0.00	2.0000	5YR	Out1
208	0.26	50.00	95.00	2.0000	5YR	J8
207	0.38	63.00	95.00	2.0000	5YR	J8
206	0.13	34.00	5.00	2.0000	5YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	5YR	J10
205	1.85	450.00	0.00	50.0000	5YR	J20
303	0.44	40.00	0.00	50.0000	5YR	J21
304	0.15	95.00	20.00	3.0000	5YR	J13
301	0.53	350.00	0.00	4.0000	5YR	J4
302	1.95	770.00	0.00	1.0000	5YR	J6
201a	0.46	76.00	5.00	13.0000	5YR	J9
204c	1.74	198.00	8.00	7.0000	5YR	J25
204b	0.37	119.00	8.00	13.0000	5YR	J25
204a	0.73	119.00	8.00	13.0000	5YR	J2
201b	0.28	76.00	5.00	13.0000	5YR	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.748	50.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.549	36.788
Surface Runoff	0.182	12.188
Final Surface Storage	0.019	1.305
Continuity Error (%)	-0.161	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.182	1.817
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.120	1.202
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.062	0.616
Continuity Error (%)	-0.003	

Highest Continuity Errors

Node J5 (1.84%)
Node J19 (1.68%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)
Link C22 (3)
Link C12 (1)

****
Routing Time Step Summary
****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	50.20	0.00	0.00	41.92	7.07	0.06	11.42	0.141
210	50.20	0.00	0.00	0.00	48.38	0.21	110.14	0.964
201c	50.20	0.00	0.00	41.62	7.40	0.12	23.60	0.147
202	50.20	0.00	0.00	40.89	8.14	0.07	17.20	0.162
100	50.20	0.00	0.00	36.79	12.23	0.19	39.52	0.244
208	50.20	0.00	0.00	0.26	47.91	0.12	66.52	0.954
207	50.20	0.00	0.00	0.26	47.91	0.18	97.19	0.954
206	50.20	0.00	0.00	42.23	6.71	0.01	1.74	0.134
209	50.20	0.00	0.00	41.92	7.13	0.02	3.68	0.142
205	50.20	0.00	0.00	41.79	7.28	0.13	32.86	0.145
303	50.20	0.00	0.00	38.82	10.27	0.05	10.79	0.205
304	50.20	0.00	0.00	27.41	21.72	0.03	17.97	0.433
301	50.20	0.00	0.00	35.60	13.56	0.07	34.92	0.270
302	50.20	0.00	0.00	37.03	11.98	0.23	45.69	0.239
201a	50.20	0.00	0.00	41.04	8.00	0.04	6.93	0.159
204c	50.20	0.00	0.00	40.45	8.55	0.15	37.64	0.170
204b	50.20	0.00	0.00	39.17	9.84	0.04	9.19	0.196
204a	50.20	0.00	0.00	39.74	9.29	0.07	16.59	0.185
201b	50.20	0.00	0.00	40.60	8.43	0.02	4.62	0.168

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min

J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.01	0.12	200.89	0	01:37
J3	JUNCTION	0.02	0.16	199.12	0	01:43
J6	JUNCTION	0.02	0.14	198.94	0	02:18
J10	JUNCTION	0.02	0.32	198.92	0	01:22
J4	JUNCTION	0.01	0.17	200.67	0	01:43
J7	JUNCTION	0.02	0.13	199.97	0	01:38
J11	JUNCTION	0.00	0.00	198.30	0	01:22
J9	JUNCTION	0.01	0.10	201.77	0	01:35
J5	JUNCTION	0.01	0.09	200.09	0	02:07
J8	JUNCTION	0.01	0.28	199.18	0	01:35
J18	JUNCTION	0.25	0.34	198.18	0	03:29
J12	JUNCTION	0.06	0.13	197.98	0	03:29
J13	JUNCTION	0.05	0.14	197.88	0	03:31
J14	JUNCTION	0.04	0.14	197.91	0	03:30
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.02	0.18	201.64	0	02:33
J22	JUNCTION	0.00	0.00	198.50	0	02:33
J19	JUNCTION	0.08	0.19	197.80	0	03:30
J21	JUNCTION	0.05	0.15	197.60	0	03:29
J16	JUNCTION	0.06	0.07	198.39	0	03:51
J23	JUNCTION	0.05	0.16	197.70	0	03:30
J24	JUNCTION	0.01	0.11	201.18	0	01:36
J25	JUNCTION	0.02	0.20	200.15	0	01:37
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.09	197.44	0	03:29
SWM_Pond	STORAGE	0.24	0.34	198.19	0	03:29

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	16.59	33.24	0 01:34	0.068	0.164
J3	JUNCTION	0.00	89.46	0 01:38	0.000	0.571
J6	JUNCTION	45.69	55.09	0 01:59	0.234	0.305
J10	JUNCTION	3.68	167.25	0 01:34	0.019	0.326
J4	JUNCTION	34.91	34.91	0 01:35	0.072	0.072
J7	JUNCTION	17.20	39.19	0 01:34	0.073	0.221
J11	JUNCTION	0.00	177.23	0 01:23	0.000	0.326

J9	JUNCTION	18.35	18.35	0	01:34	0.096	0.096
J5	JUNCTION	0.00	24.20	0	01:48	0.000	0.073
J8	JUNCTION	163.71	163.71	0	01:34	0.307	0.307
J18	JUNCTION	0.00	5.76	0	02:52	0.000	0.422
J12	JUNCTION	0.00	51.80	0	03:29	0.000	0.646
J13	JUNCTION	17.95	51.84	0	03:30	0.033	0.678
J14	JUNCTION	0.00	51.79	0	03:29	0.000	0.646
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	32.86	32.86	0	01:50	0.135	0.135
J22	JUNCTION	0.00	20.29	0	02:33	0.000	0.134
J19	JUNCTION	0.00	74.97	0	03:26	0.000	0.985
J21	JUNCTION	10.79	75.46	0	03:28	0.045	1.015
J16	JUNCTION	0.00	82.22	0	01:43	0.000	0.570
J23	JUNCTION	0.00	74.29	0	03:30	0.000	0.968
J24	JUNCTION	28.22	28.22	0	01:34	0.147	0.147
J25	JUNCTION	46.82	71.83	0	01:34	0.185	0.349
Out1	OUTFALL	39.52	39.52	0	01:35	0.187	0.187
Out2	OUTFALL	0.00	75.45	0	03:29	0.000	1.015
SWM_Pond	STORAGE	111.85	342.16	0	01:34	0.217	1.247

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.36	0.189	1.311

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average Volume	Avg Pcnt	E&I Pcnt	Maximum Volume	Max Pcnt	Time of Max Occurrence	Maximum Outflow

Storage Unit	1000 m3	Full	Loss	1000 m3	Full	days	hr:min	LPS
SWM_Pond	0.737	12	0	1.040	16	0	03:29	51.80

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	13.32	16.29	39.52	0.187
Out2	94.88	12.38	75.45	1.015
System	54.10	28.67	92.88	1.202

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	177.33	0	01:23			
C3	CONDUIT	14.64	0	02:07	0.16	0.03	0.23
C1_1	CONDUIT	26.51	0	01:37	0.21	0.01	0.21
C5	CONDUIT	29.60	0	01:38	0.28	0.01	0.19
C7	CONDUIT	163.57	0	01:35	0.47	0.25	0.59
C10	CONDUIT	16.78	0	01:35	0.24	0.01	0.14
C6	CONDUIT	48.65	0	02:18	0.24	0.03	0.22
C8	CONDUIT	177.23	0	01:23	1.42	0.27	0.33
C15	CONDUIT	82.22	0	01:43	2.13	0.08	0.20
C2	CONDUIT	24.20	0	01:48	0.27	0.04	0.22
C12	CONDUIT	51.79	0	03:29	0.71	0.25	0.37
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.18
C14	CONDUIT	51.70	0	03:30	0.31	0.03	0.19
C17	CONDUIT	51.80	0	03:31	0.26	0.03	0.22
P1	CONDUIT	5.76	0	02:52	0.33	0.93	1.00
C18	CONDUIT	20.29	0	02:33	0.29	0.01	0.12
C21	DUMMY	20.29	0	02:33			
C19	CONDUIT	74.29	0	03:30	1.07	0.10	0.23
C20	CONDUIT	75.45	0	03:29	0.58	0.03	0.16

C16	DUMMY	82.22	0	01:43			
C22	CONDUIT	74.29	0	03:30	0.41	0.04	0.20
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C4_2	CONDUIT	22.63	0	01:36	0.27	0.01	0.16
C1_2	CONDUIT	59.87	0	01:38	0.38	0.03	0.23
C11	ORIFICE	5.76	0	02:52			1.00
2	ORIFICE	46.50	0	03:29			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.09	0.0000
C1_1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C6	1.00	0.02	0.04	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C8	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.19	0.0000
C15	1.00	0.02	0.00	0.00	0.85	0.13	0.00	0.00	0.38	0.0001
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.53	0.0003
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.03	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.16	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.21	0.0000
C19	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.67	0.0004
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.44	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.28	0.0000
C4_1	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000

****
Conduit Surcharge Summary
****

	Hours	Hours

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Above Full Normal Flow	Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
P1	22.33	22.33	22.33	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:24:49 2013
Analysis ended on: Thu Jul 11 15:24:52 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	10Yr	J9
210	0.43	500.00	100.00	10.0000	10Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	10Yr	J24
202	0.90	105.00	7.00	7.0000	10Yr	J7
100	1.53	500.00	0.00	2.0000	10Yr	Out1
208	0.26	50.00	95.00	2.0000	10Yr	J8
207	0.38	63.00	95.00	2.0000	10Yr	J8
206	0.13	34.00	5.00	2.0000	10Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	10Yr	J10
205	1.85	450.00	0.00	50.0000	10Yr	J20
303	0.44	40.00	0.00	50.0000	10Yr	J21
304	0.15	95.00	20.00	3.0000	10Yr	J13
301	0.53	350.00	0.00	4.0000	10Yr	J4
302	1.95	770.00	0.00	1.0000	10Yr	J6
201a	0.46	76.00	5.00	13.0000	10Yr	J9
204c	1.74	198.00	8.00	7.0000	10Yr	J25
204b	0.37	119.00	8.00	13.0000	10Yr	J25
204a	0.73	119.00	8.00	13.0000	10Yr	J2
201b	0.28	76.00	5.00	13.0000	10Yr	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.907	60.800
Evaporation Loss	0.000	0.000
Infiltration Loss	0.603	40.457
Surface Runoff	0.286	19.170
Final Surface Storage	0.019	1.301
Continuity Error (%)	-0.211	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.286	2.858
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.224	2.239
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.062	0.619
Continuity Error (%)	0.001	

Highest Continuity Errors

Node J5 (2.34%)
Node J6 (-1.71%)
Node J19 (1.11%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (2)
Link C22 (2)
Link C12 (1)

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	60.80	0.00	0.00	46.31	13.29	0.11	26.88	0.219
210	60.80	0.00	0.00	0.00	58.93	0.25	133.40	0.969
201c	60.80	0.00	0.00	45.84	13.72	0.23	53.33	0.226
202	60.80	0.00	0.00	45.03	14.51	0.13	32.77	0.239
100	60.80	0.00	0.00	40.15	19.49	0.30	88.84	0.320
208	60.80	0.00	0.00	0.26	58.56	0.15	80.60	0.963
207	60.80	0.00	0.00	0.26	58.57	0.22	117.78	0.963
206	60.80	0.00	0.00	46.79	12.81	0.02	3.63	0.211
209	60.80	0.00	0.00	46.31	13.37	0.04	8.87	0.220
205	60.80	0.00	0.00	45.96	13.86	0.26	128.60	0.228
303	60.80	0.00	0.00	43.01	16.68	0.07	25.12	0.274
304	60.80	0.00	0.00	29.23	30.51	0.05	28.95	0.502
301	60.80	0.00	0.00	38.93	20.94	0.11	66.68	0.344
302	60.80	0.00	0.00	40.52	19.21	0.37	99.77	0.316
201a	60.80	0.00	0.00	45.23	14.48	0.07	19.48	0.238
204c	60.80	0.00	0.00	44.69	14.97	0.26	68.15	0.246
204b	60.80	0.00	0.00	43.20	16.58	0.06	26.48	0.273
204a	60.80	0.00	0.00	43.80	15.91	0.12	37.41	0.262
201b	60.80	0.00	0.00	44.76	15.01	0.04	15.84	0.247

****
Node Depth Summary
****

	Average Depth	Maximum Depth	Maximum HGL	Time of Max Occurrence

Node	Type	Meters	Meters	Meters	days	hr:min
J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.02	0.17	200.94	0	01:50
J3	JUNCTION	0.03	0.28	199.24	0	01:58
J6	JUNCTION	0.02	0.19	198.99	0	02:05
J10	JUNCTION	0.03	0.34	198.94	0	01:35
J4	JUNCTION	0.01	0.24	200.74	0	01:39
J7	JUNCTION	0.02	0.18	200.02	0	01:56
J11	JUNCTION	0.00	0.00	198.30	0	01:18
J9	JUNCTION	0.01	0.14	201.81	0	01:38
J5	JUNCTION	0.01	0.12	200.12	0	01:58
J8	JUNCTION	0.02	0.30	199.20	0	01:35
J18	JUNCTION	0.25	0.39	198.23	0	02:58
J12	JUNCTION	0.07	0.31	198.16	0	02:58
J13	JUNCTION	0.06	0.27	198.01	0	02:51
J14	JUNCTION	0.06	0.26	198.03	0	02:54
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.03	0.26	201.72	0	02:03
J22	JUNCTION	0.00	0.00	198.50	0	02:03
J19	JUNCTION	0.09	0.35	197.96	0	02:49
J21	JUNCTION	0.06	0.23	197.68	0	02:48
J16	JUNCTION	0.06	0.07	198.39	0	04:00
J23	JUNCTION	0.06	0.27	197.81	0	02:49
J24	JUNCTION	0.02	0.16	201.23	0	01:39
J25	JUNCTION	0.02	0.25	200.20	0	01:39
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.03	0.16	197.51	0	02:48
SWM_Pond	STORAGE	0.25	0.39	198.24	0	02:58

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J2	JUNCTION	37.41	69.14	0	01:35	0.116	0.295
J3	JUNCTION	0.00	183.51	0	01:43	0.000	1.022
J6	JUNCTION	99.77	104.17	0	01:50	0.375	0.485
J10	JUNCTION	8.87	207.13	0	01:35	0.036	0.411
J4	JUNCTION	66.68	66.68	0	01:35	0.111	0.111
J7	JUNCTION	32.77	71.95	0	01:36	0.131	0.403

J11	JUNCTION	0.00	205.80	0	01:35	0.000	0.411
J9	JUNCTION	46.36	46.36	0	01:35	0.178	0.178
J5	JUNCTION	0.00	47.75	0	01:42	0.000	0.113
J8	JUNCTION	198.37	198.37	0	01:34	0.375	0.375
J18	JUNCTION	0.00	5.77	0	02:05	0.000	0.414
J12	JUNCTION	0.00	155.49	0	02:58	0.000	1.351
J13	JUNCTION	28.95	157.62	0	02:58	0.046	1.396
J14	JUNCTION	0.00	155.49	0	02:58	0.000	1.351
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	128.60	128.60	0	01:35	0.257	0.257
J22	JUNCTION	0.00	43.25	0	02:03	0.000	0.256
J19	JUNCTION	0.00	216.03	0	02:41	0.000	1.888
J21	JUNCTION	25.12	219.54	0	02:48	0.073	1.941
J16	JUNCTION	0.00	166.70	0	01:58	0.000	1.018
J23	JUNCTION	0.00	213.09	0	02:49	0.000	1.867
J24	JUNCTION	69.17	69.17	0	01:35	0.271	0.271
J25	JUNCTION	94.62	133.38	0	01:35	0.322	0.616
Out1	OUTFALL	88.84	88.84	0	01:35	0.298	0.298
Out2	OUTFALL	0.00	219.54	0	02:48	0.000	1.941
SWM_Pond	STORAGE	137.02	431.04	0	01:35	0.270	1.955

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.43	0.244	1.256

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average	Avg	E&I	Maximum	Max	Time of Max	Maximum

Storage Unit	Volume 1000 m3	Pcnt Full	Pcnt Loss	Volume 1000 m3	Pcnt Full	Occurrence days hr:min	Outflow LPS
SWM_Pond	0.765	12	0	1.208	19	0 02:58	155.49

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	14.03	24.62	88.84	0.298
Out2	95.28	23.57	219.54	1.941
System	54.66	48.19	247.00	2.239

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	205.80	0 01:35			
C3	CONDUIT	26.70	0 01:58	0.18	0.05	0.31
C1_1	CONDUIT	54.21	0 01:50	0.28	0.03	0.28
C5	CONDUIT	64.58	0 01:56	0.32	0.03	0.31
C7	CONDUIT	198.27	0 01:35	0.51	0.31	0.64
C10	CONDUIT	36.95	0 01:38	0.31	0.02	0.20
C6	CONDUIT	87.99	0 02:05	0.34	0.05	0.34
C8	CONDUIT	205.80	0 01:35	1.49	0.32	0.34
C15	CONDUIT	166.70	0 01:58	2.21	0.16	0.32
C2	CONDUIT	47.75	0 01:42	0.33	0.08	0.31
C12	CONDUIT	155.49	0 02:58	0.87	0.75	0.75
C13	CONDUIT	0.00	0 00:00	0.00	0.00	0.33
C14	CONDUIT	155.59	0 02:59	0.39	0.09	0.35
C17	CONDUIT	157.79	0 02:59	0.31	0.09	0.41
P1	CONDUIT	5.77	0 02:05	0.33	0.93	1.00
C18	CONDUIT	43.25	0 02:03	0.36	0.02	0.18
C21	DUMMY	43.25	0 02:03			
C19	CONDUIT	213.09	0 02:49	1.29	0.29	0.41

C20	CONDUIT	219.54	0	02:48	0.82	0.08	0.27
C16	DUMMY	166.70	0	01:58			
C22	CONDUIT	213.09	0	02:49	0.57	0.10	0.33
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C4_2	CONDUIT	47.69	0	01:39	0.35	0.02	0.22
C1_2	CONDUIT	125.54	0	01:43	0.46	0.06	0.33
C11	ORIFICE	5.77	0	02:05			1.00
2	ORIFICE	152.15	0	02:58			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.08	0.0000
C1_1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.0000
C6	1.00	0.02	0.04	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.95	0.03	0.00	0.00	0.20	0.0000
C15	1.00	0.02	0.00	0.00	0.85	0.13	0.00	0.00	0.34	0.0001
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.04	0.00	0.00	0.96	0.01	0.00	0.00	0.53	0.0003
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.03	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.21	0.0000
C19	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.68	0.0002
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.45	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.29	0.0000
C4_1	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
C12	0.01	0.01	0.01	1.30	0.01
P1	22.42	22.42	22.42	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:26:05 2013
Analysis ended on: Thu Jul 11 15:26:08 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	25Yr	J9
210	0.43	500.00	100.00	10.0000	25Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	25Yr	J24
202	0.90	105.00	7.00	7.0000	25Yr	J7
100	1.53	500.00	0.00	2.0000	25Yr	Out1
208	0.26	50.00	95.00	2.0000	25Yr	J8
207	0.38	63.00	95.00	2.0000	25Yr	J8
206	0.13	34.00	5.00	2.0000	25Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	25Yr	J10
205	1.85	450.00	0.00	50.0000	25Yr	J20
303	0.44	40.00	0.00	50.0000	25Yr	J21
304	0.15	95.00	20.00	3.0000	25Yr	J13
301	0.53	350.00	0.00	4.0000	25Yr	J4
302	1.95	770.00	0.00	1.0000	25Yr	J6
201a	0.46	76.00	5.00	13.0000	25Yr	J9
204c	1.74	198.00	8.00	7.0000	25Yr	J25
204b	0.37	119.00	8.00	13.0000	25Yr	J25
204a	0.73	119.00	8.00	13.0000	25Yr	J2
201b	0.28	76.00	5.00	13.0000	25Yr	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.106	74.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.661	44.358
Surface Runoff	0.429	28.802
Final Surface Storage	0.019	1.280
Continuity Error (%)	-0.324	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.429	4.294
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.367	3.670
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.062	0.625
Continuity Error (%)	0.001	

Highest Continuity Errors

Node J5 (2.68%)
Node J6 (-2.57%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C12 (1)

Routing Time Step Summary

****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	74.20	0.00	0.00	51.06	22.05	0.19	61.29	0.297
210	74.20	0.00	0.00	0.00	72.39	0.31	162.80	0.976
201c	74.20	0.00	0.00	50.53	22.63	0.38	116.99	0.305
202	74.20	0.00	0.00	49.62	23.50	0.21	65.37	0.317
100	74.20	0.00	0.00	43.76	29.47	0.45	168.10	0.397
208	74.20	0.00	0.00	0.26	72.04	0.19	98.39	0.971
207	74.20	0.00	0.00	0.26	72.05	0.27	143.78	0.971
206	74.20	0.00	0.00	51.56	21.48	0.03	7.91	0.289
209	74.20	0.00	0.00	51.06	22.14	0.06	20.36	0.298
205	74.20	0.00	0.00	50.44	23.05	0.43	289.79	0.311
303	74.20	0.00	0.00	47.56	25.66	0.11	48.09	0.346
304	74.20	0.00	0.00	31.13	42.27	0.06	41.57	0.570
301	74.20	0.00	0.00	42.30	31.11	0.16	107.42	0.419
302	74.20	0.00	0.00	44.01	29.17	0.57	191.69	0.393
201a	74.20	0.00	0.00	49.73	23.52	0.11	44.71	0.317
204c	74.20	0.00	0.00	49.08	24.00	0.42	131.19	0.323
204b	74.20	0.00	0.00	47.39	25.88	0.10	55.38	0.349
204a	74.20	0.00	0.00	48.16	25.09	0.18	78.21	0.338
201b	74.20	0.00	0.00	49.09	24.15	0.07	35.99	0.325

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.00	201.67	0 00:00

J2	JUNCTION	0.02	0.24	201.01	0	01:42
J3	JUNCTION	0.04	0.44	199.40	0	01:55
J6	JUNCTION	0.02	0.25	199.05	0	01:55
J10	JUNCTION	0.03	0.37	198.97	0	01:35
J4	JUNCTION	0.01	0.30	200.80	0	01:37
J7	JUNCTION	0.02	0.25	200.09	0	01:49
J11	JUNCTION	0.00	0.00	198.30	0	01:35
J9	JUNCTION	0.01	0.21	201.88	0	01:37
J5	JUNCTION	0.01	0.16	200.16	0	01:52
J8	JUNCTION	0.02	0.33	199.23	0	01:35
J18	JUNCTION	0.27	0.51	198.35	0	02:52
J12	JUNCTION	0.09	0.39	198.24	0	02:52
J13	JUNCTION	0.08	0.38	198.12	0	02:39
J14	JUNCTION	0.07	0.37	198.14	0	02:39
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.04	0.37	201.83	0	01:51
J22	JUNCTION	0.00	0.00	198.50	0	01:51
J19	JUNCTION	0.11	0.49	198.10	0	02:37
J21	JUNCTION	0.07	0.28	197.73	0	02:36
J16	JUNCTION	0.05	0.06	198.38	0	04:06
J23	JUNCTION	0.07	0.32	197.86	0	02:37
J24	JUNCTION	0.02	0.23	201.30	0	01:39
J25	JUNCTION	0.03	0.34	200.29	0	01:39
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.04	0.20	197.55	0	02:36
SWM_Pond	STORAGE	0.27	0.51	198.36	0	02:52

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	78.20	155.13	0 01:36	0.183	0.477
J3	JUNCTION	0.00	389.96	0 01:40	0.000	1.656
J6	JUNCTION	191.66	197.56	0 01:35	0.569	0.733
J10	JUNCTION	20.35	262.44	0 01:35	0.060	0.522
J4	JUNCTION	107.41	107.41	0 01:35	0.165	0.165
J7	JUNCTION	65.36	160.69	0 01:38	0.211	0.659
J11	JUNCTION	0.00	259.98	0 01:35	0.000	0.521
J9	JUNCTION	105.98	105.98	0 01:35	0.293	0.293
J5	JUNCTION	0.00	87.15	0 01:39	0.000	0.169

J8	JUNCTION	242.17	242.17	0	01:35	0.461	0.461
J18	JUNCTION	0.00	5.78	0	01:47	0.000	0.412
J12	JUNCTION	0.00	229.47	0	02:52	0.000	2.324
J13	JUNCTION	41.56	232.64	0	02:51	0.063	2.387
J14	JUNCTION	0.00	229.47	0	02:52	0.000	2.325
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	289.73	289.73	0	01:35	0.427	0.427
J22	JUNCTION	0.00	88.45	0	01:51	0.000	0.426
J19	JUNCTION	0.00	327.29	0	02:19	0.000	3.137
J21	JUNCTION	48.08	327.34	0	02:35	0.113	3.219
J16	JUNCTION	0.00	338.19	0	01:55	0.000	1.647
J23	JUNCTION	0.00	317.56	0	02:37	0.000	3.107
J24	JUNCTION	152.95	152.95	0	01:35	0.446	0.446
J25	JUNCTION	186.55	266.91	0	01:35	0.513	0.989
Out1	OUTFALL	168.07	168.07	0	01:35	0.451	0.451
Out2	OUTFALL	0.00	327.34	0	02:36	0.000	3.219
SWM_Pond	STORAGE	170.71	588.50	0	01:35	0.339	2.933

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.49	0.364	1.136

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS

SWM_Pond	0.811	13	0	1.631	26	0	02:52	229.47

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	14.43	36.20	168.07	0.451
Out2	95.71	38.92	327.34	3.219
System	55.07	75.13	370.06	3.670

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	259.98	0	01:35			
C3	CONDUIT	46.12	0	01:52	0.20	0.08	0.41
C1_1	CONDUIT	123.83	0	01:42	0.34	0.06	0.38
C5	CONDUIT	140.24	0	01:49	0.36	0.07	0.46
C7	CONDUIT	242.09	0	01:35	0.54	0.37	0.70
C10	CONDUIT	87.93	0	01:37	0.40	0.04	0.29
C6	CONDUIT	155.84	0	01:55	0.41	0.09	0.46
C8	CONDUIT	259.98	0	01:35	1.63	0.40	0.37
C15	CONDUIT	338.19	0	01:55	2.23	0.33	0.50
C2	CONDUIT	87.15	0	01:39	0.39	0.15	0.40
C12	CONDUIT	229.47	0	02:52	1.04	1.11	0.99
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.46
C14	CONDUIT	229.92	0	02:53	0.39	0.13	0.50
C17	CONDUIT	233.28	0	02:53	0.32	0.13	0.59
P1	CONDUIT	5.78	0	01:47	0.33	0.93	1.00
C18	CONDUIT	88.45	0	01:51	0.45	0.05	0.25
C21	DUMMY	88.45	0	01:51			
C19	CONDUIT	317.56	0	02:37	1.34	0.44	0.54
C20	CONDUIT	327.34	0	02:36	0.92	0.11	0.32
C16	DUMMY	338.19	0	01:55			
C22	CONDUIT	317.56	0	02:37	0.65	0.15	0.40

C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.16
C4_2	CONDUIT	115.38	0	01:39	0.45	0.06	0.32
C1_2	CONDUIT	268.37	0	01:40	0.55	0.13	0.49
C11	ORIFICE	5.78	0	01:47			1.00
2	ORIFICE	225.49	0	02:52			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted /Actual	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.08	0.0000
C1_1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.0000
C6	1.00	0.02	0.04	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.94	0.05	0.00	0.00	0.22	0.0000
C15	1.00	0.02	0.00	0.00	0.84	0.14	0.00	0.00	0.34	0.0001
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.03	0.00	0.00	0.96	0.01	0.00	0.00	0.52	0.0003
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.02	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.21	0.0000
C19	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.67	0.0001
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.46	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.29	0.0000
C4_1	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000

****
Conduit Surcharge Summary
****

	--- Hours Full ---			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited

C9	24.00	24.00	24.00	24.00	0.01
C12	0.01	0.01	0.01	2.45	0.01
P1	22.48	22.48	22.48	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:26:52 2013
Analysis ended on: Thu Jul 11 15:26:55 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	50Yr	J9
210	0.43	500.00	100.00	10.0000	50Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	50Yr	J24
202	0.90	105.00	7.00	7.0000	50Yr	J7
100	1.53	500.00	0.00	2.0000	50Yr	Out1
208	0.26	50.00	95.00	2.0000	50Yr	J8
207	0.38	63.00	95.00	2.0000	50Yr	J8
206	0.13	34.00	5.00	2.0000	50Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	50Yr	J10
205	1.85	450.00	0.00	50.0000	50Yr	J20
303	0.44	40.00	0.00	50.0000	50Yr	J21
304	0.15	95.00	20.00	3.0000	50Yr	J13
301	0.53	350.00	0.00	4.0000	50Yr	J4
302	1.95	770.00	0.00	1.0000	50Yr	J6
201a	0.46	76.00	5.00	13.0000	50Yr	J9
204c	1.74	198.00	8.00	7.0000	50Yr	J25
204b	0.37	119.00	8.00	13.0000	50Yr	J25
204a	0.73	119.00	8.00	13.0000	50Yr	J2
201b	0.28	76.00	5.00	13.0000	50Yr	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.254	84.100
Evaporation Loss	0.000	0.000
Infiltration Loss	0.698	46.801
Surface Runoff	0.541	36.277
Final Surface Storage	0.019	1.291
Continuity Error (%)	-0.321	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.541	5.409
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.478	4.780
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.063	0.629
Continuity Error (%)	0.001	

Highest Continuity Errors

Node J6 (-2.95%)
Node J5 (2.86%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C12 (1)

Routing Time Step Summary

****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	84.10	0.00	0.00	54.11	28.95	0.24	93.61	0.344
210	84.10	0.00	0.00	0.00	82.21	0.35	184.52	0.978
201c	84.10	0.00	0.00	53.42	29.66	0.50	177.02	0.353
202	84.10	0.00	0.00	52.46	30.57	0.28	96.17	0.363
100	84.10	0.00	0.00	45.90	37.24	0.57	235.24	0.443
208	84.10	0.00	0.00	0.26	82.00	0.21	111.53	0.975
207	84.10	0.00	0.00	0.26	82.01	0.31	162.99	0.975
206	84.10	0.00	0.00	54.62	28.35	0.04	12.06	0.337
209	84.10	0.00	0.00	53.95	29.04	0.08	31.07	0.345
205	84.10	0.00	0.00	53.30	30.17	0.56	402.60	0.359
303	84.10	0.00	0.00	50.39	32.72	0.14	67.44	0.389
304	84.10	0.00	0.00	32.30	51.11	0.08	50.26	0.608
301	84.10	0.00	0.00	44.45	38.90	0.21	137.22	0.463
302	84.10	0.00	0.00	46.14	36.93	0.72	270.94	0.439
201a	84.10	0.00	0.00	52.62	30.59	0.14	66.79	0.364
204c	84.10	0.00	0.00	51.89	31.09	0.54	190.49	0.370
204b	84.10	0.00	0.00	50.18	33.07	0.12	77.15	0.393
204a	84.10	0.00	0.00	50.80	32.24	0.24	113.58	0.383
201b	84.10	0.00	0.00	51.97	31.24	0.09	51.92	0.372

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.00	201.67	0 00:00

J2	JUNCTION	0.02	0.29	201.06	0	01:40
J3	JUNCTION	0.04	0.58	199.54	0	01:55
J6	JUNCTION	0.03	0.29	199.09	0	01:51
J10	JUNCTION	0.03	0.39	198.99	0	01:35
J4	JUNCTION	0.01	0.34	200.84	0	01:36
J7	JUNCTION	0.03	0.30	200.14	0	01:45
J11	JUNCTION	0.00	0.00	198.30	0	01:35
J9	JUNCTION	0.02	0.25	201.92	0	01:37
J5	JUNCTION	0.01	0.19	200.19	0	01:49
J8	JUNCTION	0.02	0.35	199.25	0	01:35
J18	JUNCTION	0.28	0.63	198.47	0	02:50
J12	JUNCTION	0.10	0.49	198.34	0	02:48
J13	JUNCTION	0.09	0.45	198.19	0	02:33
J14	JUNCTION	0.08	0.42	198.19	0	02:34
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.04	0.45	201.91	0	01:46
J22	JUNCTION	0.00	0.00	198.50	0	01:46
J19	JUNCTION	0.13	0.56	198.17	0	02:31
J21	JUNCTION	0.07	0.30	197.75	0	02:28
J16	JUNCTION	0.05	0.07	198.39	0	04:09
J23	JUNCTION	0.08	0.35	197.89	0	02:31
J24	JUNCTION	0.02	0.28	201.35	0	01:38
J25	JUNCTION	0.03	0.39	200.34	0	01:38
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.04	0.23	197.58	0	02:28
SWM_Pond	STORAGE	0.28	0.63	198.48	0	02:50

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	113.56	236.35	0 01:35	0.235	0.620
J3	JUNCTION	0.00	580.58	0 01:40	0.000	2.156
J6	JUNCTION	270.92	283.53	0 01:35	0.720	0.925
J10	JUNCTION	31.07	305.52	0 01:35	0.078	0.604
J4	JUNCTION	137.20	137.20	0 01:35	0.206	0.206
J7	JUNCTION	96.16	251.84	0 01:38	0.275	0.861
J11	JUNCTION	0.00	302.40	0 01:35	0.000	0.603
J9	JUNCTION	160.38	160.38	0 01:35	0.384	0.384
J5	JUNCTION	0.00	119.96	0 01:38	0.000	0.211

J8	JUNCTION	274.52	274.52	0	01:34	0.525	0.525
J18	JUNCTION	0.00	5.79	0	01:41	0.000	0.413
J12	JUNCTION	0.00	283.56	0	03:01	0.000	3.078
J13	JUNCTION	50.25	287.12	0	03:01	0.077	3.154
J14	JUNCTION	0.00	283.61	0	03:01	0.000	3.079
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	402.54	402.54	0	01:35	0.558	0.558
J22	JUNCTION	0.00	129.24	0	01:47	0.000	0.558
J19	JUNCTION	0.00	409.83	0	02:04	0.000	4.105
J21	JUNCTION	67.44	400.64	0	02:28	0.144	4.210
J16	JUNCTION	0.00	466.87	0	01:55	0.000	2.141
J23	JUNCTION	0.00	388.03	0	02:31	0.000	4.067
J24	JUNCTION	228.92	228.92	0	01:35	0.583	0.583
J25	JUNCTION	267.60	397.28	0	01:35	0.663	1.282
Out1	OUTFALL	235.22	235.22	0	01:35	0.570	0.570
Out2	OUTFALL	0.00	400.64	0	02:28	0.000	4.210
SWM_Pond	STORAGE	196.55	724.76	0	01:35	0.390	3.692

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.53	0.484	1.016

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS

SWM_Pond	0.861	13	0	2.067	32	0	02:50	283.56

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	14.82	44.55	235.22	0.570
Out2	95.94	50.80	400.64	4.210
System	55.38	95.34	459.60	4.779

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	302.40	0	01:35			
C3	CONDUIT	62.54	0	01:49	0.21	0.11	0.48
C1_1	CONDUIT	190.17	0	01:40	0.39	0.09	0.45
C5	CONDUIT	212.69	0	01:45	0.39	0.11	0.58
C7	CONDUIT	274.45	0	01:35	0.56	0.42	0.74
C10	CONDUIT	136.44	0	01:37	0.44	0.07	0.35
C6	CONDUIT	217.45	0	01:51	0.45	0.12	0.53
C8	CONDUIT	302.40	0	01:35	1.72	0.47	0.39
C15	CONDUIT	466.87	0	01:55	2.83	0.45	0.52
C2	CONDUIT	119.96	0	01:38	0.43	0.21	0.47
C12	CONDUIT	283.61	0	03:01	1.28	1.37	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.50
C14	CONDUIT	284.24	0	03:02	0.38	0.16	0.58
C17	CONDUIT	288.06	0	03:02	0.33	0.16	0.67
P1	CONDUIT	5.79	0	01:41	0.33	0.93	1.00
C18	CONDUIT	129.24	0	01:47	0.50	0.07	0.30
C21	DUMMY	129.24	0	01:47			
C19	CONDUIT	388.03	0	02:31	1.38	0.54	0.61
C20	CONDUIT	400.64	0	02:28	0.98	0.14	0.35
C16	DUMMY	466.87	0	01:55			
C22	CONDUIT	388.03	0	02:31	0.69	0.18	0.44

C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.19
C4_2	CONDUIT	182.02	0	01:39	0.50	0.09	0.38
C1_2	CONDUIT	399.66	0	01:39	0.61	0.20	0.61
C11	ORIFICE	5.78	0	01:41			1.00
2	ORIFICE	279.17	0	03:01			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted /Actual	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.05	0.00	0.00	0.94	0.00	0.00	0.00	0.08	0.0000
C1_1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.0000
C6	1.00	0.01	0.04	0.00	0.95	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.93	0.06	0.00	0.00	0.22	0.0000
C15	1.00	0.01	0.00	0.00	0.84	0.15	0.00	0.00	0.34	0.0001
C2	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.03	0.00	0.00	0.96	0.01	0.00	0.00	0.49	0.0003
C13	1.00	0.03	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.22	0.0000
C19	1.00	0.01	0.00	0.00	0.98	0.01	0.00	0.00	0.67	0.0001
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.47	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.30	0.0000
C4_1	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000

****
Conduit Surcharge Summary
****

	--- Hours Full ---			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited

C9	24.00	24.00	24.00	24.00	0.01
C12	1.60	1.60	1.60	3.02	1.60
P1	22.52	22.52	22.52	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:27:25 2013
Analysis ended on: Thu Jul 11 15:27:27 2013
Total elapsed time: 00:00:02

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	100Yr	J9
210	0.43	500.00	100.00	10.0000	100Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	100Yr	J24
202	0.90	105.00	7.00	7.0000	100Yr	J7
100	1.53	500.00	0.00	2.0000	100Yr	Out1
208	0.26	50.00	95.00	2.0000	100Yr	J8
207	0.38	63.00	95.00	2.0000	100Yr	J8
206	0.13	34.00	5.00	2.0000	100Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	100Yr	J10
205	1.85	450.00	0.00	50.0000	100Yr	J20
303	0.44	40.00	0.00	50.0000	100Yr	J21
304	0.15	95.00	20.00	3.0000	100Yr	J13
301	0.53	350.00	0.00	4.0000	100Yr	J4
302	1.95	770.00	0.00	1.0000	100Yr	J6
201a	0.46	76.00	5.00	13.0000	100Yr	J9
204c	1.74	198.00	8.00	7.0000	100Yr	J25
204b	0.37	119.00	8.00	13.0000	100Yr	J25
204a	0.73	119.00	8.00	13.0000	100Yr	J2
201b	0.28	76.00	5.00	13.0000	100Yr	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.857	124.530
Evaporation Loss	0.000	0.000
Infiltration Loss	0.671	45.015
Surface Runoff	1.044	70.002
Final Surface Storage	0.145	9.751
Continuity Error (%)	-0.190	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.041	10.415
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.921	9.208
Internal Outflow	0.004	0.043
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.117	1.174
Continuity Error (%)	-0.106	

Highest Continuity Errors

Node J5 (2.13%)
Node J19 (1.04%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C16 (23)
Link C15 (13)
Link C19 (12)
Link C22 (9)
Link C12 (2)

****
Routing Time Step Summary
****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.08

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	124.53	0.00	0.00	52.33	61.18	0.51	152.10	0.491
210	124.53	0.00	0.00	0.00	122.51	0.53	164.44	0.984
201c	124.53	0.00	0.00	50.87	62.42	1.04	290.25	0.501
202	124.53	0.00	0.00	49.80	63.57	0.57	153.64	0.511
100	124.53	0.00	0.00	43.78	71.99	1.10	322.50	0.578
208	124.53	0.00	0.00	0.25	121.99	0.32	99.40	0.980
207	124.53	0.00	0.00	0.25	121.97	0.46	145.26	0.979
206	124.53	0.00	0.00	52.33	60.81	0.08	20.51	0.488
209	124.53	0.00	0.00	52.33	61.23	0.17	49.99	0.492
205	124.53	0.00	0.00	51.99	62.14	1.15	474.64	0.499
303	124.53	0.00	0.00	51.99	65.21	0.29	91.01	0.524
304	124.53	0.00	0.00	27.88	87.91	0.13	49.26	0.706
301	124.53	0.00	0.00	43.78	73.12	0.39	147.69	0.587
302	124.53	0.00	0.00	43.78	71.78	1.40	385.62	0.576
201a	124.53	0.00	0.00	50.87	63.00	0.29	98.34	0.506
204c	124.53	0.00	0.00	49.26	64.19	1.12	299.13	0.515
204b	124.53	0.00	0.00	49.26	65.40	0.24	93.93	0.525
204a	124.53	0.00	0.00	49.26	64.89	0.47	160.82	0.521
201b	124.53	0.00	0.00	50.87	63.41	0.18	67.64	0.509

****
Node Depth Summary
****

	Average	Maximum	Maximum	Time of Max

Node	Type	Depth Meters	Depth Meters	HGL Meters	Occurrence days	hr:min
J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.06	0.36	201.13	0	12:18
J3	JUNCTION	0.11	1.00	199.96	0	12:23
J6	JUNCTION	0.05	0.36	199.16	0	12:24
J10	JUNCTION	0.10	0.39	198.99	0	12:15
J4	JUNCTION	0.03	0.33	200.83	0	12:15
J7	JUNCTION	0.07	0.38	200.22	0	12:20
J11	JUNCTION	0.00	0.00	198.30	0	12:15
J9	JUNCTION	0.05	0.31	201.98	0	12:16
J5	JUNCTION	0.03	0.22	200.22	0	12:24
J8	JUNCTION	0.06	0.33	199.23	0	12:15
J18	JUNCTION	0.25	0.85	198.69	0	13:19
J12	JUNCTION	0.15	0.67	198.52	0	13:18
J13	JUNCTION	0.13	0.54	198.28	0	12:59
J14	JUNCTION	0.13	0.51	198.28	0	13:00
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.09	0.57	202.03	0	12:19
J22	JUNCTION	0.00	0.00	198.50	0	12:19
J19	JUNCTION	0.17	0.66	198.27	0	12:56
J21	JUNCTION	0.11	0.34	197.79	0	12:52
J16	JUNCTION	0.11	0.76	199.08	0	23:04
J23	JUNCTION	0.12	0.39	197.93	0	12:56
J24	JUNCTION	0.06	0.35	201.42	0	12:16
J25	JUNCTION	0.09	0.47	200.42	0	12:18
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.07	0.26	197.61	0	12:52
SWM_Pond	STORAGE	0.25	0.85	198.70	0	13:19

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J2	JUNCTION	160.78	383.09	0	12:15	0.473	1.274
J3	JUNCTION	0.00	1004.26	0	12:19	0.000	4.413
J6	JUNCTION	385.57	443.72	0	12:15	1.397	1.777
J10	JUNCTION	49.98	294.57	0	12:15	0.165	0.944
J4	JUNCTION	147.64	147.64	0	12:15	0.387	0.387

J7	JUNCTION	153.61	454.97	0	12:15	0.571	1.787
J11	JUNCTION	0.00	291.90	0	12:15	0.000	0.941
J9	JUNCTION	250.39	250.39	0	12:15	0.802	0.802
J5	JUNCTION	0.00	143.43	0	12:16	0.000	0.389
J8	JUNCTION	244.66	244.66	0	12:14	0.780	0.780
J18	JUNCTION	0.00	5.80	0	12:12	0.000	0.253
J12	JUNCTION	0.00	362.41	0	13:29	0.000	5.992
J13	JUNCTION	49.25	366.76	0	13:33	0.132	6.119
J14	JUNCTION	0.00	362.49	0	13:29	0.000	5.992
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	474.49	474.49	0	12:15	1.147	1.147
J22	JUNCTION	0.00	227.15	0	12:19	0.000	1.126
J19	JUNCTION	0.00	537.52	0	12:25	0.000	7.904
J21	JUNCTION	91.00	519.57	0	12:52	0.286	8.111
J16	JUNCTION	0.00	739.54	0	12:23	0.000	4.328
J23	JUNCTION	0.00	502.66	0	12:56	0.000	7.822
J24	JUNCTION	357.82	357.82	0	12:15	1.217	1.217
J25	JUNCTION	392.98	686.08	0	12:15	1.356	2.622
Out1	OUTFALL	322.45	322.45	0	12:15	1.099	1.099
Out2	OUTFALL	0.00	519.57	0	12:52	0.000	8.109
SWM_Pond	STORAGE	184.93	1099.77	0	12:23	0.605	7.004

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J3	JUNCTION	0.32	0.250	0.000
J18	JUNCTION	12.22	0.699	0.801
J16	JUNCTION	2.89	0.309	0.421

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters

J3	0.12	225.36	0	12:23	0.043	1.00

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.777	12	0	2.885	45	0 13:19	362.41

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	55.13	23.08	322.45	1.099
Out2	84.35	111.26	519.57	8.109
System	69.74	134.34	604.73	9.208

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	291.90	0 12:15			
C3	CONDUIT	90.99	0 12:24	0.23	0.16	0.58
C1_1	CONDUIT	332.26	0 12:18	0.45	0.17	0.56
C5	CONDUIT	382.37	0 12:20	0.41	0.19	0.76
C7	CONDUIT	244.59	0 12:15	0.52	0.38	0.72
C10	CONDUIT	229.45	0 12:16	0.48	0.11	0.45
C6	CONDUIT	327.68	0 12:24	0.48	0.19	0.64
C8	CONDUIT	291.90	0 12:15	1.70	0.45	0.39

C15	CONDUIT	739.54	0	12:23	3.86	0.72	0.64
C2	CONDUIT	143.43	0	12:16	0.43	0.25	0.52
C12	CONDUIT	362.49	0	13:29	1.64	1.75	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.50
C14	CONDUIT	363.90	0	13:33	0.38	0.21	0.70
C17	CONDUIT	369.14	0	13:33	0.30	0.20	0.80
P1	CONDUIT	5.80	0	12:12	0.33	0.93	1.00
C18	CONDUIT	227.15	0	12:19	0.58	0.12	0.38
C21	DUMMY	227.15	0	12:19			
C19	CONDUIT	502.66	0	12:56	1.52	0.69	0.70
C20	CONDUIT	519.57	0	12:52	1.05	0.18	0.40
C16	DUMMY	739.54	0	12:23			
C22	CONDUIT	502.66	0	12:56	0.75	0.24	0.49
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.24
C4_2	CONDUIT	313.05	0	12:16	0.57	0.16	0.49
C1_2	CONDUIT	630.91	0	12:18	0.66	0.31	0.80
C11	ORIFICE	5.79	0	12:12			1.00
2	ORIFICE	357.49	0	13:29			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----						Avg.	Avg.
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.45	0.01	0.00	0.54	0.00	0.00	0.00	0.07	0.0000
C1_1	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.19	0.0000
C5	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.22	0.0000
C7	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.15	0.0000
C10	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.22	0.0000
C6	1.00	0.07	0.38	0.00	0.55	0.00	0.00	0.00	0.05	0.0000
C8	1.00	0.07	0.00	0.00	0.88	0.05	0.00	0.00	0.38	0.0000
C15	1.00	0.07	0.00	0.00	0.30	0.63	0.00	0.00	1.43	0.0015
C2	1.00	0.45	0.00	0.00	0.55	0.00	0.00	0.00	0.13	0.0000
C12	1.00	0.12	0.00	0.00	0.88	0.00	0.00	0.00	0.46	0.0003
C13	1.00	0.12	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.07	0.05	0.00	0.88	0.00	0.00	0.00	0.20	0.0000
C17	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.18	0.0000
P1	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.12	0.0000
C18	1.00	0.49	0.00	0.00	0.51	0.00	0.00	0.00	0.18	0.0000
C19	1.00	0.07	0.00	0.00	0.86	0.06	0.00	0.00	0.69	0.0011
C20	1.00	0.10	0.00	0.00	0.90	0.00	0.00	0.00	0.47	0.0000
C22	1.00	0.08	0.00	0.00	0.92	0.00	0.00	0.00	0.30	0.0000

C4_1	1.00	0.07	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.24	0.0000
C1_2	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.27	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
C15	0.01	0.01	0.01	0.59	0.01
C12	2.89	2.89	2.89	4.89	2.89
P1	12.16	12.16	12.16	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:28:17 2013
Analysis ended on: Thu Jul 11 15:28:20 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	25mm	J9
210	0.43	500.00	100.00	10.0000	25mm	SWM_Pond
201c	1.67	205.00	5.00	8.0000	25mm	J24
202	0.90	105.00	7.00	7.0000	25mm	J7
100	1.53	500.00	0.00	2.0000	25mm	Out1
208	0.26	50.00	95.00	2.0000	25mm	J8
207	0.38	63.00	95.00	2.0000	25mm	J8
206	0.13	34.00	5.00	2.0000	25mm	SWM_Pond
209	0.27	68.00	5.00	2.0000	25mm	J10
205	1.85	450.00	0.00	50.0000	25mm	J20
303	0.44	40.00	0.00	50.0000	25mm	J21
304	0.15	95.00	20.00	3.0000	25mm	J13
301	0.53	350.00	0.00	4.0000	25mm	J4
302	1.95	770.00	0.00	1.0000	25mm	J6
201a	0.46	76.00	5.00	13.0000	25mm	J9
204c	1.74	198.00	8.00	7.0000	25mm	J25
204b	0.37	119.00	8.00	13.0000	25mm	J25
204a	0.73	119.00	8.00	13.0000	25mm	J2
201b	0.28	76.00	5.00	13.0000	25mm	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.373	24.990
Evaporation Loss	0.000	0.000
Infiltration Loss	0.317	21.246
Surface Runoff	0.036	2.415
Final Surface Storage	0.020	1.345
Continuity Error (%)	-0.065	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.036	0.360
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.019	0.191
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.017	0.169
Continuity Error (%)	-0.028	

Highest Continuity Errors

Node J19 (3.17%)
Node J25 (-2.23%)
Node J3 (1.70%)
Node J24 (-1.36%)
Node J2 (1.31%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (16)

****
Routing Time Step Summary
****
Minimum Time Step   :   1.00 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	24.99	0.00	0.00	22.54	1.15	0.01	7.18	0.046
210	24.99	0.00	0.00	0.00	23.07	0.10	73.53	0.923
201c	24.99	0.00	0.00	22.54	1.15	0.02	14.28	0.046
202	24.99	0.00	0.00	22.06	1.61	0.01	10.77	0.065
100	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
208	24.99	0.00	0.00	0.25	22.63	0.06	42.47	0.906
207	24.99	0.00	0.00	0.25	22.63	0.09	61.55	0.905
206	24.99	0.00	0.00	22.54	1.15	0.00	1.11	0.046
209	24.99	0.00	0.00	22.54	1.15	0.00	2.31	0.046
205	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
303	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
304	24.99	0.00	0.00	19.01	4.61	0.01	5.13	0.185
301	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
302	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
201a	24.99	0.00	0.00	22.54	1.15	0.01	3.93	0.046
204c	24.99	0.00	0.00	21.83	1.85	0.03	23.80	0.074
204b	24.99	0.00	0.00	21.83	1.85	0.01	5.06	0.074
204a	24.99	0.00	0.00	21.83	1.85	0.01	9.98	0.074
201b	24.99	0.00	0.00	22.54	1.16	0.00	2.39	0.046

****
Node Depth Summary
****

	Average Depth	Maximum Depth	Maximum HGL	Time of Max Occurrence

Node	Type	Meters	Meters	Meters	days	hr:min
J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.00	0.08	200.85	0	01:54
J3	JUNCTION	0.01	0.11	199.07	0	02:00
J6	JUNCTION	0.00	0.00	198.80	0	00:00
J10	JUNCTION	0.02	0.33	198.93	0	01:48
J4	JUNCTION	0.00	0.00	200.50	0	00:00
J7	JUNCTION	0.01	0.08	199.92	0	01:55
J11	JUNCTION	0.00	0.00	198.30	0	01:48
J9	JUNCTION	0.00	0.07	201.74	0	01:51
J5	JUNCTION	0.00	0.00	200.00	0	00:00
J8	JUNCTION	0.01	0.23	199.13	0	01:50
J18	JUNCTION	0.09	0.12	197.96	0	04:28
J12	JUNCTION	0.03	0.04	197.89	0	04:29
J13	JUNCTION	0.02	0.05	197.79	0	01:50
J14	JUNCTION	0.02	0.03	197.80	0	04:32
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.00	0.00	201.46	0	00:00
J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.04	0.05	197.66	0	04:08
J21	JUNCTION	0.02	0.03	197.48	0	04:11
J16	JUNCTION	0.05	0.06	198.38	0	02:23
J23	JUNCTION	0.02	0.03	197.57	0	04:09
J24	JUNCTION	0.00	0.08	201.15	0	01:52
J25	JUNCTION	0.01	0.14	200.09	0	01:53
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.01	197.36	0	04:11
SWM_Pond	STORAGE	0.08	0.11	197.96	0	04:28

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J2	JUNCTION	9.98	19.11	0	01:49	0.013	0.029
J3	JUNCTION	0.00	39.68	0	01:56	0.000	0.106
J6	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J10	JUNCTION	2.31	103.87	0	01:50	0.003	0.148
J4	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J7	JUNCTION	10.77	20.41	0	01:50	0.015	0.037

J11	JUNCTION	0.00	178.22	0	01:48	0.000	0.148
J9	JUNCTION	11.11	11.11	0	01:49	0.015	0.015
J5	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J8	JUNCTION	104.00	104.00	0	01:49	0.145	0.145
J18	JUNCTION	0.00	3.09	0	04:27	0.000	0.192
J12	JUNCTION	0.00	3.09	0	04:28	0.000	0.192
J13	JUNCTION	5.13	5.13	0	01:45	0.007	0.198
J14	JUNCTION	0.00	3.09	0	04:29	0.000	0.192
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	4.05	0	01:52	0.000	0.198
J21	JUNCTION	0.00	3.14	0	04:09	0.000	0.191
J16	JUNCTION	0.00	42.86	0	02:00	0.000	0.105
J23	JUNCTION	0.00	3.14	0	04:08	0.000	0.191
J24	JUNCTION	16.67	16.67	0	01:45	0.023	0.023
J25	JUNCTION	28.86	37.83	0	01:49	0.039	0.067
Out1	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
Out2	OUTFALL	0.00	3.14	0	04:11	0.000	0.191
SWM_Pond	STORAGE	74.64	257.84	0	01:48	0.101	0.353

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.221	3	0	0.319	5	0 04:28	3.09

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	0.00	0.00	0.00	0.000
Out2	92.19	2.40	3.14	0.191
System	46.09	2.40	3.14	0.191

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.34	0	01:48			
C3	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C1_1	CONDUIT	11.35	0	01:54	0.15	0.01	0.15
C5	CONDUIT	12.49	0	01:55	0.25	0.01	0.13
C7	CONDUIT	101.63	0	01:50	0.38	0.16	0.55
C10	CONDUIT	9.39	0	01:51	0.23	0.00	0.10
C6	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C8	CONDUIT	178.22	0	01:48	1.42	0.27	0.33
C15	CONDUIT	42.86	0	02:00	1.91	0.04	0.19
C2	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C12	CONDUIT	3.09	0	04:29	0.28	0.01	0.10
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.04
C14	CONDUIT	3.09	0	04:32	0.13	0.00	0.04
C17	CONDUIT	4.05	0	01:52	0.15	0.00	0.05
P1	CONDUIT	3.09	0	04:27	0.29	0.50	0.78
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	3.14	0	04:08	0.41	0.00	0.05
C20	CONDUIT	3.14	0	04:11	0.18	0.00	0.03
C16	DUMMY	42.86	0	02:00			
C22	CONDUIT	3.14	0	04:09	0.13	0.00	0.04
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C4_2	CONDUIT	10.69	0	01:52	0.24	0.01	0.11
C1_2	CONDUIT	27.22	0	01:56	0.31	0.01	0.16

C11	ORIFICE	3.09	0	04:28	1.00
2	ORIFICE	0.00	0	00:00	
3	WEIR	0.00	0	00:00	0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C1_1	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.09	0.0000
C5	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.16	0.0000
C7	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.06	0.0000
C6	1.00	0.05	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C8	1.00	0.05	0.00	0.00	0.94	0.01	0.00	0.00	0.18	0.0000
C15	1.00	0.05	0.00	0.00	0.91	0.04	0.00	0.00	0.14	0.0001
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C12	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.07	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.05	0.03	0.00	0.93	0.00	0.00	0.00	0.22	0.0000
C17	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.25	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.05	0.00	0.00	0.94	0.01	0.00	0.00	0.71	0.0000
C20	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.37	0.0000
C22	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.24	0.0000
C4_1	1.00	0.05	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.08	0.0000
C1_2	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.17	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
C21	24.00	24.00	24.00	24.00	0.01

C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:29:56 2013
Analysis ended on: Thu Jul 11 15:29:58 2013
Total elapsed time: 00:00:02

APPENDIX D

PROPOSED VERTICAL EXPANSION CONDITION HYDROLOGIC MODEL INPUT AND OUTPUT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	2YR	J9
210	0.43	500.00	100.00	10.0000	2YR	SWM_Pond
204	2.64	319.00	8.00	25.0000	2YR	J2
202	0.85	96.00	7.00	25.0000	2YR	J7
201	2.62	307.00	5.00	25.0000	2YR	J1
100	1.53	500.00	0.00	2.0000	2YR	Out1
208	0.26	50.00	95.00	2.0000	2YR	J8
207	0.38	63.00	95.00	2.0000	2YR	J8
206	0.13	34.00	5.00	2.0000	2YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	2YR	J10
205	1.85	450.00	0.00	50.0000	2YR	J20
303	0.44	40.00	0.00	50.0000	2YR	J21
304	0.15	95.00	20.00	3.0000	2YR	J13
301	0.53	350.00	0.00	4.0000	2YR	J4
302	1.95	770.00	0.00	1.0000	2YR	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.510	34.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.428	28.708
Surface Runoff	0.063	4.230
Final Surface Storage	0.019	1.283
Continuity Error (%)	-0.064	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.063	0.631
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.057	0.573
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.006	0.058
Continuity Error (%)	0.010	

Highest Continuity Errors

Node J2 (-3.38%)
Node J3 (2.24%)
Node J5 (1.14%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (3)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	34.20	0.00	0.00	31.39	1.62	0.01	7.68	0.047
210	34.20	0.00	0.00	0.00	32.33	0.14	75.03	0.945
204	34.20	0.00	0.00	30.40	2.59	0.07	36.85	0.076
202	34.20	0.00	0.00	30.73	2.26	0.02	10.38	0.066
201	34.20	0.00	0.00	31.39	1.62	0.04	22.86	0.047
100	34.20	0.00	0.00	30.22	2.80	0.04	7.86	0.082
208	34.20	0.00	0.00	0.26	31.83	0.08	45.23	0.931
207	34.20	0.00	0.00	0.26	31.82	0.12	66.05	0.930
206	34.20	0.00	0.00	31.39	1.62	0.00	1.13	0.047
209	34.20	0.00	0.00	31.39	1.62	0.00	2.36	0.047
205	34.20	0.00	0.00	32.99	0.00	0.00	0.00	0.000
303	34.20	0.00	0.00	30.92	2.12	0.01	1.91	0.062
304	34.20	0.00	0.00	23.64	9.25	0.01	5.24	0.270
301	34.20	0.00	0.00	29.34	3.66	0.02	4.03	0.107
302	34.20	0.00	0.00	30.32	2.66	0.05	9.45	0.078

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.11	201.78	0 01:35
J2	JUNCTION	0.00	0.16	200.93	0 01:36
J3	JUNCTION	0.00	0.12	199.08	0 01:44
J6	JUNCTION	0.00	0.06	198.86	0 03:09
J10	JUNCTION	0.01	0.33	198.93	0 01:26
J4	JUNCTION	0.00	0.06	200.56	0 02:18
J7	JUNCTION	0.00	0.11	199.95	0 01:39
J11	JUNCTION	0.00	0.00	198.30	0 01:26
J9	JUNCTION	0.00	0.06	201.73	0 01:35
J5	JUNCTION	0.00	0.04	200.04	0 03:04
J8	JUNCTION	0.00	0.24	199.14	0 01:35
J18	JUNCTION	0.06	0.16	198.00	0 03:40
J12	JUNCTION	0.03	0.05	197.85	0 03:41
J13	JUNCTION	0.02	0.05	197.79	0 01:35

J14	JUNCTION	0.02	0.04	197.81	0	03:51
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.00	0.00	200.00	0	00:00
J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.03	0.11	197.72	0	03:23
J21	JUNCTION	0.02	0.07	197.52	0	03:17
J16	JUNCTION	0.06	0.06	198.38	0	02:14
J23	JUNCTION	0.02	0.07	197.61	0	03:24
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.03	197.38	0	03:17
SWM_Pond	STORAGE	0.06	0.16	198.01	0	03:40

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	22.86	22.86	0	01:30	0.043	0.042
J2	JUNCTION	36.85	43.72	0	01:34	0.068	0.083
J3	JUNCTION	0.00	55.55	0	01:38	0.000	0.148
J6	JUNCTION	9.45	12.65	0	03:00	0.052	0.071
J10	JUNCTION	2.36	113.35	0	01:35	0.004	0.208
J4	JUNCTION	4.03	4.03	0	02:19	0.019	0.019
J7	JUNCTION	10.38	30.35	0	01:34	0.019	0.063
J11	JUNCTION	0.00	178.13	0	01:26	0.000	0.208
J9	JUNCTION	7.68	7.68	0	01:34	0.014	0.014
J5	JUNCTION	0.00	4.41	0	02:31	0.000	0.020
J8	JUNCTION	111.28	111.28	0	01:34	0.204	0.204
J18	JUNCTION	0.00	4.19	0	03:40	0.000	0.438
J12	JUNCTION	0.00	4.19	0	03:40	0.000	0.438
J13	JUNCTION	5.24	6.45	0	01:34	0.014	0.452
J14	JUNCTION	0.00	4.19	0	03:41	0.000	0.438
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	16.19	0	03:06	0.000	0.523
J21	JUNCTION	1.91	15.54	0	03:16	0.009	0.530
J16	JUNCTION	0.00	49.22	0	01:44	0.000	0.145
J23	JUNCTION	0.00	14.70	0	03:23	0.000	0.521
Out1	OUTFALL	7.86	7.86	0	02:50	0.043	0.043
Out2	OUTFALL	0.00	15.54	0	03:17	0.000	0.530
SWM_Pond	STORAGE	76.17	260.12	0	01:26	0.141	0.493

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	4.31	0.011	1.499

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.174	3	0	0.451	7	0 03:40	4.19

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	3.95	4.27	7.86	0.043
Out2	98.07	2.10	15.54	0.530
System	51.01	6.37	22.65	0.573

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.24	0	01:26			
C3	CONDUIT	3.31	0	03:04	0.10	0.01	0.10
C4	CONDUIT	20.61	0	01:36	0.29	0.01	0.14
C5	CONDUIT	21.15	0	01:39	0.28	0.01	0.15
C7	CONDUIT	111.00	0	01:35	0.42	0.17	0.55
C10	CONDUIT	6.91	0	01:35	0.09	0.00	0.15
C6	CONDUIT	11.22	0	03:09	0.13	0.01	0.12
C8	CONDUIT	178.13	0	01:26	1.42	0.27	0.33
C1	CONDUIT	34.47	0	01:38	0.33	0.02	0.18
C15	CONDUIT	49.22	0	01:44	1.91	0.05	0.19
C2	CONDUIT	4.41	0	02:31	0.15	0.01	0.09
C12	CONDUIT	4.19	0	03:41	0.30	0.03	0.12
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C14	CONDUIT	4.19	0	03:51	0.14	0.00	0.05
C17	CONDUIT	6.29	0	01:36	0.17	0.00	0.10
P1	CONDUIT	4.19	0	03:40	0.32	0.67	1.00
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	14.70	0	03:23	0.50	0.02	0.12
C20	CONDUIT	15.54	0	03:17	0.33	0.01	0.07
C16	DUMMY	49.22	0	01:44			
C22	CONDUIT	14.70	0	03:24	0.23	0.01	0.09
C11	ORIFICE	4.19	0	03:40			1.00
2	ORIFICE	0.00	0	00:00			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.01	0.32	0.00	0.68	0.00	0.00	0.00	0.03	0.0000

C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.08	0.0000
C10	1.00	0.01	0.64	0.00	0.35	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.01	0.06	0.00	0.92	0.01	0.00	0.00	0.07	0.0000
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.23	0.00	0.74	0.02	0.00	0.00	0.06	0.0000
C2	1.00	0.02	0.57	0.00	0.41	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.49	0.0000
C13	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.22	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.14	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.38	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.01	0.00	0.00	0.87	0.12	0.00	0.00	0.79	0.0000
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.37	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.23	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
P1	2.54	2.54	2.54	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:32:34 2013
Analysis ended on: Thu Jul 11 15:32:41 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	5YR	J9
210	0.43	500.00	100.00	10.0000	5YR	SWM_Pond
204	2.64	319.00	8.00	25.0000	5YR	J2
202	0.85	96.00	7.00	25.0000	5YR	J7
201	2.62	307.00	5.00	25.0000	5YR	J1
100	1.53	500.00	0.00	2.0000	5YR	Out1
208	0.26	50.00	95.00	2.0000	5YR	J8
207	0.38	63.00	95.00	2.0000	5YR	J8
206	0.13	34.00	5.00	2.0000	5YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	5YR	J10
205	1.85	450.00	0.00	50.0000	5YR	J20
303	0.44	40.00	0.00	50.0000	5YR	J21
304	0.15	95.00	20.00	3.0000	5YR	J13
301	0.53	350.00	0.00	4.0000	5YR	J4
302	1.95	770.00	0.00	1.0000	5YR	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.748	50.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.546	36.624
Surface Runoff	0.184	12.362
Final Surface Storage	0.019	1.299
Continuity Error (%)	-0.169	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.184	1.843
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.174	1.737
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.106
Continuity Error (%)	0.007	

Highest Continuity Errors

Node J5 (1.78%)
Node J2 (-1.18%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (5)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

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Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	50.20	0.00	0.00	41.62	7.46	0.07	12.27	0.149
210	50.20	0.00	0.00	0.00	48.38	0.21	110.14	0.964
204	50.20	0.00	0.00	39.74	9.32	0.25	60.16	0.186
202	50.20	0.00	0.00	40.17	8.82	0.07	17.06	0.176
201	50.20	0.00	0.00	41.04	7.98	0.21	39.39	0.159
100	50.20	0.00	0.00	36.79	12.23	0.19	39.52	0.244
208	50.20	0.00	0.00	0.26	47.91	0.12	66.52	0.954
207	50.20	0.00	0.00	0.26	47.91	0.18	97.19	0.954
206	50.20	0.00	0.00	42.23	6.71	0.01	1.74	0.134
209	50.20	0.00	0.00	41.92	7.13	0.02	3.68	0.142
205	50.20	0.00	0.00	41.79	7.28	0.13	32.86	0.145
303	50.20	0.00	0.00	38.82	10.27	0.05	10.79	0.205
304	50.20	0.00	0.00	27.41	21.72	0.03	17.97	0.433
301	50.20	0.00	0.00	35.60	13.56	0.07	34.92	0.270
302	50.20	0.00	0.00	37.03	11.98	0.23	45.69	0.239

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Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.13	201.80	0 01:36
J2	JUNCTION	0.01	0.19	200.96	0 01:37
J3	JUNCTION	0.01	0.15	199.11	0 01:51
J6	JUNCTION	0.01	0.14	198.94	0 02:18
J10	JUNCTION	0.01	0.32	198.92	0 01:22
J4	JUNCTION	0.00	0.17	200.67	0 01:43
J7	JUNCTION	0.01	0.14	199.98	0 02:26
J11	JUNCTION	0.00	0.00	198.30	0 01:22
J9	JUNCTION	0.00	0.08	201.75	0 01:35
J5	JUNCTION	0.00	0.09	200.09	0 02:07
J8	JUNCTION	0.00	0.28	199.18	0 01:35
J18	JUNCTION	0.15	0.34	198.18	0 03:29
J12	JUNCTION	0.05	0.17	197.97	0 03:29
J13	JUNCTION	0.03	0.14	197.88	0 03:31
J14	JUNCTION	0.03	0.15	197.92	0 03:30

J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.01	0.20	200.20	0	02:40
J22	JUNCTION	0.00	0.00	198.50	0	02:40
J19	JUNCTION	0.06	0.19	197.80	0	03:31
J21	JUNCTION	0.04	0.15	197.60	0	03:31
J16	JUNCTION	0.06	0.06	198.38	0	03:50
J23	JUNCTION	0.03	0.16	197.70	0	03:32
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.09	197.44	0	03:31
SWM_Pond	STORAGE	0.15	0.34	198.19	0	03:29

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	39.38	39.38	0	01:34	0.209	0.209
J2	JUNCTION	60.15	70.80	0	01:34	0.246	0.312
J3	JUNCTION	0.00	87.16	0	01:39	0.000	0.600
J6	JUNCTION	45.69	55.09	0	01:59	0.234	0.306
J10	JUNCTION	3.68	167.25	0	01:34	0.019	0.326
J4	JUNCTION	34.91	34.91	0	01:35	0.072	0.072
J7	JUNCTION	17.06	47.97	0	01:35	0.075	0.285
J11	JUNCTION	0.00	177.23	0	01:23	0.000	0.326
J9	JUNCTION	12.27	12.27	0	01:34	0.066	0.066
J5	JUNCTION	0.00	24.20	0	01:48	0.000	0.073
J8	JUNCTION	163.71	163.71	0	01:34	0.307	0.307
J18	JUNCTION	0.00	6.20	0	02:54	0.000	0.932
J12	JUNCTION	0.00	55.72	0	03:29	0.000	1.172
J13	JUNCTION	17.95	55.66	0	03:30	0.033	1.205
J14	JUNCTION	0.00	55.70	0	03:29	0.000	1.173
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	32.86	32.86	0	01:50	0.135	0.135
J22	JUNCTION	0.00	18.35	0	02:40	0.000	0.135
J19	JUNCTION	0.00	78.62	0	03:26	0.000	1.512
J21	JUNCTION	10.79	78.34	0	03:31	0.045	1.550
J16	JUNCTION	0.00	80.04	0	01:51	0.000	0.596
J23	JUNCTION	0.00	77.31	0	03:31	0.000	1.503
Out1	OUTFALL	39.52	39.52	0	01:35	0.187	0.187
Out2	OUTFALL	0.00	78.33	0	03:31	0.000	1.550
SWM_Pond	STORAGE	111.85	333.32	0	01:34	0.217	1.273

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	32.94	0.191	1.319

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.430	7	0	1.047	16	0 03:29	55.72

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.43	16.29	39.52	0.187
Out2	98.30	6.08	78.33	1.550
System	51.36	22.37	93.18	1.737

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	177.33	0	01:23			
C3	CONDUIT	14.64	0	02:07	0.16	0.03	0.23
C4	CONDUIT	33.07	0	01:37	0.33	0.02	0.18
C5	CONDUIT	39.36	0	02:26	0.32	0.02	0.20
C7	CONDUIT	163.57	0	01:35	0.47	0.25	0.59
C10	CONDUIT	10.79	0	01:35	0.13	0.01	0.18
C6	CONDUIT	48.65	0	02:18	0.24	0.03	0.22
C8	CONDUIT	177.23	0	01:23	1.42	0.27	0.33
C1	CONDUIT	53.22	0	01:39	0.37	0.03	0.22
C15	CONDUIT	80.04	0	01:51	2.11	0.08	0.19
C2	CONDUIT	24.20	0	01:48	0.27	0.04	0.22
C12	CONDUIT	55.70	0	03:29	0.64	0.44	0.42
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C14	CONDUIT	55.52	0	03:30	0.32	0.03	0.19
C17	CONDUIT	55.59	0	03:31	0.27	0.03	0.22
P1	CONDUIT	6.20	0	02:54	0.35	1.00	1.00
C18	CONDUIT	18.35	0	02:40	0.23	0.01	0.13
C21	DUMMY	18.35	0	02:40			
C19	CONDUIT	77.31	0	03:31	1.08	0.11	0.23
C20	CONDUIT	78.33	0	03:31	0.59	0.03	0.16
C16	DUMMY	80.04	0	01:51			
C22	CONDUIT	77.30	0	03:32	0.41	0.04	0.21
C11	ORIFICE	6.20	0	02:54			1.00
2	ORIFICE	50.18	0	03:29			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.01	0.30	0.00	0.69	0.00	0.00	0.00	0.04	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.14	0.0000

C7	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.01	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.01	0.06	0.00	0.92	0.01	0.00	0.00	0.07	0.0000
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.22	0.00	0.73	0.04	0.00	0.00	0.13	0.0000
C2	1.00	0.02	0.57	0.00	0.41	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.12	0.0000
C19	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0001
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.42	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.26	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
P1	31.53	31.53	31.53	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:33:24 2013
Analysis ended on: Thu Jul 11 15:33:32 2013
Total elapsed time: 00:00:08

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	10Yr	J9
210	0.43	500.00	100.00	10.0000	10Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	10Yr	J2
202	0.85	96.00	7.00	25.0000	10Yr	J7
201	2.62	307.00	5.00	25.0000	10Yr	J1
100	1.53	500.00	0.00	2.0000	10Yr	Out1
208	0.26	50.00	95.00	2.0000	10Yr	J8
207	0.38	63.00	95.00	2.0000	10Yr	J8
206	0.13	34.00	5.00	2.0000	10Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	10Yr	J10
205	1.85	450.00	0.00	50.0000	10Yr	J20
303	0.44	40.00	0.00	50.0000	10Yr	J21
304	0.15	95.00	20.00	3.0000	10Yr	J13
301	0.53	350.00	0.00	4.0000	10Yr	J4
302	1.95	770.00	0.00	1.0000	10Yr	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.907	60.800
Evaporation Loss	0.000	0.000
Infiltration Loss	0.600	40.232
Surface Runoff	0.289	19.397
Final Surface Storage	0.020	1.311
Continuity Error (%)	-0.229	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.289	2.892
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.278	2.785
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.107
Continuity Error (%)	0.005	

Highest Continuity Errors

Node J5 (2.31%)
Node J6 (-1.82%)
Node J2 (-1.51%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	60.80	0.00	0.00	45.83	13.78	0.12	33.98	0.227
210	60.80	0.00	0.00	0.00	58.93	0.25	133.40	0.969
204	60.80	0.00	0.00	43.65	15.94	0.42	137.02	0.262
202	60.80	0.00	0.00	44.27	15.38	0.13	40.17	0.253
201	60.80	0.00	0.00	45.23	14.46	0.38	109.96	0.238
100	60.80	0.00	0.00	40.15	19.49	0.30	88.84	0.320
208	60.80	0.00	0.00	0.26	58.56	0.15	80.60	0.963
207	60.80	0.00	0.00	0.26	58.57	0.22	117.78	0.963
206	60.80	0.00	0.00	46.79	12.81	0.02	3.63	0.211
209	60.80	0.00	0.00	46.31	13.37	0.04	8.87	0.220
205	60.80	0.00	0.00	45.96	13.86	0.26	128.60	0.228
303	60.80	0.00	0.00	43.01	16.68	0.07	25.12	0.274
304	60.80	0.00	0.00	29.23	30.51	0.05	28.95	0.502
301	60.80	0.00	0.00	38.93	20.94	0.11	66.68	0.344
302	60.80	0.00	0.00	40.52	19.21	0.37	99.77	0.316

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.01	0.20	201.87	0 01:39
J2	JUNCTION	0.01	0.25	201.02	0 01:40
J3	JUNCTION	0.01	0.30	199.26	0 02:03
J6	JUNCTION	0.01	0.19	198.99	0 02:05
J10	JUNCTION	0.01	0.34	198.94	0 01:35
J4	JUNCTION	0.00	0.24	200.74	0 01:39
J7	JUNCTION	0.01	0.21	200.05	0 01:55
J11	JUNCTION	0.00	0.00	198.30	0 01:18
J9	JUNCTION	0.00	0.12	201.79	0 01:38
J5	JUNCTION	0.00	0.12	200.12	0 01:58
J8	JUNCTION	0.01	0.30	199.20	0 01:34
J18	JUNCTION	0.15	0.39	198.23	0 02:52
J12	JUNCTION	0.05	0.32	198.12	0 02:52
J13	JUNCTION	0.04	0.29	198.03	0 02:52

J14	JUNCTION	0.04	0.28	198.05	0	02:52
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.01	0.29	200.29	0	02:09
J22	JUNCTION	0.00	0.00	198.50	0	02:09
J19	JUNCTION	0.06	0.37	197.98	0	02:49
J21	JUNCTION	0.04	0.24	197.69	0	02:50
J16	JUNCTION	0.04	0.04	198.36	0	03:56
J23	JUNCTION	0.04	0.28	197.82	0	02:50
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.17	197.52	0	02:50
SWM_Pond	STORAGE	0.15	0.39	198.24	0	02:52

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	109.90	109.90	0	01:35	0.379	0.379
J2	JUNCTION	136.93	157.20	0	01:35	0.421	0.542
J3	JUNCTION	0.00	217.33	0	01:46	0.000	1.061
J6	JUNCTION	99.76	104.16	0	01:50	0.375	0.485
J10	JUNCTION	8.86	207.13	0	01:35	0.036	0.411
J4	JUNCTION	66.64	66.64	0	01:35	0.111	0.111
J7	JUNCTION	40.15	107.50	0	01:44	0.131	0.512
J11	JUNCTION	0.00	205.80	0	01:35	0.000	0.411
J9	JUNCTION	33.97	33.97	0	01:35	0.121	0.121
J5	JUNCTION	0.00	47.75	0	01:42	0.000	0.113
J8	JUNCTION	198.37	198.37	0	01:34	0.375	0.375
J18	JUNCTION	0.00	6.22	0	02:08	0.000	0.931
J12	JUNCTION	0.00	172.06	0	02:52	0.000	1.888
J13	JUNCTION	28.94	174.22	0	02:52	0.046	1.934
J14	JUNCTION	0.00	172.06	0	02:52	0.000	1.889
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	128.54	128.54	0	01:35	0.257	0.257
J22	JUNCTION	0.00	38.00	0	02:09	0.000	0.256
J19	JUNCTION	0.00	229.26	0	02:49	0.000	2.427
J21	JUNCTION	25.11	236.10	0	02:49	0.073	2.487
J16	JUNCTION	0.00	187.49	0	02:03	0.000	1.052
J23	JUNCTION	0.00	237.40	0	02:49	0.000	2.412
Out1	OUTFALL	88.83	88.83	0	01:35	0.298	0.298
Out2	OUTFALL	0.00	235.62	0	02:50	0.000	2.487
SWM_Pond	STORAGE	137.02	415.80	0	01:34	0.270	1.989

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	33.26	0.242	1.268

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.441	7	0	1.208	19	0 02:52	172.06

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.67	24.62	88.83	0.298
Out2	98.43	9.74	235.62	2.487
System	51.55	34.36	262.05	2.785

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	205.80	0	01:35			
C3	CONDUIT	26.69	0	01:58	0.18	0.05	0.31
C4	CONDUIT	82.74	0	01:44	0.41	0.04	0.27
C5	CONDUIT	96.36	0	01:55	0.39	0.05	0.34
C7	CONDUIT	198.27	0	01:35	0.51	0.31	0.64
C10	CONDUIT	25.38	0	01:38	0.15	0.01	0.25
C6	CONDUIT	88.03	0	02:05	0.33	0.05	0.35
C8	CONDUIT	205.80	0	01:35	1.49	0.32	0.34
C1	CONDUIT	130.27	0	01:46	0.46	0.06	0.35
C15	CONDUIT	187.49	0	02:03	2.19	0.18	0.34
C2	CONDUIT	47.75	0	01:42	0.33	0.08	0.31
C12	CONDUIT	172.06	0	02:52	0.92	1.36	0.79
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.25
C14	CONDUIT	172.05	0	02:53	0.40	0.10	0.38
C17	CONDUIT	174.24	0	02:53	0.32	0.10	0.44
P1	CONDUIT	6.22	0	02:08	0.35	1.00	1.00
C18	CONDUIT	38.00	0	02:09	0.28	0.03	0.19
C21	DUMMY	38.00	0	02:09			
C19	CONDUIT	237.40	0	02:49	1.34	0.33	0.43
C20	CONDUIT	235.62	0	02:50	0.84	0.08	0.27
C16	DUMMY	187.49	0	02:03			
C22	CONDUIT	229.75	0	02:50	0.58	0.11	0.34
C11	ORIFICE	6.22	0	02:08			1.00
2	ORIFICE	168.00	0	02:52			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.00	0.30	0.00	0.69	0.00	0.00	0.00	0.04	0.0000

C5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.00	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.00	0.06	0.00	0.92	0.01	0.00	0.00	0.08	0.0000
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.22	0.00	0.73	0.04	0.00	0.00	0.12	0.0000
C2	1.00	0.02	0.57	0.00	0.41	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0001
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.42	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.27	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C12	0.01	0.01	0.01	1.76	0.01
P1	31.87	31.87	31.87	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:36:24 2013
Analysis ended on: Thu Jul 11 15:36:31 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	25Yr	J9
210	0.43	500.00	100.00	10.0000	25Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	25Yr	J2
202	0.85	96.00	7.00	25.0000	25Yr	J7
201	2.62	307.00	5.00	25.0000	25Yr	J1
100	1.53	500.00	0.00	2.0000	25Yr	Out1
208	0.26	50.00	95.00	2.0000	25Yr	J8
207	0.38	63.00	95.00	2.0000	25Yr	J8
206	0.13	34.00	5.00	2.0000	25Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	25Yr	J10
205	1.85	450.00	0.00	50.0000	25Yr	J20
303	0.44	40.00	0.00	50.0000	25Yr	J21
304	0.15	95.00	20.00	3.0000	25Yr	J13
301	0.53	350.00	0.00	4.0000	25Yr	J4
302	1.95	770.00	0.00	1.0000	25Yr	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.106	74.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.658	44.107
Surface Runoff	0.433	29.066
Final Surface Storage	0.019	1.289
Continuity Error (%)	-0.353	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.433	4.334
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.423	4.226
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.108
Continuity Error (%)	0.003	

Highest Continuity Errors

Node J5 (2.66%)
Node J6 (-2.66%)
Node J2 (-2.11%)
Node J3 (1.30%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	74.20	0.00	0.00	50.56	22.63	0.20	80.26	0.305
210	74.20	0.00	0.00	0.00	72.39	0.31	162.80	0.976
204	74.20	0.00	0.00	48.00	25.12	0.66	286.96	0.339
202	74.20	0.00	0.00	48.68	24.50	0.21	86.12	0.330
201	74.20	0.00	0.00	49.73	23.49	0.62	252.17	0.317
100	74.20	0.00	0.00	43.76	29.47	0.45	168.10	0.397
208	74.20	0.00	0.00	0.26	72.04	0.19	98.39	0.971
207	74.20	0.00	0.00	0.26	72.05	0.27	143.78	0.971
206	74.20	0.00	0.00	51.56	21.48	0.03	7.91	0.289
209	74.20	0.00	0.00	51.06	22.14	0.06	20.36	0.298
205	74.20	0.00	0.00	50.44	23.05	0.43	289.79	0.311
303	74.20	0.00	0.00	47.56	25.66	0.11	48.09	0.346
304	74.20	0.00	0.00	31.13	42.27	0.06	41.57	0.570
301	74.20	0.00	0.00	42.30	31.11	0.16	107.42	0.419
302	74.20	0.00	0.00	44.01	29.17	0.57	191.69	0.393

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Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.01	0.30	201.97	0 01:39
J2	JUNCTION	0.01	0.35	201.12	0 01:39
J3	JUNCTION	0.01	0.46	199.42	0 01:58
J6	JUNCTION	0.01	0.25	199.05	0 01:55
J10	JUNCTION	0.01	0.37	198.97	0 01:35
J4	JUNCTION	0.00	0.30	200.80	0 01:37
J7	JUNCTION	0.01	0.30	200.14	0 01:48
J11	JUNCTION	0.00	0.00	198.30	0 01:35
J9	JUNCTION	0.00	0.18	201.85	0 01:38
J5	JUNCTION	0.00	0.16	200.16	0 01:52
J8	JUNCTION	0.01	0.33	199.23	0 01:35
J18	JUNCTION	0.16	0.51	198.35	0 02:52
J12	JUNCTION	0.06	0.44	198.24	0 02:50

J13	JUNCTION	0.04	0.39	198.13	0	02:38
J14	JUNCTION	0.04	0.37	198.14	0	02:40
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.02	0.40	200.40	0	01:54
J22	JUNCTION	0.00	0.00	198.50	0	01:54
J19	JUNCTION	0.07	0.50	198.11	0	02:35
J21	JUNCTION	0.04	0.28	197.73	0	02:33
J16	JUNCTION	0.03	0.04	198.36	0	04:00
J23	JUNCTION	0.04	0.32	197.86	0	02:35
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.21	197.56	0	02:33
SWM_Pond	STORAGE	0.15	0.51	198.36	0	02:52

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	252.12	252.12	0	01:35	0.616	0.616
J2	JUNCTION	286.91	336.87	0	01:35	0.663	0.862
J3	JUNCTION	0.00	486.09	0	01:43	0.000	1.708
J6	JUNCTION	191.66	197.55	0	01:35	0.569	0.733
J10	JUNCTION	20.35	262.44	0	01:35	0.060	0.522
J4	JUNCTION	107.41	107.41	0	01:35	0.165	0.165
J7	JUNCTION	86.10	249.46	0	01:41	0.208	0.830
J11	JUNCTION	0.00	259.98	0	01:35	0.000	0.521
J9	JUNCTION	80.24	80.24	0	01:35	0.199	0.199
J5	JUNCTION	0.00	87.14	0	01:39	0.000	0.169
J8	JUNCTION	242.17	242.17	0	01:35	0.461	0.461
J18	JUNCTION	0.00	6.24	0	01:50	0.000	0.929
J12	JUNCTION	0.00	240.33	0	03:07	0.000	2.871
J13	JUNCTION	41.56	243.27	0	03:05	0.063	2.935
J14	JUNCTION	0.00	240.39	0	03:07	0.000	2.872
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	289.73	289.73	0	01:35	0.427	0.427
J22	JUNCTION	0.00	76.22	0	01:54	0.000	0.426
J19	JUNCTION	0.00	346.12	0	02:05	0.000	3.686
J21	JUNCTION	48.08	333.13	0	02:33	0.113	3.775
J16	JUNCTION	0.00	361.11	0	01:58	0.000	1.686
J23	JUNCTION	0.00	322.99	0	02:35	0.000	3.662
Out1	OUTFALL	168.07	168.07	0	01:35	0.451	0.451
Out2	OUTFALL	0.00	333.12	0	02:33	0.000	3.775

SWM_Pond	STORAGE	170.71	546.59	0	01:34	0.339	2.973

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	33.56	0.364	1.146

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.457	7	0	1.630	26	0 02:52	240.33

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.80	36.20	168.07	0.451
Out2	98.57	14.76	333.12	3.775
System	51.69	50.96	377.85	4.226

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	259.98	0	01:35			
C3	CONDUIT	46.11	0	01:52	0.20	0.08	0.41
C4	CONDUIT	196.72	0	01:42	0.52	0.10	0.39
C5	CONDUIT	210.53	0	01:48	0.48	0.10	0.50
C7	CONDUIT	242.09	0	01:35	0.54	0.37	0.70
C10	CONDUIT	62.65	0	01:38	0.20	0.03	0.35
C6	CONDUIT	156.15	0	01:55	0.41	0.09	0.47
C8	CONDUIT	259.98	0	01:35	1.63	0.40	0.37
C1	CONDUIT	292.93	0	01:43	0.57	0.15	0.50
C15	CONDUIT	361.11	0	01:58	2.20	0.35	0.51
C2	CONDUIT	87.14	0	01:39	0.39	0.15	0.40
C12	CONDUIT	240.39	0	03:07	1.09	1.90	0.99
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.34
C14	CONDUIT	240.97	0	03:08	0.41	0.14	0.51
C17	CONDUIT	243.86	0	03:05	0.32	0.13	0.59
P1	CONDUIT	6.24	0	01:50	0.35	1.00	1.00
C18	CONDUIT	76.22	0	01:54	0.35	0.05	0.27
C21	DUMMY	76.22	0	01:54			
C19	CONDUIT	322.99	0	02:35	1.35	0.45	0.55
C20	CONDUIT	333.12	0	02:33	0.93	0.11	0.32
C16	DUMMY	361.11	0	01:58			
C22	CONDUIT	322.99	0	02:35	0.65	0.15	0.40
C11	ORIFICE	6.24	0	01:50			1.00
2	ORIFICE	236.31	0	03:07			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000

C4	1.00	0.00	0.30	0.00	0.69	0.00	0.00	0.00	0.04	0.0000
C5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.00	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.00	0.06	0.00	0.92	0.02	0.00	0.00	0.08	0.0000
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.22	0.00	0.73	0.05	0.00	0.00	0.12	0.0000
C2	1.00	0.02	0.57	0.00	0.42	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.52	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0000
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.43	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.27	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C12	0.01	0.01	0.01	2.61	0.01
P1	32.18	32.18	32.18	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:37:01 2013
Analysis ended on: Thu Jul 11 15:37:08 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	50Yr	J9
210	0.43	500.00	100.00	10.0000	50Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	50Yr	J2
202	0.85	96.00	7.00	25.0000	50Yr	J7
201	2.62	307.00	5.00	25.0000	50Yr	J1
100	1.53	500.00	0.00	2.0000	50Yr	Out1
208	0.26	50.00	95.00	2.0000	50Yr	J8
207	0.38	63.00	95.00	2.0000	50Yr	J8
206	0.13	34.00	5.00	2.0000	50Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	50Yr	J10
205	1.85	450.00	0.00	50.0000	50Yr	J20
303	0.44	40.00	0.00	50.0000	50Yr	J21
304	0.15	95.00	20.00	3.0000	50Yr	J13
301	0.53	350.00	0.00	4.0000	50Yr	J4
302	1.95	770.00	0.00	1.0000	50Yr	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.254	84.100
Evaporation Loss	0.000	0.000
Infiltration Loss	0.694	46.557
Surface Runoff	0.545	36.556
Final Surface Storage	0.019	1.283
Continuity Error (%)	-0.352	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.545	5.451
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.534	5.342
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.109
Continuity Error (%)	0.002	

Highest Continuity Errors

Node J6 (-3.02%)
Node J5 (2.85%)
Node J2 (-2.60%)
Node J3 (1.64%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	84.10	0.00	0.00	53.61	29.56	0.26	121.41	0.351
210	84.10	0.00	0.00	0.00	82.21	0.35	184.52	0.978
204	84.10	0.00	0.00	50.80	32.28	0.85	416.37	0.384
202	84.10	0.00	0.00	51.51	31.63	0.27	126.39	0.376
201	84.10	0.00	0.00	52.62	30.57	0.80	376.97	0.363
100	84.10	0.00	0.00	45.90	37.24	0.57	235.24	0.443
208	84.10	0.00	0.00	0.26	82.00	0.21	111.53	0.975
207	84.10	0.00	0.00	0.26	82.01	0.31	162.99	0.975
206	84.10	0.00	0.00	54.62	28.35	0.04	12.06	0.337
209	84.10	0.00	0.00	53.95	29.04	0.08	31.07	0.345
205	84.10	0.00	0.00	53.30	30.17	0.56	402.60	0.359
303	84.10	0.00	0.00	50.39	32.72	0.14	67.44	0.389
304	84.10	0.00	0.00	32.30	51.11	0.08	50.26	0.608
301	84.10	0.00	0.00	44.45	38.90	0.21	137.22	0.463
302	84.10	0.00	0.00	46.14	36.93	0.72	270.94	0.439

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.01	0.37	202.04	0 01:38
J2	JUNCTION	0.01	0.42	201.19	0 01:39
J3	JUNCTION	0.01	0.59	199.55	0 01:58
J6	JUNCTION	0.01	0.29	199.09	0 01:51
J10	JUNCTION	0.01	0.39	198.99	0 01:35
J4	JUNCTION	0.00	0.34	200.84	0 01:36
J7	JUNCTION	0.01	0.36	200.20	0 01:45
J11	JUNCTION	0.00	0.00	198.30	0 01:35
J9	JUNCTION	0.00	0.21	201.88	0 01:37
J5	JUNCTION	0.00	0.19	200.19	0 01:49
J8	JUNCTION	0.01	0.35	199.25	0 01:35
J18	JUNCTION	0.16	0.64	198.48	0 02:52
J12	JUNCTION	0.06	0.54	198.34	0 02:50

J13	JUNCTION	0.05	0.45	198.19	0	02:37
J14	JUNCTION	0.05	0.42	198.19	0	02:38
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.02	0.47	200.47	0	01:50
J22	JUNCTION	0.00	0.00	198.50	0	01:50
J19	JUNCTION	0.07	0.56	198.17	0	02:35
J21	JUNCTION	0.04	0.30	197.75	0	02:32
J16	JUNCTION	0.03	0.03	198.35	0	04:03
J23	JUNCTION	0.04	0.35	197.89	0	02:35
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.23	197.58	0	02:32
SWM_Pond	STORAGE	0.16	0.64	198.49	0	02:52

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	376.87	376.87	0	01:35	0.801	0.801
J2	JUNCTION	416.27	498.71	0	01:35	0.852	1.113
J3	JUNCTION	0.00	736.71	0	01:41	0.000	2.219
J6	JUNCTION	270.88	283.46	0	01:35	0.720	0.926
J10	JUNCTION	31.07	305.52	0	01:35	0.078	0.604
J4	JUNCTION	137.20	137.20	0	01:35	0.206	0.206
J7	JUNCTION	126.36	386.84	0	01:38	0.269	1.079
J11	JUNCTION	0.00	302.40	0	01:35	0.000	0.603
J9	JUNCTION	121.38	121.38	0	01:35	0.260	0.260
J5	JUNCTION	0.00	119.95	0	01:38	0.000	0.211
J8	JUNCTION	274.52	274.52	0	01:35	0.525	0.525
J18	JUNCTION	0.00	6.23	0	01:43	0.000	0.933
J12	JUNCTION	0.00	286.82	0	03:01	0.000	3.631
J13	JUNCTION	50.26	290.48	0	03:01	0.077	3.709
J14	JUNCTION	0.00	286.87	0	03:01	0.000	3.633
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	402.51	402.51	0	01:35	0.558	0.558
J22	JUNCTION	0.00	111.18	0	01:50	0.000	0.558
J19	JUNCTION	0.00	412.35	0	01:55	0.000	4.660
J21	JUNCTION	67.43	398.36	0	02:32	0.144	4.772
J16	JUNCTION	0.00	482.28	0	01:58	0.000	2.182
J23	JUNCTION	0.00	386.46	0	02:35	0.000	4.628
Out1	OUTFALL	235.19	235.19	0	01:35	0.570	0.570
Out2	OUTFALL	0.00	398.36	0	02:32	0.000	4.772

SWM_Pond	STORAGE	196.56	681.78	0	01:35	0.390	3.734

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	33.87	0.491	1.019

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.476	7	0	2.091	33	0 02:52	286.82

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.93	44.53	235.19	0.570
Out2	98.65	18.65	398.36	4.772
System	51.79	63.18	455.12	5.342

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	302.40	0	01:35			
C3	CONDUIT	62.52	0	01:49	0.21	0.11	0.48
C4	CONDUIT	303.74	0	01:40	0.58	0.15	0.46
C5	CONDUIT	317.77	0	01:45	0.53	0.16	0.62
C7	CONDUIT	274.45	0	01:35	0.56	0.42	0.74
C10	CONDUIT	97.78	0	01:37	0.23	0.05	0.42
C6	CONDUIT	218.58	0	01:51	0.45	0.12	0.53
C8	CONDUIT	302.40	0	01:35	1.72	0.47	0.39
C1	CONDUIT	445.41	0	01:41	0.63	0.22	0.61
C15	CONDUIT	482.28	0	01:58	2.91	0.47	0.52
C2	CONDUIT	119.95	0	01:38	0.43	0.21	0.47
C12	CONDUIT	286.87	0	03:01	1.30	2.27	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.39
C14	CONDUIT	287.61	0	03:02	0.40	0.17	0.58
C17	CONDUIT	291.36	0	03:02	0.33	0.16	0.67
P1	CONDUIT	6.23	0	01:43	0.35	1.00	1.00
C18	CONDUIT	111.18	0	01:50	0.39	0.08	0.31
C21	DUMMY	111.18	0	01:50			
C19	CONDUIT	386.46	0	02:35	1.38	0.53	0.61
C20	CONDUIT	398.36	0	02:32	0.98	0.14	0.35
C16	DUMMY	482.28	0	01:58			
C22	CONDUIT	386.46	0	02:35	0.69	0.18	0.43
C11	ORIFICE	6.23	0	01:43			1.00
2	ORIFICE	282.41	0	03:01			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class --- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000

C4	1.00	0.00	0.30	0.00	0.70	0.00	0.00	0.00	0.04	0.0000
C5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.00	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.00	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.00	0.06	0.00	0.92	0.02	0.00	0.00	0.08	0.0000
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.00	0.22	0.00	0.72	0.05	0.00	0.00	0.13	0.0000
C2	1.00	0.02	0.57	0.00	0.42	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.51	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.17	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0000
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.43	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.27	0.0000

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C9	72.00	72.00	72.00	72.00	0.01
C12	1.63	1.63	1.63	3.18	1.63
P1	32.49	32.49	32.49	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:37:53 2013
Analysis ended on: Thu Jul 11 15:38:00 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	100Yr	J9
210	0.43	500.00	100.00	10.0000	100Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	100Yr	J2
202	0.85	96.00	7.00	25.0000	100Yr	J7
201	2.62	307.00	5.00	25.0000	100Yr	J1
100	1.53	500.00	0.00	2.0000	100Yr	Out1
208	0.26	50.00	95.00	2.0000	100Yr	J8
207	0.38	63.00	95.00	2.0000	100Yr	J8
206	0.13	34.00	5.00	2.0000	100Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	100Yr	J10
205	1.85	450.00	0.00	50.0000	100Yr	J20
303	0.44	40.00	0.00	50.0000	100Yr	J21
304	0.15	95.00	20.00	3.0000	100Yr	J13
301	0.53	350.00	0.00	4.0000	100Yr	J4
302	1.95	770.00	0.00	1.0000	100Yr	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.859	124.697
Evaporation Loss	0.000	0.000
Infiltration Loss	0.775	52.010
Surface Runoff	1.060	71.071
Final Surface Storage	0.027	1.823
Continuity Error (%)	-0.166	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.060	10.597
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.032	10.317
Internal Outflow	0.005	0.053
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.023	0.235
Continuity Error (%)	-0.076	

Highest Continuity Errors

Node J2 (-2.02%)
Node J6 (-1.64%)
Node J3 (1.30%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C16 (7)
Link C19 (7)
Link C15 (4)
Link C22 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.04

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	124.70	0.00	0.00	61.22	62.37	0.55	182.74	0.500
210	124.70	0.00	0.00	0.00	122.71	0.53	164.44	0.984
204	124.70	0.00	0.00	57.40	65.73	1.74	586.20	0.527
202	124.70	0.00	0.00	58.03	65.07	0.55	182.94	0.522
201	124.70	0.00	0.00	59.28	63.84	1.67	557.21	0.512
100	124.70	0.00	0.00	49.69	73.37	1.12	322.50	0.588
208	124.70	0.00	0.00	0.25	122.47	0.32	99.40	0.982
207	124.70	0.00	0.00	0.25	122.49	0.47	145.26	0.982
206	124.70	0.00	0.00	61.22	62.02	0.08	20.51	0.497
209	124.70	0.00	0.00	61.22	62.22	0.17	49.99	0.499
205	124.70	0.00	0.00	60.33	62.68	1.16	474.64	0.503
303	124.70	0.00	0.00	57.39	66.20	0.29	91.01	0.531
304	124.70	0.00	0.00	30.87	88.50	0.13	49.26	0.710
301	124.70	0.00	0.00	49.69	73.83	0.39	147.69	0.592
302	124.70	0.00	0.00	49.69	73.29	1.43	385.62	0.588

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.02	0.44	202.11	0 12:16
J2	JUNCTION	0.03	0.49	201.26	0 12:16
J3	JUNCTION	0.04	1.00	199.96	0 12:25
J6	JUNCTION	0.02	0.36	199.16	0 12:24
J10	JUNCTION	0.04	0.39	198.99	0 12:15
J4	JUNCTION	0.01	0.33	200.83	0 12:15
J7	JUNCTION	0.03	0.45	200.29	0 12:20
J11	JUNCTION	0.00	0.00	198.30	0 12:15
J9	JUNCTION	0.01	0.27	201.94	0 12:16
J5	JUNCTION	0.01	0.22	200.22	0 12:24
J8	JUNCTION	0.02	0.33	199.23	0 12:15

J18	JUNCTION	0.21	0.85	198.69	0	13:23
J12	JUNCTION	0.09	0.72	198.52	0	13:22
J13	JUNCTION	0.07	0.53	198.27	0	13:05
J14	JUNCTION	0.07	0.51	198.28	0	13:06
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.04	0.60	200.60	0	12:21
J22	JUNCTION	0.00	0.00	198.50	0	12:21
J19	JUNCTION	0.10	0.65	198.26	0	12:59
J21	JUNCTION	0.06	0.34	197.79	0	12:58
J16	JUNCTION	0.38	0.76	199.08	0	21:42
J23	JUNCTION	0.06	0.39	197.93	0	12:58
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.04	0.26	197.61	0	12:58
SWM_Pond	STORAGE	0.21	0.85	198.70	0	13:23

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	557.02	557.02	0	12:15	1.673	1.673
J2	JUNCTION	586.01	743.55	0	12:15	1.735	2.285
J3	JUNCTION	0.00	1200.79	0	12:18	0.000	4.571
J6	JUNCTION	385.48	443.65	0	12:15	1.429	1.821
J10	JUNCTION	49.97	294.56	0	12:15	0.168	0.952
J4	JUNCTION	147.66	147.66	0	12:15	0.391	0.391
J7	JUNCTION	182.88	671.92	0	12:16	0.553	2.239
J11	JUNCTION	0.00	291.90	0	12:15	0.000	0.952
J9	JUNCTION	182.67	182.67	0	12:15	0.549	0.549
J5	JUNCTION	0.00	143.43	0	12:16	0.000	0.395
J8	JUNCTION	244.66	244.66	0	12:15	0.784	0.784
J18	JUNCTION	0.00	6.19	1	02:47	0.000	1.062
J12	JUNCTION	0.00	365.26	0	13:31	0.000	6.960
J13	JUNCTION	49.25	369.97	0	13:34	0.133	7.092
J14	JUNCTION	0.00	365.36	0	13:35	0.000	6.960
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	474.54	474.54	0	12:15	1.160	1.160
J22	JUNCTION	0.00	196.00	0	12:21	0.000	1.160
J19	JUNCTION	0.00	525.44	0	12:23	0.000	8.943
J21	JUNCTION	90.98	509.53	0	12:57	0.291	9.195
J16	JUNCTION	0.00	739.54	0	12:25	0.000	4.459
J23	JUNCTION	0.00	497.14	0	12:58	0.000	8.898

Out1	OUTFALL	322.39	322.39	0	12:15	1.123	1.123
Out2	OUTFALL	0.00	509.39	0	12:58	0.000	9.194
SWM_Pond	STORAGE	184.93	1054.80	0	12:25	0.608	7.182

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J3	JUNCTION	0.32	0.250	0.000
J18	JUNCTION	44.05	0.701	0.809
J16	JUNCTION	51.46	0.310	0.420

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J3	0.12	302.47	0 12:25	0.053	1.00

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.631	10	0	2.894	45	0 13:23	365.26

****
Outfall Loading Summary

****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	25.34	17.07	322.39	1.123
Out2	94.79	37.38	509.39	9.194
System	60.06	54.45	594.56	10.317

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	291.90	0	12:15			
C3	CONDUIT	90.98	0	12:24	0.23	0.16	0.58
C4	CONDUIT	520.36	0	12:17	0.66	0.26	0.58
C5	CONDUIT	550.38	0	12:20	0.58	0.27	0.79
C7	CONDUIT	244.59	0	12:15	0.52	0.38	0.72
C10	CONDUIT	163.51	0	12:16	0.27	0.08	0.51
C6	CONDUIT	328.40	0	12:24	0.49	0.19	0.63
C8	CONDUIT	291.90	0	12:15	1.70	0.45	0.39
C1	CONDUIT	692.68	0	12:16	0.70	0.34	0.79
C15	CONDUIT	739.54	0	12:25	4.11	0.72	0.63
C2	CONDUIT	143.43	0	12:16	0.43	0.25	0.52
C12	CONDUIT	365.36	0	13:35	1.65	2.88	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.46
C14	CONDUIT	367.16	0	13:34	0.39	0.21	0.69
C17	CONDUIT	372.16	0	13:34	0.30	0.20	0.79
P1	CONDUIT	6.19	1	02:47	0.35	1.00	1.00
C18	CONDUIT	196.00	0	12:21	0.46	0.14	0.40
C21	DUMMY	196.00	0	12:21			
C19	CONDUIT	497.14	0	12:58	1.52	0.69	0.69
C20	CONDUIT	509.39	0	12:58	1.05	0.18	0.40
C16	DUMMY	739.54	0	12:25			
C22	CONDUIT	493.76	0	12:58	0.74	0.23	0.48
C11	ORIFICE	6.19	1	02:47			1.00
2	ORIFICE	360.33	0	13:35			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.15	0.00	0.00	0.85	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.12	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000
C7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.02	0.32	0.00	0.66	0.00	0.00	0.00	0.05	0.0000
C6	1.00	0.02	0.13	0.00	0.85	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.18	0.0000
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000
C15	1.00	0.03	0.07	0.00	0.69	0.21	0.00	0.00	0.51	0.0005
C2	1.00	0.15	0.26	0.00	0.59	0.00	0.00	0.00	0.05	0.0000
C12	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.49	0.0001
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.01	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C18	1.00	0.16	0.00	0.00	0.84	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.69	0.0004
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.45	0.0000
C22	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.28	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C15	0.01	0.01	0.01	0.62	0.01
C12	2.92	2.92	2.92	6.09	2.92
P1	42.62	42.62	42.62	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:38:42 2013
Analysis ended on: Thu Jul 11 15:38:49 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

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NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary

****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	25mm	J9
210	0.43	500.00	100.00	10.0000	25mm	SWM_Pond
204	2.64	319.00	8.00	25.0000	25mm	J2
202	0.85	96.00	7.00	25.0000	25mm	J7
201	2.62	307.00	5.00	25.0000	25mm	J1
100	1.53	500.00	0.00	2.0000	25mm	Out1
208	0.26	50.00	95.00	2.0000	25mm	J8
207	0.38	63.00	95.00	2.0000	25mm	J8
206	0.13	34.00	5.00	2.0000	25mm	SWM_Pond
209	0.27	68.00	5.00	2.0000	25mm	J10
205	1.85	450.00	0.00	50.0000	25mm	J20
303	0.44	40.00	0.00	50.0000	25mm	J21
304	0.15	95.00	20.00	3.0000	25mm	J13
301	0.53	350.00	0.00	4.0000	25mm	J4
302	1.95	770.00	0.00	1.0000	25mm	J6

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Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	
J10	JUNCTION	198.60	1.00	0.0	
J4	JUNCTION	200.50	1.20	0.0	

J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400

C11	J18	J12	ORIFICE
2	SWM_Pond	J12	ORIFICE
3	SWM_Pond	J15	WEIR

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

********** Runoff Quantity Continuity **********	Volume hectare-m	Depth mm
Total Precipitation	0.373	24.990
Evaporation Loss	0.000	0.000
Infiltration Loss	0.317	21.258
Surface Runoff	0.036	2.404
Final Surface Storage	0.020	1.345
Continuity Error (%)	-0.066	

**********	Volume	Volume

Flow Routing Continuity	hectare-m	10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.036	0.358
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.031	0.308
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.005	0.051
Continuity Error (%)	-0.061	

Highest Continuity Errors

Node J2 (-4.22%)
Node J3 (3.05%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	1.00 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	24.99	0.00	0.00	22.54	1.16	0.01	7.52	0.046
210	24.99	0.00	0.00	0.00	23.07	0.10	73.53	0.923
204	24.99	0.00	0.00	21.83	1.85	0.05	36.11	0.074
202	24.99	0.00	0.00	22.06	1.62	0.01	10.17	0.065
201	24.99	0.00	0.00	22.54	1.15	0.03	22.40	0.046
100	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
208	24.99	0.00	0.00	0.26	22.63	0.06	42.47	0.906
207	24.99	0.00	0.00	0.26	22.63	0.09	61.55	0.905
206	24.99	0.00	0.00	22.54	1.15	0.00	1.11	0.046
209	24.99	0.00	0.00	22.54	1.15	0.00	2.31	0.046
205	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
303	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
304	24.99	0.00	0.00	19.01	4.61	0.01	5.13	0.185
301	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
302	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000

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Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.10	201.77	0 01:52
J2	JUNCTION	0.00	0.14	200.91	0 01:54
J3	JUNCTION	0.00	0.10	199.06	0 02:04
J6	JUNCTION	0.00	0.00	198.80	0 00:00
J10	JUNCTION	0.01	0.33	198.93	0 01:48
J4	JUNCTION	0.00	0.00	200.50	0 00:00
J7	JUNCTION	0.00	0.09	199.93	0 02:00
J11	JUNCTION	0.00	0.00	198.30	0 01:48
J9	JUNCTION	0.00	0.06	201.73	0 01:51
J5	JUNCTION	0.00	0.00	200.00	0 00:00
J8	JUNCTION	0.00	0.23	199.13	0 01:50
J18	JUNCTION	0.05	0.12	197.96	0 04:28
J12	JUNCTION	0.03	0.05	197.85	0 04:10
J13	JUNCTION	0.01	0.05	197.79	0 01:50
J14	JUNCTION	0.02	0.03	197.80	0 04:33
J15	JUNCTION	0.00	0.00	198.95	0 00:00
J20	JUNCTION	0.00	0.00	200.00	0 00:00

J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.03	0.05	197.66	0	04:09
J21	JUNCTION	0.02	0.03	197.48	0	04:12
J16	JUNCTION	0.05	0.05	198.37	0	02:21
J23	JUNCTION	0.01	0.03	197.57	0	04:10
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.01	197.36	0	04:12
SWM_Pond	STORAGE	0.05	0.11	197.96	0	04:28

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	22.40	22.40	0	01:49	0.030	0.030
J2	JUNCTION	36.11	41.37	0	01:49	0.049	0.059
J3	JUNCTION	0.00	36.92	0	02:03	0.000	0.106
J6	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J10	JUNCTION	2.31	103.87	0	01:50	0.003	0.148
J4	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J7	JUNCTION	10.17	21.94	0	01:50	0.014	0.045
J11	JUNCTION	0.00	178.22	0	01:48	0.000	0.148
J9	JUNCTION	7.52	7.52	0	01:49	0.010	0.010
J5	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J8	JUNCTION	104.00	104.00	0	01:49	0.145	0.145
J18	JUNCTION	0.00	3.38	0	04:27	0.000	0.303
J12	JUNCTION	0.00	3.38	0	04:28	0.000	0.303
J13	JUNCTION	5.13	5.13	0	01:45	0.007	0.310
J14	JUNCTION	0.00	3.38	0	04:29	0.000	0.303
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	3.83	0	01:53	0.000	0.309
J21	JUNCTION	0.00	3.41	0	04:10	0.000	0.308
J16	JUNCTION	0.00	36.38	0	02:04	0.000	0.103
J23	JUNCTION	0.00	3.41	0	04:09	0.000	0.308
Out1	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
Out2	OUTFALL	0.00	3.41	0	04:12	0.000	0.308
SWM_Pond	STORAGE	74.64	254.99	0	01:48	0.101	0.352

****

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.124	2	0	0.313	5	0 04:28	3.38

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	0.00	0.00	0.00	0.000
Out2	97.39	1.22	3.41	0.308
System	48.70	1.22	3.41	0.308

Link Flow Summary

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth

C9	DUMMY	178.34	0	01:48			
C3	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C4	CONDUIT	14.59	0	01:54	0.26	0.01	0.12
C5	CONDUIT	14.41	0	02:01	0.26	0.01	0.13
C7	CONDUIT	101.63	0	01:50	0.38	0.16	0.55
C10	CONDUIT	5.56	0	01:51	0.10	0.00	0.13
C6	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C8	CONDUIT	178.22	0	01:48	1.42	0.27	0.33
C1	CONDUIT	22.92	0	02:04	0.30	0.01	0.15
C15	CONDUIT	36.38	0	02:04	1.84	0.04	0.17
C2	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C12	CONDUIT	3.38	0	04:29	0.28	0.03	0.10
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C14	CONDUIT	3.38	0	04:33	0.13	0.00	0.04
C17	CONDUIT	3.83	0	01:53	0.15	0.00	0.05
P1	CONDUIT	3.38	0	04:27	0.32	0.54	0.76
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	3.41	0	04:09	0.41	0.00	0.05
C20	CONDUIT	3.41	0	04:12	0.19	0.00	0.03
C16	DUMMY	36.38	0	02:04			
C22	CONDUIT	3.41	0	04:10	0.14	0.00	0.04
C11	ORIFICE	3.38	0	04:28			1.00
2	ORIFICE	0.00	0	00:00			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted /Actual	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4	1.00	0.02	0.31	0.00	0.68	0.00	0.00	0.00	0.03	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.02	0.02	0.00	0.97	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.02	0.63	0.00	0.36	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C8	1.00	0.02	0.06	0.00	0.92	0.00	0.00	0.00	0.07	0.0000
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.02	0.22	0.00	0.74	0.01	0.00	0.00	0.05	0.0000
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C12	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.47	0.0000

C13	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.01	0.00	0.98	0.00	0.00	0.00	0.21	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.43	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.02	0.00	0.00	0.86	0.12	0.00	0.00	0.82	0.0000
C20	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.35	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.22	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Mon Jul 08 14:08:53 2013
Analysis ended on: Mon Jul 08 14:09:02 2013
Total elapsed time: 00:00:09

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	Huricane_Hazel	J9
210	0.43	500.00	100.00	10.0000	Huricane_Hazel	SWM_Pond
204	2.64	319.00	8.00	25.0000	Huricane_Hazel	J2
202	0.85	96.00	7.00	25.0000	Huricane_Hazel	J7
201	2.62	307.00	5.00	25.0000	Huricane_Hazel	J1
100	1.53	500.00	0.00	2.0000	Huricane_Hazel	Out1
208	0.26	50.00	95.00	2.0000	Huricane_Hazel	J8
207	0.38	63.00	95.00	2.0000	Huricane_Hazel	J8
206	0.13	34.00	5.00	2.0000	Huricane_Hazel	SWM_Pond
209	0.27	68.00	5.00	2.0000	Huricane_Hazel	J10
205	1.85	450.00	0.00	50.0000	Huricane_Hazel	J20
303	0.44	40.00	0.00	50.0000	Huricane_Hazel	J21
304	0.15	95.00	20.00	3.0000	Huricane_Hazel	J13
301	0.53	350.00	0.00	4.0000	Huricane_Hazel	J4
302	1.95	770.00	0.00	1.0000	Huricane_Hazel	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	3.161	212.000
Evaporation Loss	0.000	0.000
Infiltration Loss	0.937	62.810
Surface Runoff	2.206	147.947
Final Surface Storage	0.020	1.316
Continuity Error (%)	-0.035	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	2.206	22.059
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.171	21.713
Internal Outflow	0.019	0.192
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.016	0.156
Continuity Error (%)	-0.011	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)
Link C16 (2)
Link C15 (1)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff

Subcatchment	mm	mm	mm	mm	mm	10^6 ltr	LPS	
203	212.00	0.00	0.00	74.29	136.52	1.20	110.08	0.644
210	212.00	0.00	0.00	0.00	210.08	0.90	63.30	0.991
204	212.00	0.00	0.00	69.74	141.05	3.72	335.67	0.665
202	212.00	0.00	0.00	70.59	140.20	1.19	107.75	0.661
201	212.00	0.00	0.00	72.11	138.72	3.63	331.07	0.654
100	212.00	0.00	0.00	59.16	151.68	2.32	200.84	0.715
208	212.00	0.00	0.00	0.26	209.55	0.54	38.28	0.988
207	212.00	0.00	0.00	0.26	209.55	0.80	55.94	0.988
206	212.00	0.00	0.00	75.33	135.51	0.18	15.88	0.639
209	212.00	0.00	0.00	74.70	136.09	0.37	33.52	0.642
205	212.00	0.00	0.00	72.68	138.23	2.56	236.15	0.652
303	212.00	0.00	0.00	69.73	141.13	0.62	55.53	0.666
304	212.00	0.00	0.00	38.70	171.65	0.26	21.09	0.810
301	212.00	0.00	0.00	58.03	152.83	0.81	70.82	0.721
302	212.00	0.00	0.00	59.35	151.46	2.95	254.11	0.714

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.03	0.36	202.03	0 10:15
J2	JUNCTION	0.03	0.41	201.18	0 10:15
J3	JUNCTION	0.06	1.00	199.96	0 10:01
J6	JUNCTION	0.03	0.35	199.15	0 10:18
J10	JUNCTION	0.04	0.33	198.93	0 09:22
J4	JUNCTION	0.01	0.22	200.72	0 09:39
J7	JUNCTION	0.03	0.40	200.24	0 10:16
J11	JUNCTION	0.00	0.00	198.30	0 09:22
J9	JUNCTION	0.02	0.23	201.90	0 10:15
J5	JUNCTION	0.01	0.20	200.20	0 10:17
J8	JUNCTION	0.02	0.22	199.12	0 10:15
J18	JUNCTION	0.26	1.49	199.33	0 11:27
J12	JUNCTION	0.14	1.33	199.13	0 11:27
J13	JUNCTION	0.10	1.10	198.84	0 11:27
J14	JUNCTION	0.10	1.07	198.84	0 11:27
J15	JUNCTION	0.00	0.14	199.09	0 11:28
J20	JUNCTION	0.05	0.63	200.63	0 10:17
J22	JUNCTION	0.00	0.00	198.50	0 10:17
J19	JUNCTION	0.14	1.20	198.81	0 11:14
J21	JUNCTION	0.08	0.46	197.91	0 11:15

J16	JUNCTION	0.03	0.04	198.36	0	13:31
J23	JUNCTION	0.08	0.53	198.07	0	11:15
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.05	0.37	197.72	0	11:15
SWM_Pond	STORAGE	0.25	1.49	199.34	0	11:27

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	331.07	331.07	0	10:15	3.634	3.634
J2	JUNCTION	335.67	445.20	0	10:15	3.724	4.926
J3	JUNCTION	0.00	871.61	0	10:15	0.000	9.779
J6	JUNCTION	254.11	323.17	0	10:15	2.953	3.765
J10	JUNCTION	33.52	127.73	0	10:15	0.367	1.709
J4	JUNCTION	70.82	70.82	0	10:15	0.810	0.810
J7	JUNCTION	107.75	436.50	0	10:15	1.192	4.831
J11	JUNCTION	0.00	178.05	0	09:22	0.000	1.709
J9	JUNCTION	110.08	110.08	0	10:15	1.201	1.201
J5	JUNCTION	0.00	71.42	0	09:54	0.000	0.812
J8	JUNCTION	94.22	94.22	0	10:15	1.341	1.341
J18	JUNCTION	0.00	6.21	0	05:50	0.000	1.042
J12	JUNCTION	0.00	512.00	0	12:44	0.000	12.875
J13	JUNCTION	21.09	821.61	0	11:35	0.257	15.032
J14	JUNCTION	0.00	815.74	0	11:36	0.000	14.775
J15	JUNCTION	0.00	423.91	0	11:27	0.000	1.900
J20	JUNCTION	236.15	236.15	0	10:15	2.557	2.557
J22	JUNCTION	0.00	214.68	0	10:17	0.000	2.557
J19	JUNCTION	0.00	1048.49	0	11:22	0.000	18.824
J21	JUNCTION	55.53	1064.04	0	11:15	0.621	19.393
J16	JUNCTION	0.00	739.54	0	10:01	0.000	9.576
J23	JUNCTION	0.00	1022.22	0	11:14	0.000	18.771
Out1	OUTFALL	200.84	200.84	0	10:15	2.321	2.321
Out2	OUTFALL	0.00	1063.89	0	11:15	0.000	19.392
SWM_Pond	STORAGE	79.18	1159.42	0	10:15	1.080	14.923

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J3	JUNCTION	1.49	0.250	0.000
J18	JUNCTION	41.45	1.344	0.166
J12	JUNCTION	3.16	0.428	0.072
J13	JUNCTION	1.95	0.346	0.104
J14	JUNCTION	1.72	0.323	0.127
J19	JUNCTION	2.65	0.450	0.000

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J3	0.53	132.07	0 10:15	0.175	1.00
J19	0.27	26.27	0 11:22	0.017	1.20

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.805	13	0	5.630	88	0 11:27	815.31

****
Outfall Loading Summary
****

	Flow Freq.	Avg. Flow	Max. Flow	Total Volume

Outfall Node	Pcnt.	LPS	LPS	10^6 ltr
Out1	15.30	58.42	200.84	2.321
Out2	97.99	76.23	1063.89	19.392
System	56.65	134.66	1215.10	21.713

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.17	0	09:22			
C3	CONDUIT	69.29	0	10:17	0.20	0.13	0.54
C4	CONDUIT	328.84	0	10:15	0.53	0.16	0.51
C5	CONDUIT	431.51	0	10:16	0.39	0.21	0.77
C7	CONDUIT	94.22	0	10:15	0.37	0.15	0.53
C10	CONDUIT	109.55	0	10:15	0.25	0.05	0.42
C6	CONDUIT	309.81	0	10:18	0.28	0.18	0.73
C8	CONDUIT	178.05	0	09:22	1.42	0.27	0.33
C1	CONDUIT	440.32	0	10:15	0.44	0.22	0.77
C15	CONDUIT	739.54	0	10:01	4.41	0.72	0.52
C2	CONDUIT	71.42	0	09:54	0.34	0.13	0.39
C12	CONDUIT	512.23	0	12:44	2.32	4.04	1.00
C13	CONDUIT	423.90	0	11:28	0.40	0.08	0.63
C14	CONDUIT	815.86	0	11:36	0.41	0.47	1.00
C17	CONDUIT	821.72	0	11:35	0.37	0.45	1.00
P1	CONDUIT	6.21	0	05:50	0.35	1.00	1.00
C18	CONDUIT	214.68	0	10:17	0.47	0.15	0.42
C21	DUMMY	214.68	0	10:17			
C19	CONDUIT	1022.22	0	11:14	2.55	1.41	0.85
C20	CONDUIT	1063.89	0	11:15	1.28	0.37	0.55
C16	DUMMY	739.54	0	10:01			
C22	CONDUIT	1022.26	0	11:20	0.94	0.49	0.66
C11	ORIFICE	6.21	0	05:50			1.00
2	ORIFICE	506.28	0	12:44			
3	WEIR	423.91	0	11:27			0.96

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.01	0.17	0.00	0.82	0.00	0.00	0.00	0.08	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
C7	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.49	0.00	0.50	0.00	0.00	0.00	0.03	0.0000
C6	1.00	0.01	0.05	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.95	0.04	0.00	0.00	0.15	0.0000
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.15	0.0000
C15	1.00	0.01	0.16	0.00	0.66	0.17	0.00	0.00	0.43	0.0001
C2	1.00	0.05	0.43	0.00	0.51	0.00	0.00	0.00	0.04	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.47	0.0001
C13	1.00	0.01	0.93	0.00	0.06	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.12	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.14	0.0000
C19	1.00	0.01	0.00	0.00	0.98	0.01	0.00	0.00	0.70	0.0001
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.47	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.30	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C15	0.01	0.01	0.01	1.92	0.01
C12	7.64	7.64	7.64	10.03	7.64
C14	1.72	1.72	1.72	0.01	0.01
C17	1.95	1.95	1.95	0.01	0.01
P1	39.99	39.99	39.99	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C19	0.01	0.01	0.01	2.05	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:39:24 2013
Analysis ended on: Thu Jul 11 15:39:32 2013

Total elapsed time: 00:00:08

APPENDIX E

SUPPORTING DESIGN CALCULATIONS

APPENDIX E1

FOREBAY DESIGN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Brooks Road Landfill Proposed SWM Pond

Design forebay For The Outlet From Outlet

Forebay Length (L)

$$L = \sqrt{\frac{r\ Q}{Vs}}$$

L = 29 m

Length to width ratio (r) =	1	:1
25mm Storm Peak flowrate (Q) =	0.258	m^3/s
Particle size settling velocity (V_s) =	0.0003	m/s

Dispersion Length (D)

$$D = \frac{8\ Q}{d\ V\ f}$$

D = 11 m

Permanent Pool Depth (d) =	0.65	m
Desired Velocity in the Forebay (V_f) =	0.5	m/s
10 year Storm Peak flow rate (Q) =	0.429	m^3/s

Minimum Forebay Bottom Width (W)

$$W = \frac{L}{8}$$

W = 4 m

Velocity Within Forebay (V)

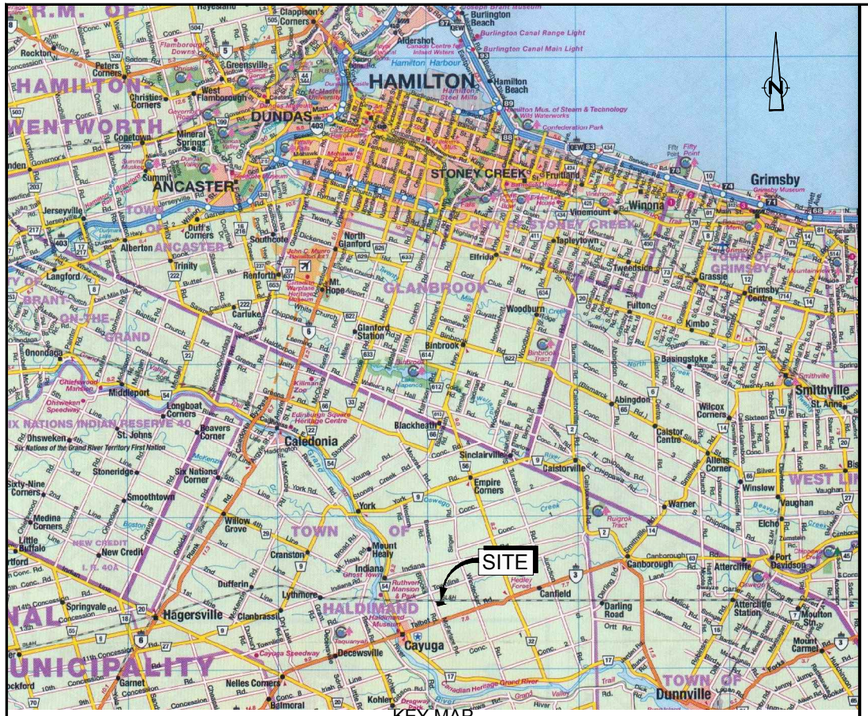
$$V = \frac{Q}{A}$$

V = 0.056 m/s

Actual Upstream Width	4	m
Actual Downstream Width	15	m
Permanent Pool Depth =	0.65	m
Channel Side Slopes =	4	:1
Cross Sectional Area (A) =	8	m^2

Notes: 1. Design Equations are from the "*Stormwater Management Planning and Design Manual*" (MOE, 2003)

DRAWINGS



KEY MAP

BROOKS ROAD LANDFILL SITE

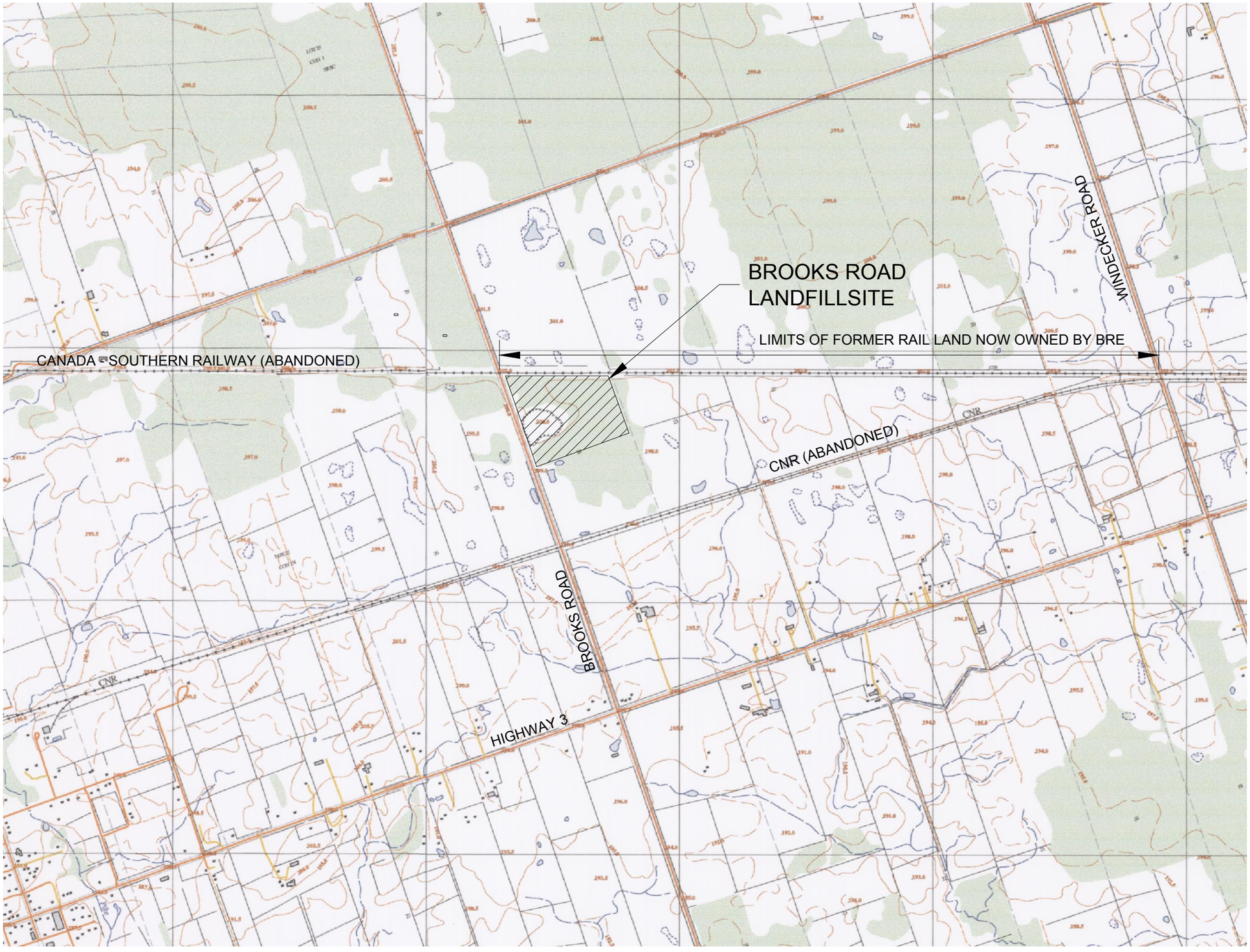
BROOKS ROAD ENVIRONMENTAL C/O 2270386 ONTARIO LIMITED

DESIGN AND OPERATIONS PLANS

DRAWING INDEX

DWG. Nº	REV. Nº	DATE	TITLE
1	1	SEPTEMBER 2013	SURROUNDING PROPERTY PLAN
2	1	SEPTEMBER 2013	EXISTING CONDITIONS
3	0	SEPTEMBER 2013	INTERIM STORMWATER MANAGEMENT SITE DRAINAGE PLAN
4	0	SEPTEMBER 2013	INTERIM STORMWATER MANAGEMENT SITE DRAINAGE PLAN DETAILS
5	2	SEPTEMBER 2013	APPROVED FINAL CONTOURS
6	1	NOVEMBER 2003	BASE CONTOURS FOR WASTE DISPOSAL
7	1	NOVEMBER 2003	TOP OF WASTE CONTOURS
8	2	SEPTEMBER 2013	TYPICAL SECTIONS
9	2	SEPTEMBER 2013	SITE SEQUENCING AND MONITORING PLAN
10	1	NOVEMBER 2003	LEACHATE COLLECTION SYSTEM
11	1	NOVEMBER 2003	LEACHATE COLLECTION SYSTEM DETAILS
12	2	SEPTEMBER 2013	STORMWATER DRAINAGE PLAN DETAILS 1 OF 2
13	0	SEPTEMBER 2013	STORMWATER DRAINAGE PLAN DETAILS 2 OF 2
14	0	OCTOBER 2002	SITE LAYOUT FOR DECOMMISSIONING ACTIVITIES

CONESTOGA-ROVERS & ASSOCIATES



No	Revision	Date	Initial

0 100 200 300m

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

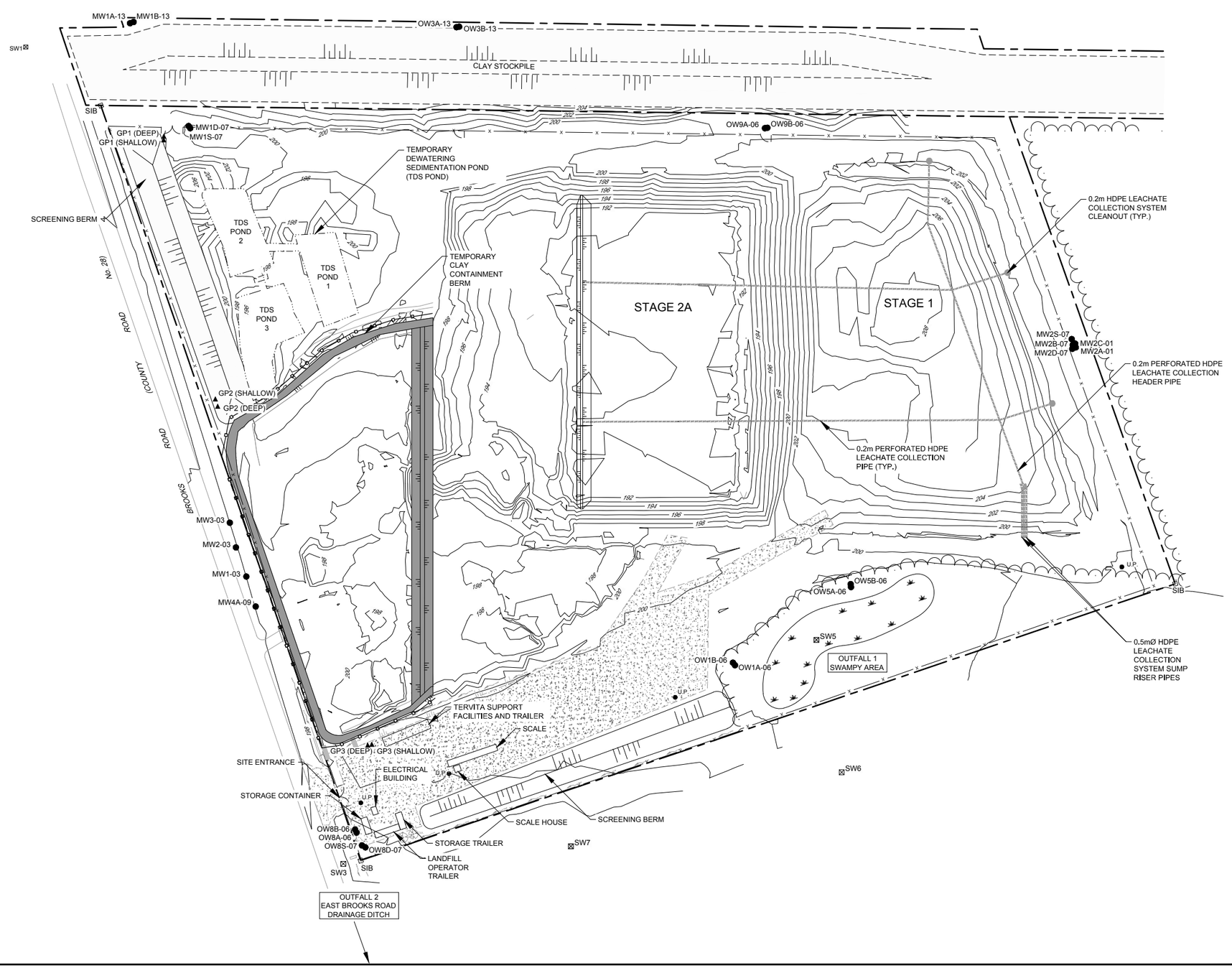
SURROUNDING PROPERTY PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
MINISTRY OF NATURAL RESOURCES, AIR PHOTOGRAPHY 1983
MAP No. 10 17 5900 47550 & 10 17 5950 47550

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P.KEMP	SEPTEMBER 2013	
Scale: 1:10,000	Project No: 18235-00	Report No: 007	Drawing No: 1

18235-00(007)GN-WA007 SEP 10/2013



Nº	Revision	Date	Initial

0 10 20 30m

LEGEND:

- PROPERTY LINE
- FENCELINE
- EDGE OF PONDED WATER
- TREELINE
- GROUND CONTOUR AT 0.5m INTERVAL
- GROUND CONTOUR AT 1.0m INTERVAL
- SWAMPY AREA
- OW1B-06 OBSERVATION WELL
- MW2A-01 MONITORING WELL
- SW6 SURFACE WATER MONITORING
- SILT FENCE
- GP3 GAS PROBE
- CLAY STOCKPILE AREA
- TEMPORARY CLAY CONTAINMENT BERM

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

EXISTING CONDITIONS

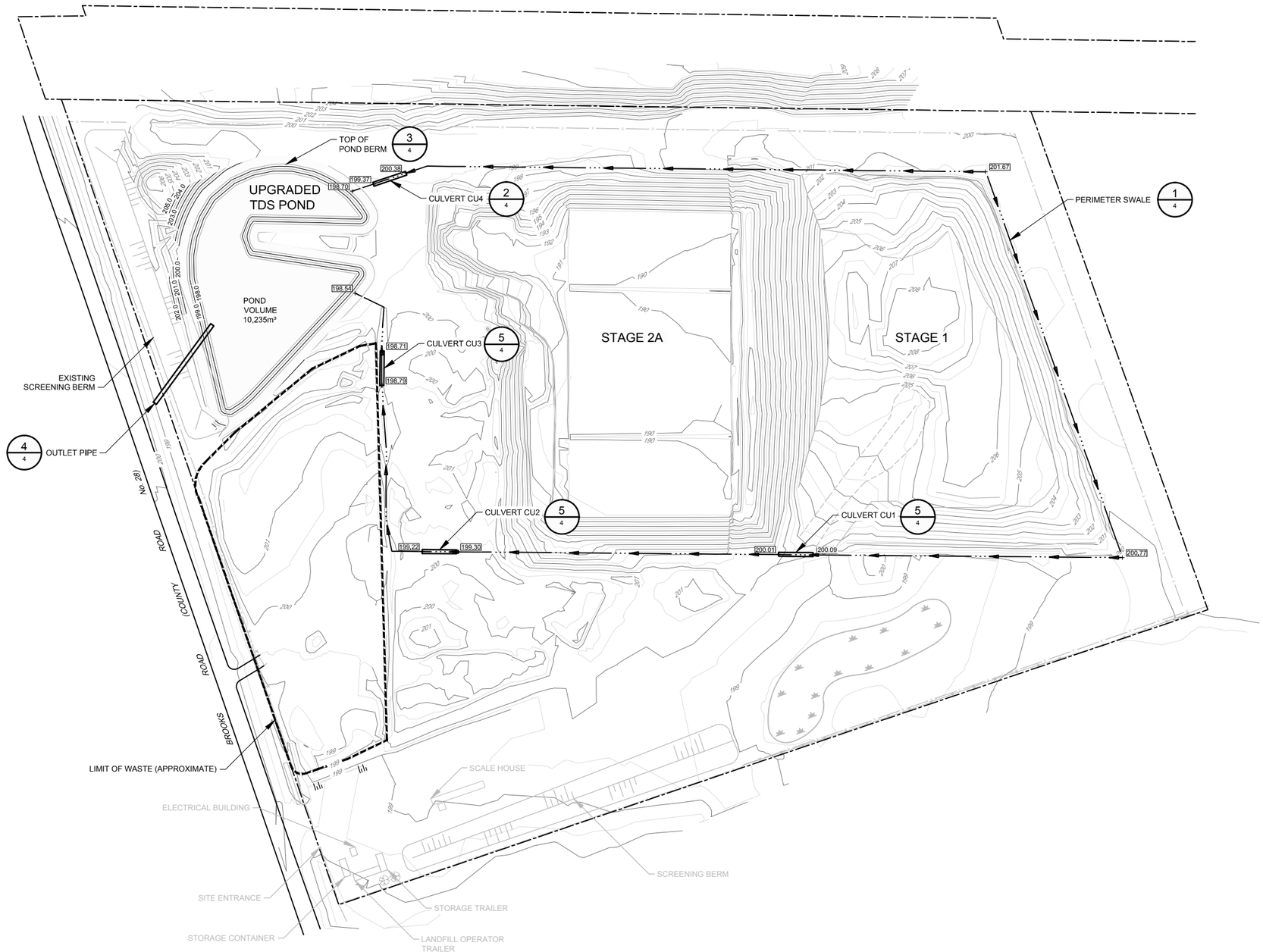
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P.KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 2

18235-00(007)GN-WA008 SEP 10/2013



Nº	Revision	Date	Initial

N

0 10 20 30m

LEGEND

- DRAINAGE SWALE
- PROPOSED CULVERT
- POND CONTOUR - 0.5m INTERVAL
- 200.0 POND CONTOUR - 1.0m INTERVAL
- PROPERTY LINE
- LIMIT OF WASTE (APPROXIMATE)
- EXISTING POST AND WIRE FENCE
- GROUND CONTOUR - 0.5m INTERVAL
- 200.0 GROUND CONTOUR - 1.0m INTERVAL
- CHAINLINK FENCE
- GRAVEL ROADWAY
- CULVERT
- LOW AREA

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH UPDATED ISWMP APPLICATION	JAN 2013	PK

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

INTERIM STORMWATER MANAGEMENT SITE DRAINAGE PLAN

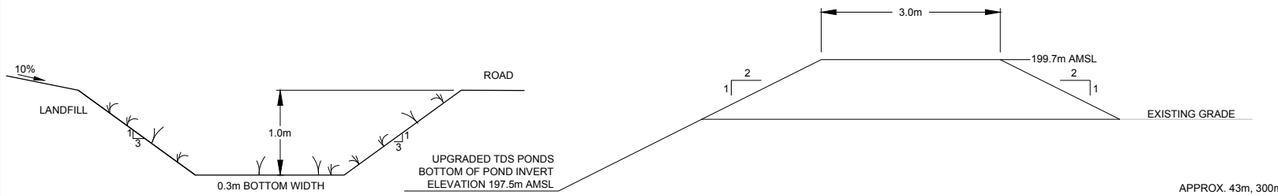
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

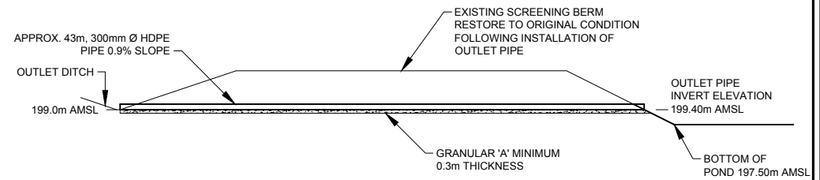
Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 3

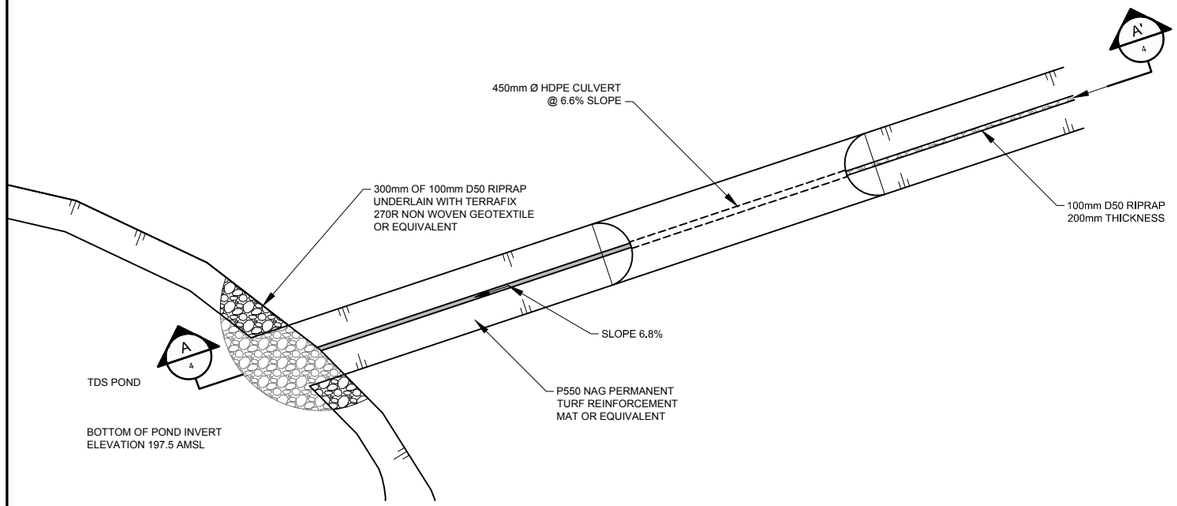
18235-00(007)GN-WA025 SEP 6/2013



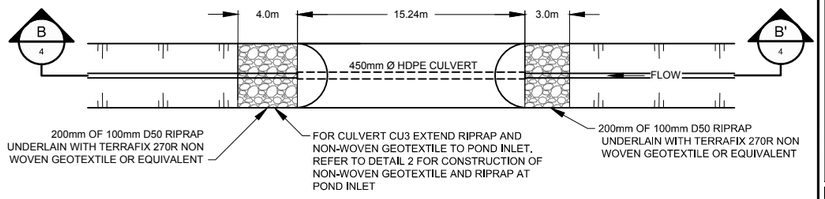
DETAIL 1/3 TYPICAL PERIMETER SWALE SECTION
NTS

DETAIL 3/3 TOP OF POND BERM
NTS

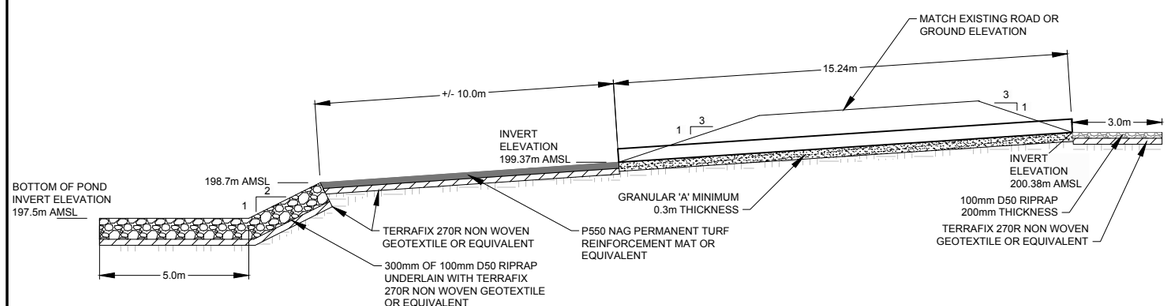




DETAIL 4/3 OUTLET PIPE
NTS

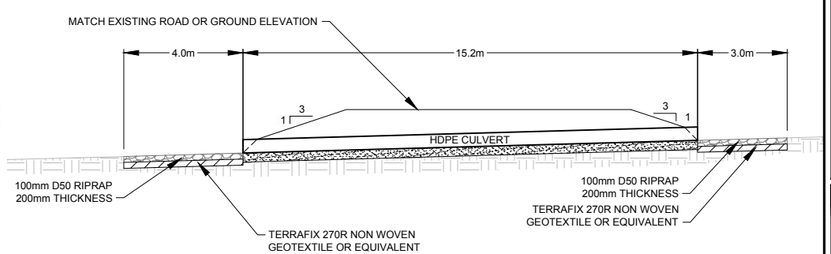


DETAIL 2/3 CULVERT 4 AND POND INLET
NTS



SECTION A-A' CULVERT 4 AND POND INLET

DETAIL 5/3 CULVERTS CU1, CU2, & CU3
NTS



SECTION B-B' CULVERTS CU1, CU2, & CU3

NO	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH UPDATED ISWMP APPLICATION	JAN 2013	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

INTERIM STORMWATER MANAGEMENT
SITE DRAINAGE PLAN DETAILS

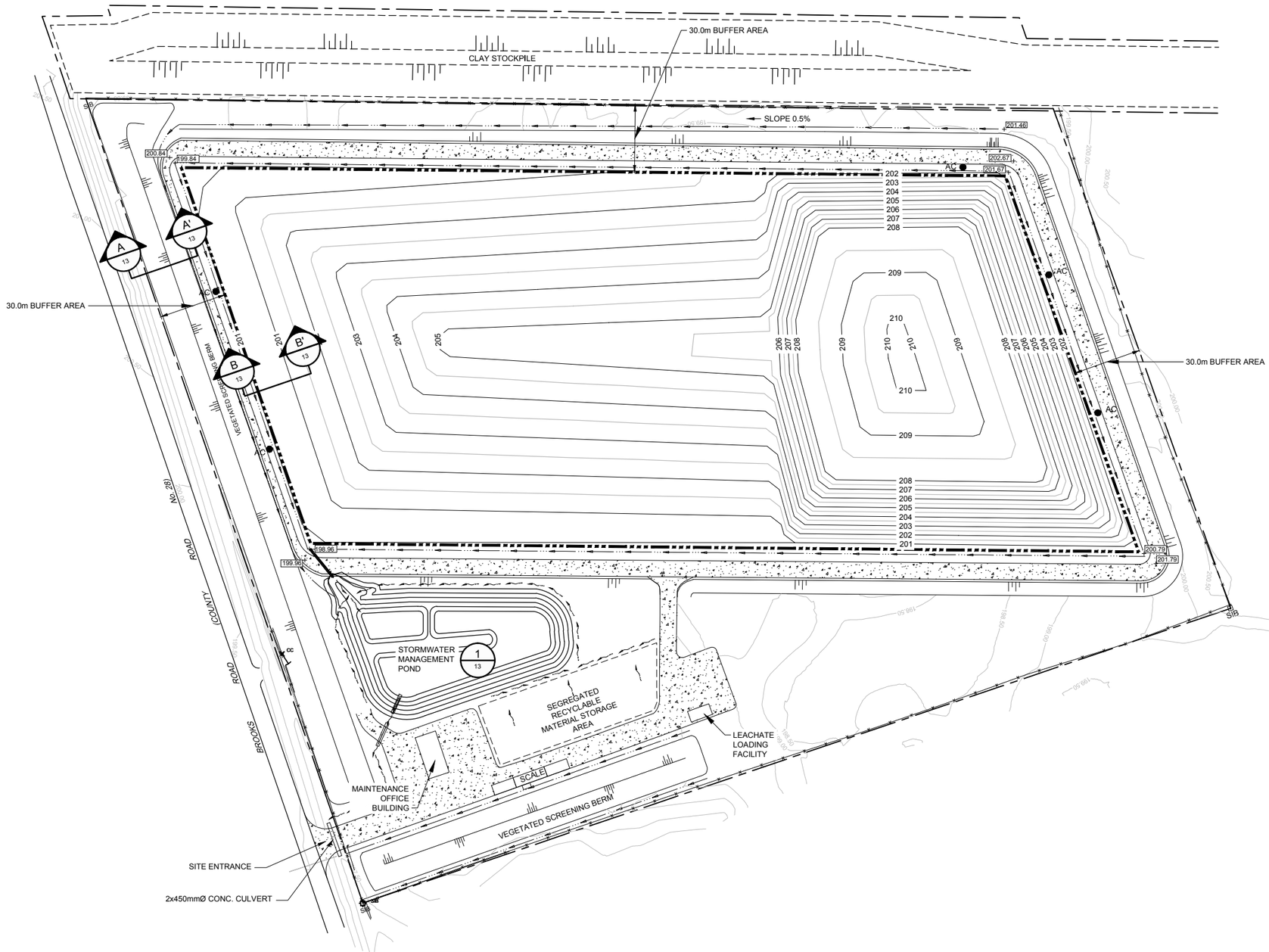
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project No: 18235-00	Report No: 007	Drawing No: 4

18235-00(007)GN-WA027 SEP 6/2013



NO.	Revision	Date	Initial
1	MATERIAL STORAGE AREA DRAINAGE ADDED	SEP 2003	DCC

0 10 20 30m

LEGEND

- PROPERTY LINE
- LANDFILL AREA FOOTPRINT
- EXISTING FENCELINE
- EXISTING GROUND CONTOUR AT 0.5m INTERVAL
- EXISTING GROUND CONTOUR AT 1.0m INTERVAL
- GRANULAR SURFACE ACCESS ROAD
- DRAINAGE SWALE
- TOP OF FINAL COVER CONTOUR (m AMSL)
- SPOT ELEVATION (m AMSL)
- ACCESS CHAMBER
- CLAY STOCKPILE AREA

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

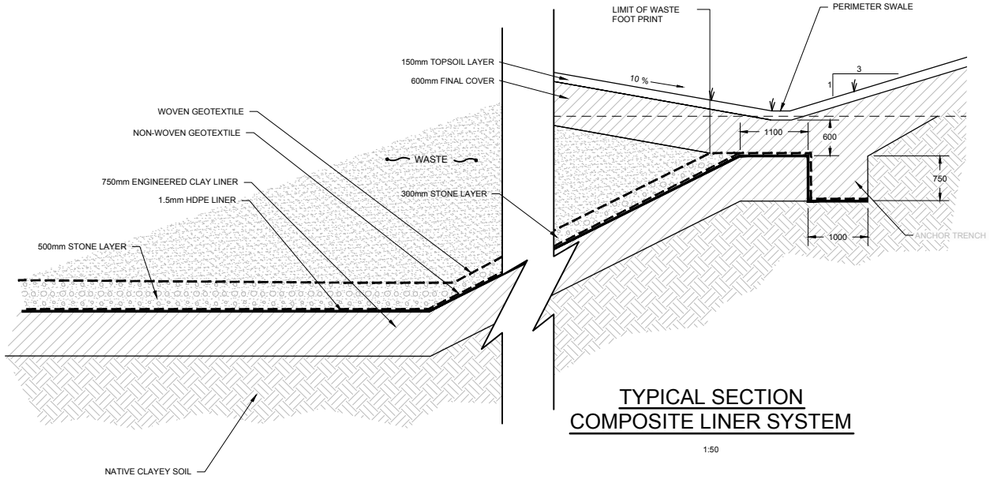
APPROVED FINAL CONTOURS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project No.: 18235-00	Report No.: 007	Drawing No.: 5

18235-00(007)GN-WA009 SEP 6/2013



TYPICAL SECTION
COMPOSITE LINER SYSTEM

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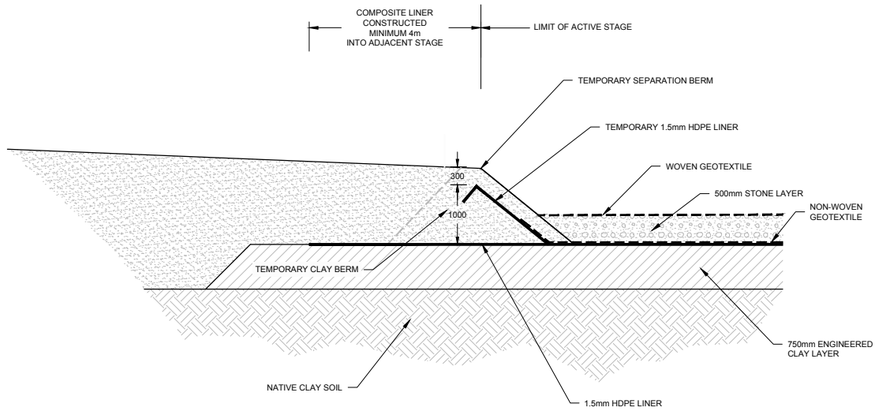
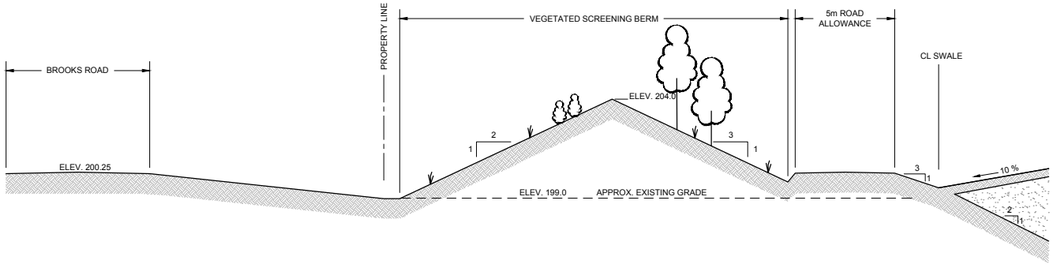


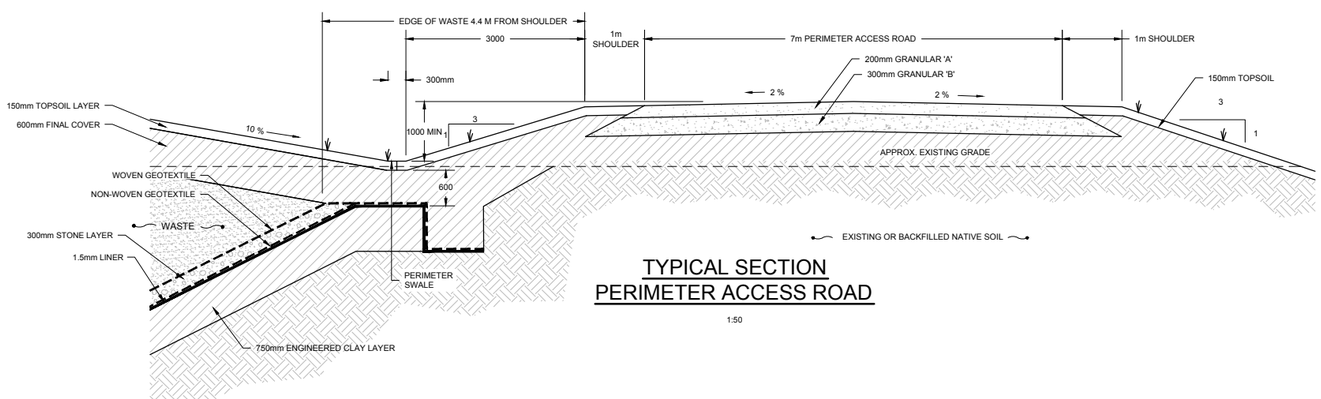
TYPICAL SECTION
TEMPORARY SEPARATION BERM
AT LIMIT OF ACTIVE STAGE

NTS



TYPICAL SECTION
BERM ALONG BROOKS ROAD

1:150



TYPICAL SECTION
PERIMETER ACCESS ROAD

1:50

Nº	Revision	Date	Initial
1	TEMPORARY SEPARATION BERM SECTION ADDED	SEP 2003	DCC

NOTE:

1. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

TYPICAL SECTIONS

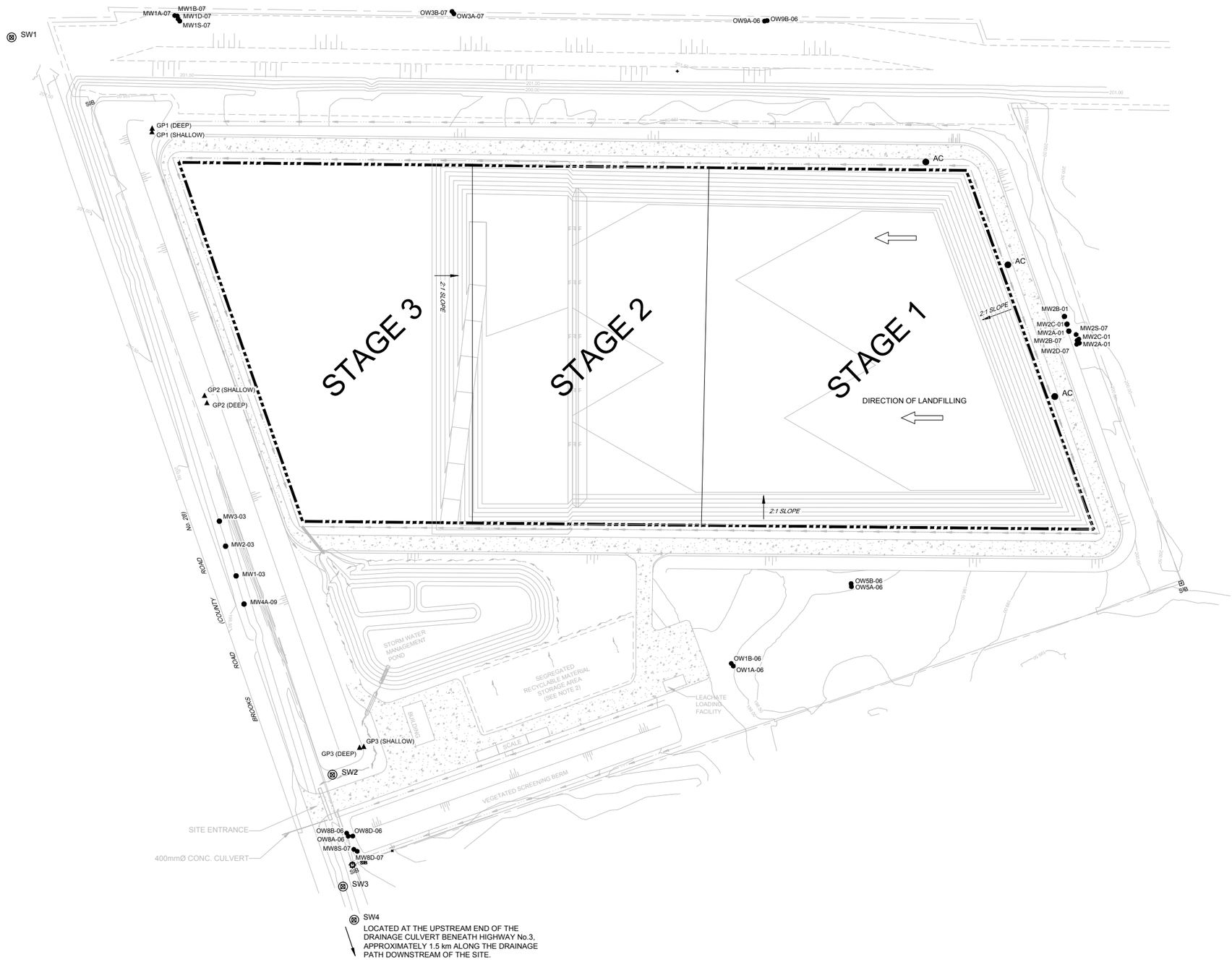
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 8

18235-00(007)GN-WA014 SEP 6/2013



Nº	Revision	Date	Initial
1	STAGE 1 CONSTRUCTION DETAILS ADDED	SEP 2003	DCC
	GAS PROBE LOCATIONS ADDED		
	MATERIAL STORAGE AREA DRAINAGE ADDED		

N

0 10 20 30m

LEGEND

- PROPERTY LINE
- PROPOSED LANDFILL AREA FOOTPRINT
- EXISTING FENCELINE
- EXISTING TREELINE
- EXISTING GROUND CONTOUR AT 0.25m INTERVAL
- EXISTING GROUND CONTOUR AT 1.0m INTERVAL
- EXISTING SWAMPY AREA
- ACCESS ROAD
- OW6B-92 EXISTING OBSERVATION WELL
- MW2-01 GROUNDWATER MONITORING WELL LOCATION
- SW1 SURFACE WATER MONITORING LOCATION
- GP1 GAS PROBE LOCATION
- AC ACCESS CHAMBER

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

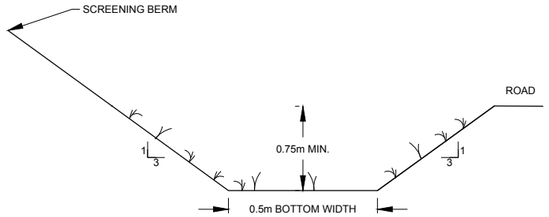
SITE SEQUENCING AND MONITORING PLAN

CONESTOGA-ROVERS & ASSOCIATES

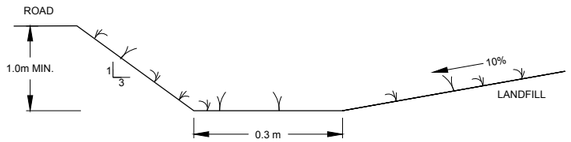
Source Reference:
FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P.KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 9

18235-00(007)GN-WA012 SEP 6/2013



SECTION A-A' (6) TYPICAL GRASS LINED SWALE SECTION
NTS



SECTION B-B' (6) TYPICAL PERIMETER SWALE SECTION
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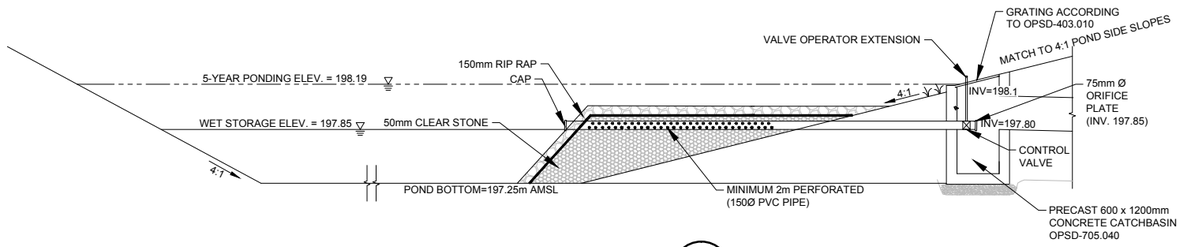
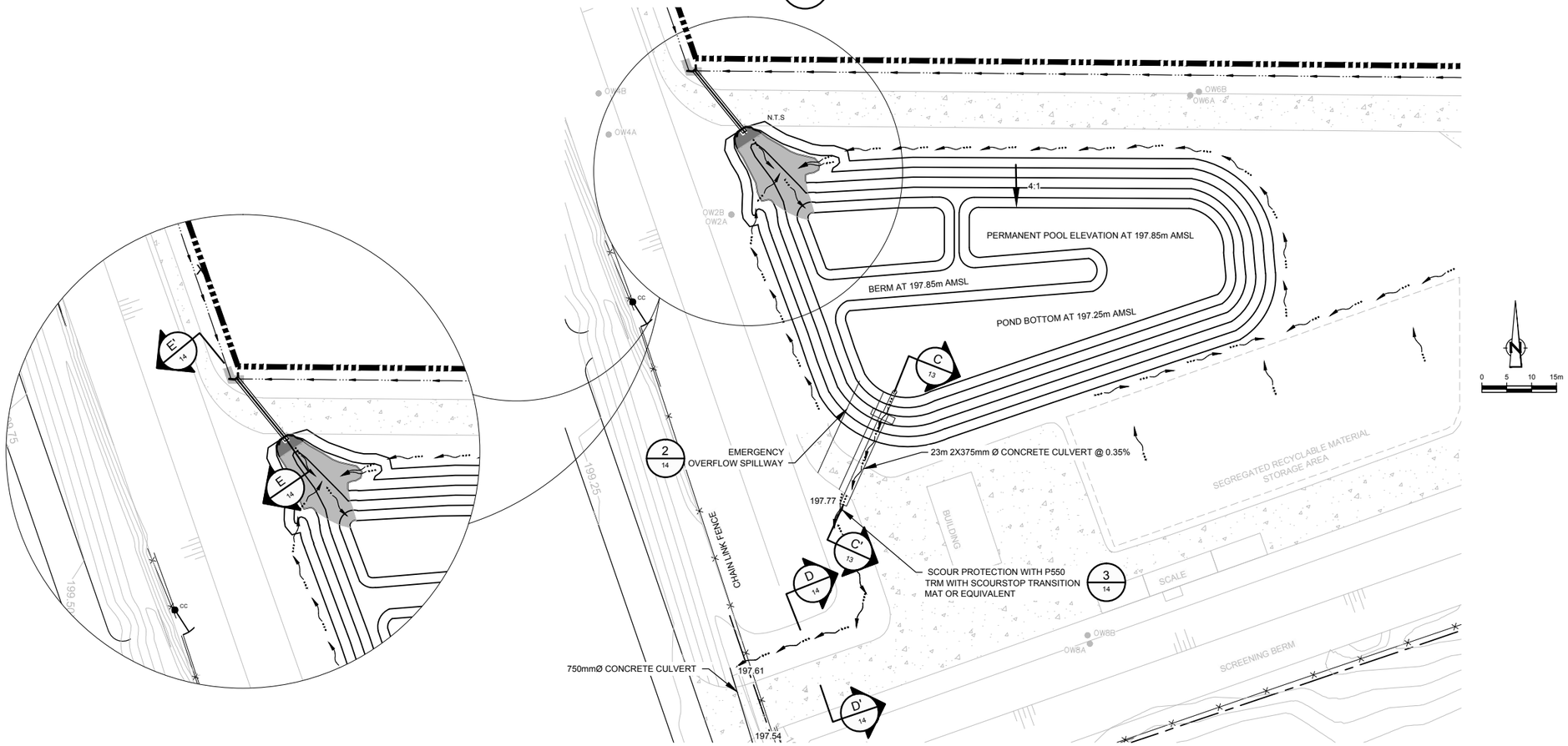


SECTION C-C' (13)
NTS



DETAIL 1 (5) STORM WATER MANAGEMENT POND
1:500

No	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

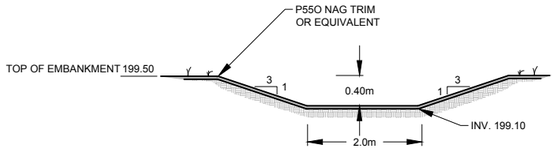
DESIGN AND OPERATIONS REPORT

STORMWATER DRAINAGE PLAN DETAILS 1 OF 2

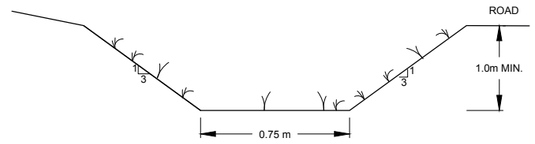
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

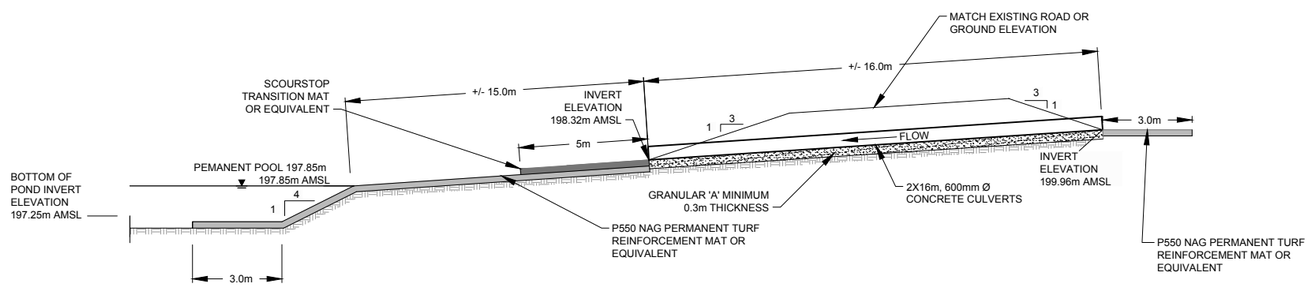
Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: AS SHOWN	Project No: 18235-00	Report No: 007	Drawing No: 12



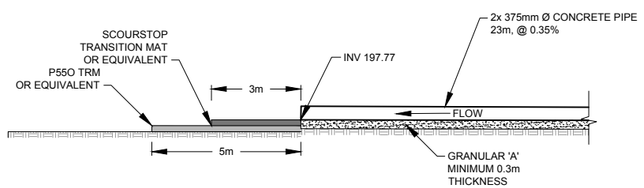
DETAIL 2 EMERGENCY OVERFLOW SPILLWAY
NTS 13



SECTION D-D' GRASSED LINED SWALE SECTION
NTS 13



SECTION E-E' CULVERT AND POND INLET
NTS 13



DETAIL 3
NTS 13

Nº	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

STORMWATER DRAINAGE PLAN DETAILS 2 OF 2

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: AS SHOWN	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 13

Appendix C

Stormwater Resources Assessment

Brooks Road Environmental

Surface Water Resources Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment

Brooks Road Landfill Site
160 Brooks Road
Haldimand County, Ontario

JULY 2016
REF. NO. 018235 (67)

Table of Contents

List of Figures

List of Tables

List of Drawings
(Following Text)

List of Appendices

Section 1.0 Introduction

In July 2015 the Minister of the Environment and Climate Change approved the Terms of Reference (ToR) for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment (EA). This report provides an overview of the alternative conceptual vertical capacity expansion designs (i.e., 'Alternative Methods') for the Brooks Road Landfill Site Vertical Capacity Expansion EA (**Section 2.0**) and documents the following with respect to the Surface Water Resources discipline:

- Describes the Surface Water Resources Existing Conditions associated with the EA Study Areas (**Section 3.0**)
- Details the mitigation measures to be incorporated into the Alternative Method designs in order to prevent or minimize effects on Surface Water Resources (**Section 4.0**)
- Documents the net effects analysis for each Alternative Method with respect to Surface Water Resources (**Section 5.0**)
- Identifies the Preferred Alternative Method from a Surface Water Resources perspective through a comparative evaluation process (**Section 6.0**)

Section 2.0 Alternative Methods for Vertical Expansion

Three vertical expansion alternatives have been developed for comparative analysis. The alternatives were identified in consideration of the criteria and assumptions outlined in the Conceptual Design Report (CDR) and based on public input received during the ToR.

The following aspects will be identical across all three vertical expansion alternatives, including:

- An expansion capacity of 421,000 m^3, including waste, daily cover, and interim cover
- The limit of waste (i.e., landfill footprint)
- Traffic associated with importing waste, daily cover, and interim cover
- The location of the site entrance, scalehouse, and other ancillary supporting features
- The size and location of all buffer areas
- The final cover design (0.6 m of compacted fine-grained soil overlain by a 0.15 m thick vegetative layer)
- The leachate treatment (i.e., batch leachate treatment system)

The three vertical expansion alternatives are illustrated on **Drawings C-02** through **C-07** (following text) and their unique attributes are outlined in **Table 2.1**, below. Further information on the vertical expansion alternatives is found in the CDR.

Table 2.1 Comparison of Vertical Expansion Options			
Attribute	**Alternative 1**	**Alternative 2**	**Alternative 3**
General Description	Expansion capacity with 3H to 1V (33%) side slopes to a crest height of 218.075 m	Expansion capacity with 4H to 1V (25%) side slopes to a crest height of 221.0 m	Expansion capacity with 3H to 1V (33%) side slopes to a crest height of 221.25 m and bench at approx. 210.0 m
Approximate Elevation of Top of Landfill (including final cover)	219.65 m	221.50 m	222.13 m
Approximate Height of Landfill Above Existing Grade of 198.96	20.69 m	22.54 m	23.17 m
Post-Closure Leachate Generation Rate	36 m^3/day	36 m^3/day	36 m^3/day
Number of Vehicles Per Day Associated with Waste and Construction Materials	16	16	16

Section 3.0 Surface Water Resources Environment Potentially Affected

The July 2015 Minister-approved ToR includes a preliminary description of the existing environmental conditions within the Study Areas and commits to providing an expanded description of the existing environmental conditions within the Study Areas in the EA. The following section provides a more detailed description and understanding of the Surface Water Resources Existing Conditions within the Study Areas for use in the assessment and evaluation of Alternative Methods.

3.1 Study Areas

The following two generic study areas were established for preparation of the EA:

- **Site Study Area**, including all lands (i.e., 14.3 hectares (ha)) within the existing, approved boundaries of the Brooks Road Landfill Site (Site), as defined by Environmental Compliance Approval (ECA) No. A110302, dated July 21, 2014, as amended
- **Local Study Area**, including all lands and waters within a 1 kilometre (km) radius of the Site Study Area boundaries including agricultural, residential, and municipal properties

As provided for in the approved ToR, each technical discipline may modify the Local Study Area, as required, during the EA. For Surface Water Resources both the Site and Local Study Areas are applicable (see **Figure 3.1**).

Source: MNRF NRVIS, 2014. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016;
Aerial: 2006 Grand River Conservation Authority
Coordinate System: NAD 1983 UTM Zone 17N

figure 3.1

STUDY AREAS
SURFACE WATER RESOURCES ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

Legend

Site Study Area

Local Study Area (1km Radius)

018235-20(INT004)GIS-WA001 Jul 08/2016

3.2 Methodology

Information on the Surface Water Resources Existing Conditions within the Study Areas was gathered from a combination of primary and secondary source research as well as field investigations.

3.2.1 Available Secondary Source Information Collection and Review

The following information was reviewed:

- 2015 Operations & Monitoring Report, Brooks Road Landfill, prepared by Conestoga-Rovers & Associates Ltd. , dated April 2016.
- Scoped Environmental Impact Study, Former Railway Corridor Lands, North of Brooks Road Landfill, Haldimand County, ON, dated December 2013.
- Stormwater Management Plan, prepared by Conestoga-Rovers & Associates Ltd., dated September 2013.
- Amended Environmental Compliance Approval Number 6869-9EAT28, for establishment of a stormwater management facility and a leachate collection, treatment, and disposal system, and issued by the Ministry of the Environment, dated November 12, 2014.
- Application for Amendment to Environmental Compliance Approval for Stormwater Management Plan, prepared by Conestoga-Rovers & Associates Ltd., dated September 11, 2013.
- Stage 3B and Final Stormwater Pond Construction Drawings, prepared by Conestoga-Rovers & Associates Ltd., dated May 2014.
- Amphibian monitoring, Edwards Landfill Monitoring Report, prepared by Natural Resource Solutions Inc., dated May 22, 2007.
- Application for Approval of Industrial Sewage Works – Ontario Water Resources Act, Surface Water Management Plan, prepared by Conestoga-Rovers & Associates, dated February 9, 2004.
- Natural Heritage Features Assessment, prepared by Natural Resource Solutions Inc., dated December 2004.
- Monitoring Program Review and Comments, issued by the Ministry of Natural Resources, in a letter dated May 28, 2007.
- Preliminary Surface Water Assessment, Edwards Landfill Site, prepared by Conestoga-Rovers & Associates, dated November 2001.

3.2.2 Field Investigations

Regular surface water field investigations are completed four times annually. During the 2015 monitoring period, field investigations were conducted on March 19, 2015, May 23, 2015, August 4, 2015, and November 12, 2015.

The field investigations include monitoring of surface water quality and quantity, through water sampling and flow rate measurements. Additionally, any characteristic changes to drainage patterns, run-off, or features influencing site conditions are also identified.

3.3 Existing Surface Water Resources Conditions

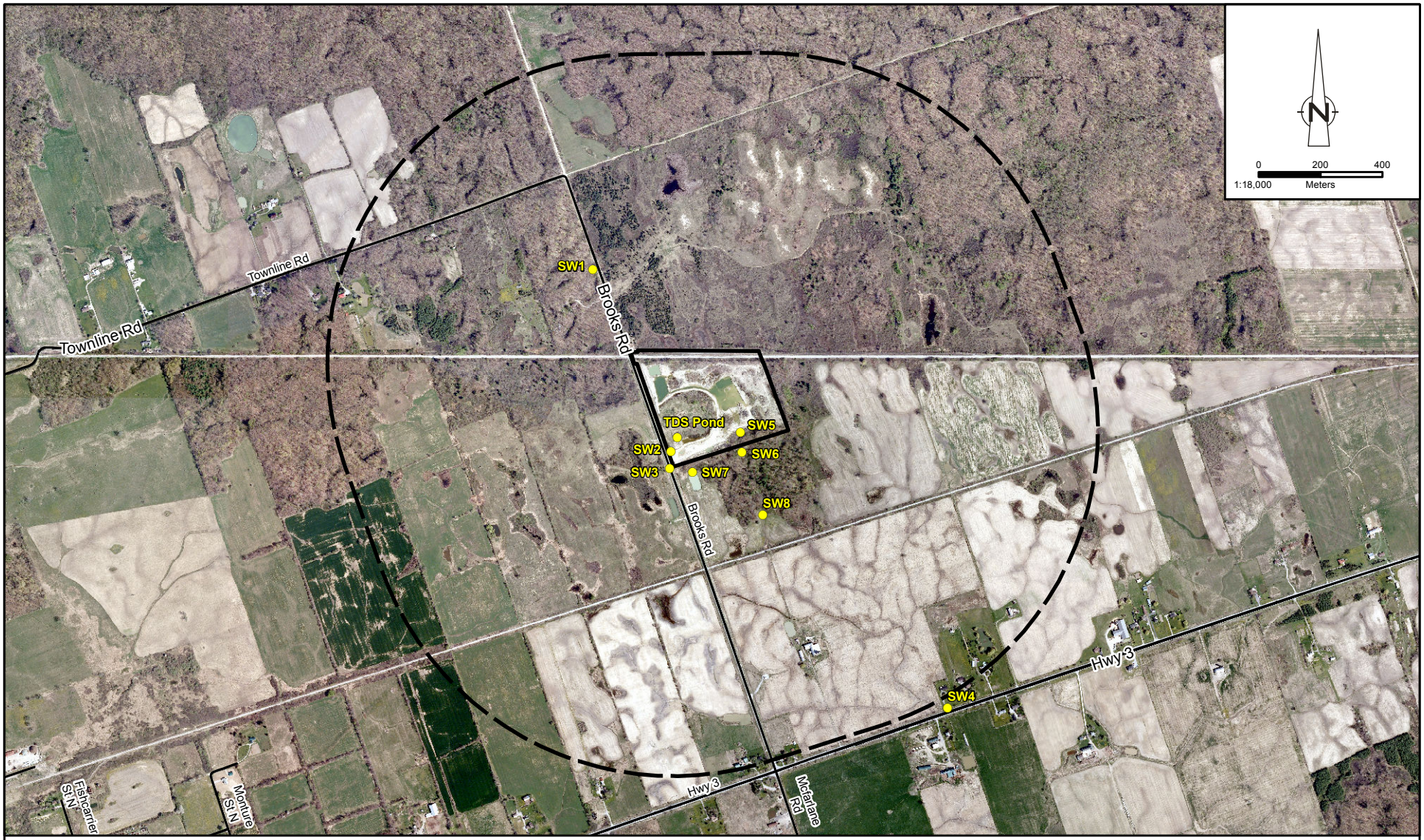
The on-Site drainage patterns have changed considerably since the documentation from early 2001 to 2007. Surface water management appears to be a key control at the Site. The Site stormwater management practices currently operate under amended ECA No. 6869-9EAT28, issued in November 2014. The Site drainage network is being configured to the Post Closure Condition, illustrated on Figure 2 of the 2013 Stormwater Management Plan (see **Appendix A**).

The Local Study Area includes slough forest, woodlot, agricultural, residential, and municipal properties. The on-Site topography is very flat with a slight 0.003 metre/metre (m/m) horizontal gradient to the south. The topography across the Local Study Area from north to south ranges from approximately 202 metre above mean seal level (m AMSL) to approximately 196 m AMSL.

As indicated in the 2013 Stormwater Management Plan, the stormwater management system for the Site was designed to provide water quality and water quantity control of surface water runoff. The design criteria is designed to attenuate peak flows up to the 100-year storm event. The drainage ditches were further sized, at a minimum, to accommodate the peak flow from a 3-hour duration, 25-year storm. The current design for the Site includes two outfalls (Outfall 1 and Outfall 2). Outfall 1 is characterized as an undeveloped area of land on the south-east corner of the Site where no work or changes are being proposed. Precipitation that falls in Outfall 1 will be absorbed by the biota and/or conveyed off-Site to the South. Outfall 2 combines the remainder of the Site area, including run-off from the landfill cap. Prior to discharge, Outfall 2 surface water will be collected in an extended detention wet stormwater management pond. The stormwater management pond has been designed with additional capacity for the proposed vertical expansion of the landfill. The discharge point for Outfall 2 is to the Brooks Road ditch near the south-west corner of the Site.

Although the Site is on the boundary of two watersheds and the conditions are primarily ephemeral, the surface water drainage pattern meanders through road-side ditches, farm land, and Norton's Creek to the Grand River, located approximately 7 km from the Site.

As shown on **Figure 3.2**, the surface water monitoring network is currently comprised of eight monitoring locations, and consists of two background monitoring locations, two on-Site monitoring locations, and four downstream monitoring locations.



Source: MNRF NRVIS, 2014. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016; Haldimand County Official Plan
Aerial: 2006 Grand River Conservation Authority
Coordinate System: NAD 1983 UTM Zone 17N

figure 3.2

SURFACE WATER MONITORING LOCATIONS
SURFACE WATER RESOURCES ASSESSMENT REPORT
BROOKS ROAD LANDFILL SITE
160 Brooks Road, Cayuga, Ontario

Legend

- Surface Water Monitoring Location
- Site Location
- Local Study Area (1km Radius)

018235-20(067)GIS-WA001 Apr 21/2016

The background monitoring locations are typically characterized by concentrations of phosphorus, aluminum, and iron that have consistently been reported above the Provincial Water Quality Objectives (PWQO). Other parameters that have been occasionally detected at concentrations elevated above their respective PWQO's include: phenolics, chromium, cobalt, copper, vanadium, zinc, toluene, and some PAH parameters.

Recent water quality results obtained from on-Site surface water monitoring locations are generally consistent with background surface water monitoring locations. One of the on-Site surface water monitoring locations (SW5) has historically reported elevated lead and PAH concentrations. The elevated lead and PAH concentrations were previously interpreted to be the result of an historic railway ballast stockpile located in the catchment area.

Surface water quality results for SW3, located immediately downstream of the Site within the Brooks Road ditch, have consistently been reported to contain elevated concentrations of some PAH parameters. The elevated PAH results at SW3 have previously been interpreted to have resulted from poor handling of railway ballast materials.

Downstream water quality is generally consistent with background water quality results and demonstrates an improvement from SW3.

Section 4.0 Mitigation Measures to be Incorporated into the Alternative Method Designs

Based on the description of the Alternative Methods provided in **Section 2.0** and the characterization of Surface Water Resources Existing Conditions within the Study Areas described in **Section 3.0**, **Table 4.1** presents the mitigation measures recommended to be incorporated into the Alternative Methods designs in order to avoid or minimize impacts on Surface Water Resources.

Table 4.1 Mitigation Measures to be Incorporated into the Design

	Recommended Design Mitigation Measure	***Resulting Net Effect***
Alternative Method 1	Extended detention wet stormwater management pond, as previously designed in the Stormwater Management Plan prepared by GHD (September 2013)	No net environmental effect
Alternative Method 2	Extended detention wet stormwater management pond, as previously designed in the Stormwater Management Plan prepared by GHD (September 2013)	No net environmental effect
Alternative Method 3	Extended detention wet stormwater management pond, as previously designed in the Stormwater Management Plan prepared by GHD (September 2013)	No net environmental effect

Section 5.0 Net Effects Assessment

This section documents the net effects assessment for the Alternative Methods for the Brooks Road Landfill Site Vertical Capacity Expansion EA from a Surface Water Resources perspective.

5.1 Net Effects Assessment Methodology

The assessment of the Alternative Methods was conducted in two steps:

- **Step 1: Confirm Evaluation Criteria and Indicators/Measures**
  Prior to undertaking the net effects assessment, the Surface Water Resources evaluation criteria, indicators, and measures developed in the Minister approved ToR were reviewed and confirmed for application to each of the Alternative Methods.
- **Step 2: Undertake the Net Effects Analysis**
  With the evaluation criteria, indicators and measures confirmed through the preceding step, a net effects analysis of the Alternative Methods was carried out consisting of the following activities:
  - Identify potential effects (based on measures) on the Surface Water Resources
  - Develop and apply avoidance/mitigation/compensation/enhancement measures
  - Determine net effects on the environment

5.2 General Assumptions

For the following analysis, the following assumptions have been made:

- The landfill cap will be vegetated and no pollutants of any kind (i.e., pesticides, herbicides, fertilizers) will be applied to the cap once it has been fully vegetated
- Only areas on the landfill cap are changing, no other area of the landfill will change slopes or have its drainage significantly re-configured in any way
- No surface water will ever come in contact with waste. Any surface water that infiltrates through the cap will be captured by the leachate collection system and treated
- There will be no leachate seeps or exchange of surface water and leachate

5.3 Criteria/Indicators

The evaluation criteria, indicators, rationale and data sources for the Surface Water Resources environmental component are shown below.

	Environmental Component	Evaluation Criteria	Study Area	Indicators	Rationale	Data Sources
NATURAL	Surface Water Resources	Surface water quality	Site & Local Study Areas	• Predicted effects on surface water quality on-site and off-site	Contaminants associated with waste disposal sites have the potential to seep or runoff into surface water.	• Topographic maps • Air photos • Facility layout, drainage maps and figures • Proposed on-site stormwater management concept designs for vertical expansion alternatives • Existing leachate management system • Annual monitoring reports • Interviews and discussions with staff, MOE, Conservation Authorities, and Environment Canada • Published water quality and flow information from MOE, Environment Canada and conservation authorities • Site reconnaissance • PWQMN
		Surface water quantity	Site & Local Study Areas	• Change in drainage areas • Predicted occurrence and degree of off-site effects	The construction of physical works may disrupt natural surface drainage patterns and may alter runoff and peak flows. The presence of the facility may also affect base flow to surface water.	

5.4 Potential Environmental Effects

5.4.1 Alternative Method 1

Potential effects on surface water quality are:

- Increased erosion/soil loss due to steeper slopes

Based on the Universal Soil Loss Equation (USLE), an increased slope would lead to increased soil loss due to erosion. The increase is soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of Total Suspended Solids (TSS) and TSS related pollutants (e.g. metals entrained in the soil).

Potential effects on surface water quantity are:

- Increased runoff peak flows due to a steeper slope
- Increased runoff volumes due to a steeper slope

Based on hydrologic modelling completed in the Stormwater Management Plan report for Alternative Method 2 there is no significant increase in runoff peak flow rates or volumes with steeper landfill slopes. Although the modeling was performed based on the design for Alternative Method 2, it is expected that the results for the steeper slopes of Alternative Method 1 would be similar.

5.4.2 Alternative Method 2

Potential effects on surface water quality are:

- Increased erosion/soil loss due to steeper slopes

Based on the USLE, an increased slope would lead to increased soil loss due to erosion. The increase is soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of TSS and TSS related pollutants (e.g., metals entrained in the soil).

Potential effects on surface water quantity are:

- Increased runoff peak flows due to a steeper slope
- Increased runoff volumes due to a steeper slope

Based on hydrologic modelling completed in the Stormwater Management Plan report for Alternative Method 2 there is no significant increase in runoff peak flow rates or volumes with steeper landfill slopes.

5.4.3 Alternative Method 3

Potential effects on surface water quality are:

- Increased erosion/soil loss due to steeper slopes

Based on the USLE, an increased slope would lead to increased soil loss due to erosion. The increase is soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of TSS and TSS related pollutants (e.g., metals entrained in the soil).

Potential effects on surface water quantity are:

- Increased runoff peak flows due to a steeper slope
- Increased runoff volumes due to a steeper slope

Based on hydrologic modelling completed in the Stormwater Management Plan report for Alternative Method 2 there is no significant increase in runoff peak flow rates or volumes with steeper landfill slopes. Although the modeling was performed based on the design for Alternative Method 2, it is expected that the results for the steeper slopes of Alternative Method 3 would be similar.

5.5 Mitigation Measures Beyond Those Incorporated into the Design

5.5.1 Alternative Method 1

To mitigate the effects of an increase in runoff TSS concentrations and peak flow rates, an extended detention wet stormwater management pond was designed. The stormwater management pond was designed based on Alternative Method 2, which is expected to have similar runoff TSS concentrations and peak flows as Alternative Method 1. Since the stormwater management pond has already been designed to mitigate the effects of Alternative Method 2, no additional mitigation measures are needed beyond those incorporated into the design.

5.5.2 Alternative Method 2

To mitigate the effects of an increase in runoff TSS concentrations and peak flow rates, an extended detention wet stormwater management pond was designed. The stormwater management pond was designed based on Alternative Method 2. Since the stormwater management pond has already been designed to mitigate the effects of Alternative Method 2, no additional mitigation measures are needed beyond those incorporated into the design.

5.5.3 Alternative Method 3

To mitigate the effects of an increase in runoff TSS concentrations and peak flow rates, a an extended detention wet stormwater management pond was designed. The stormwater management pond was designed based on Alternative Method 2, which is expected to have similar runoff TSS concentrations and peak flows as Alternative Method 3. Since the stormwater management pond has already been designed to mitigate the effects of Alternative Method 2, no additional mitigation measures are needed beyond those incorporated into the design.

5.6 Net Environmental Effects

5.6.1 Alternative Method 1

The stormwater management pond, as designed, will mitigate all water quality and quantity effects, and no net environmental effect is expected.

5.6.2 Alternative Method 2

The stormwater management pond, as designed, will mitigate all water quality and quantity effects, and no net environmental effect is expected.

5.6.3 Alternative Method 3

The stormwater management pond, as designed, will mitigate all water quality and quantity effects, and no net environmental effect is expected.

Table 5.1 Alternative Method 1 Surface Water Resources Potential Environmental Effects, Mitigation Measures & Net Effects						
	Environmental Component	**Evaluation Criteria**	**Indicator**	**Potential Effects**	**Mitigation Measures**	**Net Effects**
Natural	Surface Water Resources	Surface Water Quality	Predicted effects on surface water quality on-site and off-site	Based on the USLE, an increased slope would lead to increased soil loss due to erosion. The increase in soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of TSS and TSS related pollutants.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to remove the excess TSS.	No effects on surface water quality on-site or off-site.
		Surface Water Quantity	Change in drainage areas	Hydrologic modelling completed in the Stormwater Management Plan report for Alternative Method 2 shows no significant increases in runoff peak flow rates or volumes for Alternative Method 2 compared to currently approved final closure conditions. Although the slopes for Alternative Method 1 are steeper, the effect on peak flows and runoff volumes is expected to be negligible.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows.	No change in drainage areas.
			Predicted occurrence and degree of off-site effects	Hydrologic modelling completed in the Stormwater Management Plan report shows that for Alternative Method 2 the stormwater management pond will attenuate runoff peak flow rates for all storm events modelled. The expected peak flows and runoff volumes for Alternative Method 1 are expected to be the same as Alternative Method 2, therefore the pond will attenuate peak flows in the same way.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows to protect downstream receivers from potential changes in water quantity.	No off-site effects to surface water quantity.

Table 5.2 Alternative Method 2 Surface Water Resources Potential Environmental Effects, Mitigation Measures & Net Effects						
	Environmental Component	**Evaluation Criteria**	**Indicator**	**Potential Effects**	**Mitigation Measures**	**Net Effects**
Natural	Surface Water Resources	Surface Water Quality	Predicted effects on surface water quality on-site and offsite	Based on the USLE, an increased slope would lead to increase soil loss due to erosion. The increase in soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of TSS and TSS related pollutants.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to remove the excess TSS.	No effects on surface water quality on-site or off-site.
		Surface Water Quantity	Change in drainage areas	Hydrologic modelling completed in the Stormwater Management Plan report shows no significant increases in runoff peak flow rates or volumes for Alternative Method 2 compared to currently approved final closure conditions.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows.	No change in drainage areas.
			Predicted occurrence and degree of off-site effects	Hydrologic modelling completed in the Stormwater Management Plan report shows that the stormwater management pond will attenuate runoff peak flow rates for all storm events modelled.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows to protect downstream receivers from potential changes in water quantity.	No off-site effects to surface water quantity.

Table 5.3 Alternative Method 3 Surface Water Resources Potential Environmental Effects, Mitigation Measures & Net Effects						
	Environmental Component	**Evaluation Criteria**	**Indicator**	**Potential Effects**	**Mitigation Measures**	**Net Effects**
Natural	Surface Water Resources	Surface Water Quality	Predicted effects on surface water quality on-site and offsite	Based on the USLE, an increased slope would lead to increase soil loss due to erosion. The increase in soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of TSS and TSS related pollutants.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to remove the excess TSS.	No effects on surface water quality on-site or off-site.
		Surface Water Quantity	Change in drainage areas	Hydrologic modelling completed in the Stormwater Management Plan report for Alternative Method 2 shows no significant increases in runoff peak flow rates or volumes for Alternative Method 2 compared to currently approved final closure conditions. Although the slopes for Alternative Method 3 are steeper, the effect on peak flows and runoff volumes is expected to be negligible.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows.	No change in drainage areas.
			Predicted occurrence and degree of off-site effects	Hydrologic modelling completed in the Stormwater Management Plan report shows that for Alternative Method 2 the stormwater management pond will attenuate runoff peak flow rates for all storm events modelled. The expected peak flows and runoff volumes for Alternative Method 3 are expected to be the same as Alternative Method 2, therefore the pond will attenuate peak flows in the same way.	No specific mitigation measures required beyond the continued operation of the stormwater management pond to attenuate peak flows to protect downstream receivers from potential changes in water quantity.	No off-site effects to surface water quantity.

Section 6.0 Comparative Evaluation

This section documents the comparative evaluation of the Alternative Methods from a Surface Water Resources perspective based on the net environmental effects identified in **Section 5.0**.

6.1 Comparative Evaluation Methodology

The Minister approved ToR states that the comparative evaluation of the Alternative Methods will be carried out using a Reasoned Argument (or Trade-off) method, with evaluation criteria as the basis for comparison. Under the Reasoned Argument approach, the differences in the net effects associated with each Alternative Method are highlighted. Based on these differences, the advantages and disadvantages of each alternative can be identified according to the evaluation of trade-offs between the various evaluation criteria and indicators. The relative significance of potential impacts is then examined to provide a clear rationale for the selection of a preferred alternative from a Surface Water Resources perspective. The term *trade-offs* is defined as "*things of value given up in order to gain different things of value*". Each Alternative Method will be compared against the others to distinguish relative differences in impacts to the environment, taking into account possible mitigation measures.

6.2 Comparative Evaluation Results

Based on the results of the comparative evaluation in **Table 6.1**, all three alternative methods are equal in causing no net environmental effect.

Table 6.1 Surface Water Resources Comparative Evaluation

	Environmental Component	Evaluation Criteria	Indicator	Alternative Method 1 Net Effects	Alternative Method 2 Net Effects	Alternative Method 3 Net Effects
NATURAL	Surface Water Resources	Surface Water Quality	Predicted effects on surface water quality on-site and offsite	No effects on surface water quality on-site or off-site. **NO NET EFFECTS**	No effects on surface water quality on-site or off-site. **NO NET EFFECTS**	No effects on surface water quality on-site or off-site. **NO NET EFFECTS**
			Criteria Ranking:	**Tied for 1st**	**Tied for 1st**	**Tied for 1st**
			Criteria Rationale:	No on-site or off-site effects on surface water quality associated with any of the three alternative methods.		
		Surface Water Quantity	Change in drainage areas	No change in drainage areas. **NO NET EFFECTS**	No change in drainage areas. **NO NET EFFECTS**	No change in drainage areas. **NO NET EFFECTS**
			Predicted occurrence and degree of off-site effects	No off-site effects to surface water quantity. **NO NET EFFECTS**	No off-site effects to surface water quantity. **NO NET EFFECTS**	No off-site effects to surface water quantity. **NO NET EFFECTS**
			Criteria Ranking:	**Tied for 1st**	**Tied for 1st**	**Tied for 1st**
			Criteria Rationale:	No effects on surface water quantity associated with any of the three alternative methods.		
		Environmental Component Ranking:		**Tied for 1st**	**Tied for 1st**	**Tied for 1st**
	RATIONALE			All three alternative methods have no net effect with respect to surface water quality and quantity		

Section 7.0 Conclusion

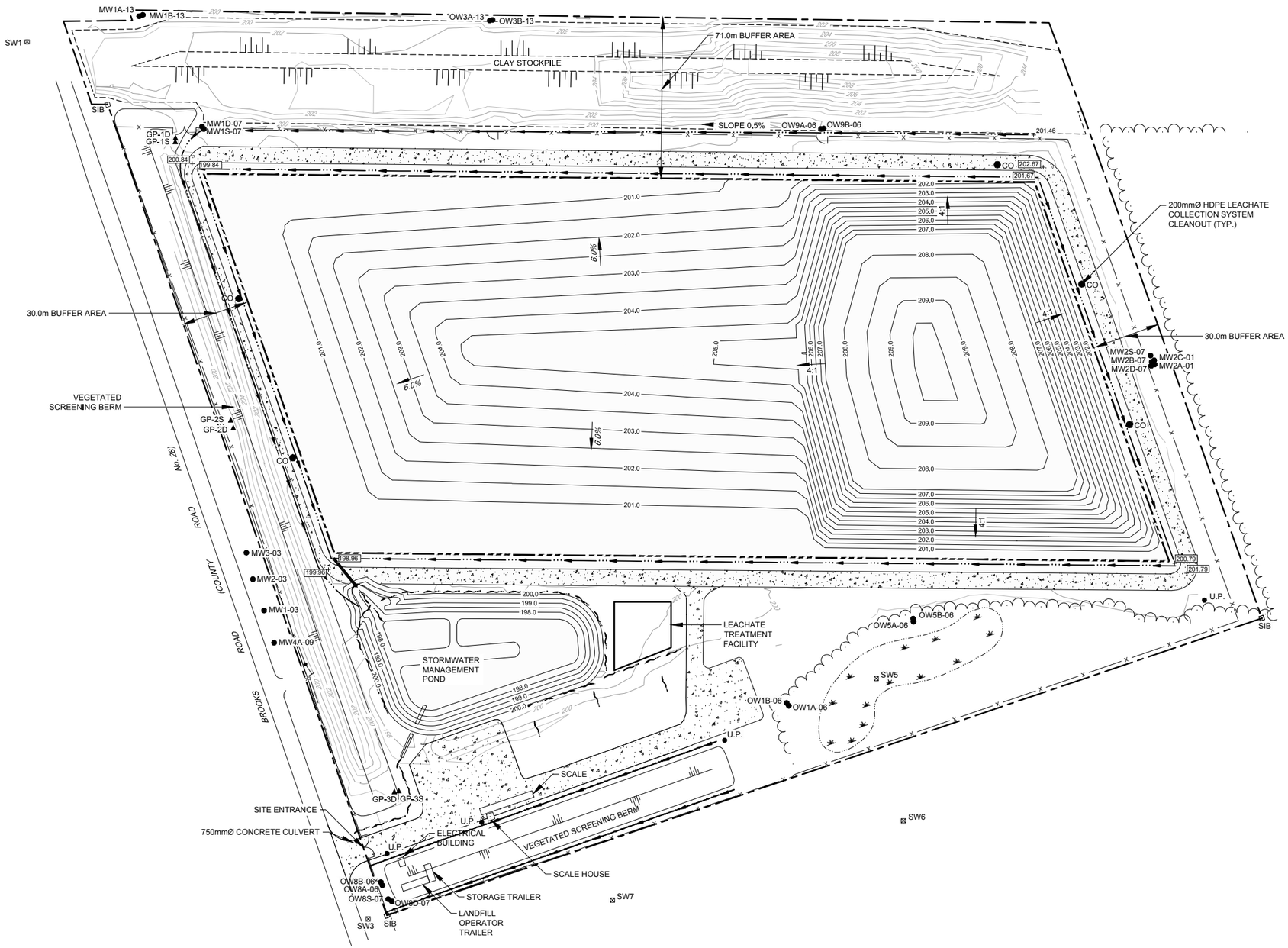
As indicated in the 2013 Stormwater Management Plan, the stormwater management system for the existing Site was designed to provide water quality and water quantity control of surface water runoff. The stormwater management pond has been designed with additional capacity for the proposed vertical expansion of the landfill.

All three alternatives may result in increased erosion/soil loss, runoff peak flow rates and/or runoff volumes due to steeper slopes. The increase is soil loss would be minor as slope is only one of numerous factors that affect soil loss. The erosion would show up in stormwater runoff as slightly increased concentrations of TSS and TSS related pollutants (e.g., metals entrained in the soil). Based on hydrologic modelling completed in the Stormwater Management Plan report there is no significant increase in runoff peak flow rates or volumes with steeper landfill slopes.

No mitigation measures beyond those incorporated into the design are recommended for any of the alternative methods.

Based on the preceding evaluation, each of the three alternative methods proposed is equal in that none of them are anticipated to affect surface water quality or quantity for downstream receivers.

Drawings



No.	Revision	Date	Initial

LEGEND

- 202.0 — FINAL CONTOURS BEFORE VERTICAL EXPANSION (1.0m INTERVAL (m AMSL))
- FINAL CONTOURS BEFORE VERTICAL EXPANSION (0.5m INTERVAL (m AMSL))
- 202 — GROUND CONTOUR (2.0m INTERVAL)
- GROUND CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- APPROVED LIMIT OF WASTE
- x — EXISTING FENCELINE
- CLAY STOCKPILE AREA
- PERIMETER DITCH
- TREELINE
- GRANULAR SURFACE ACCESS ROAD
- SWAMPY AREA
- 201.67 — SPOT ELEVATION (m AMSL)
- CO — LEACHATE COLLECTION SYSTEM CLEAN OUT
- SIB — STANDARD IRON BAR
- OW1B-06 — OBSERVATION WELL
- MW2A-01 — MONITORING WELL
- SW6 — SURFACE WATER MONITORING
- GP-3S — GAS PROBE
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

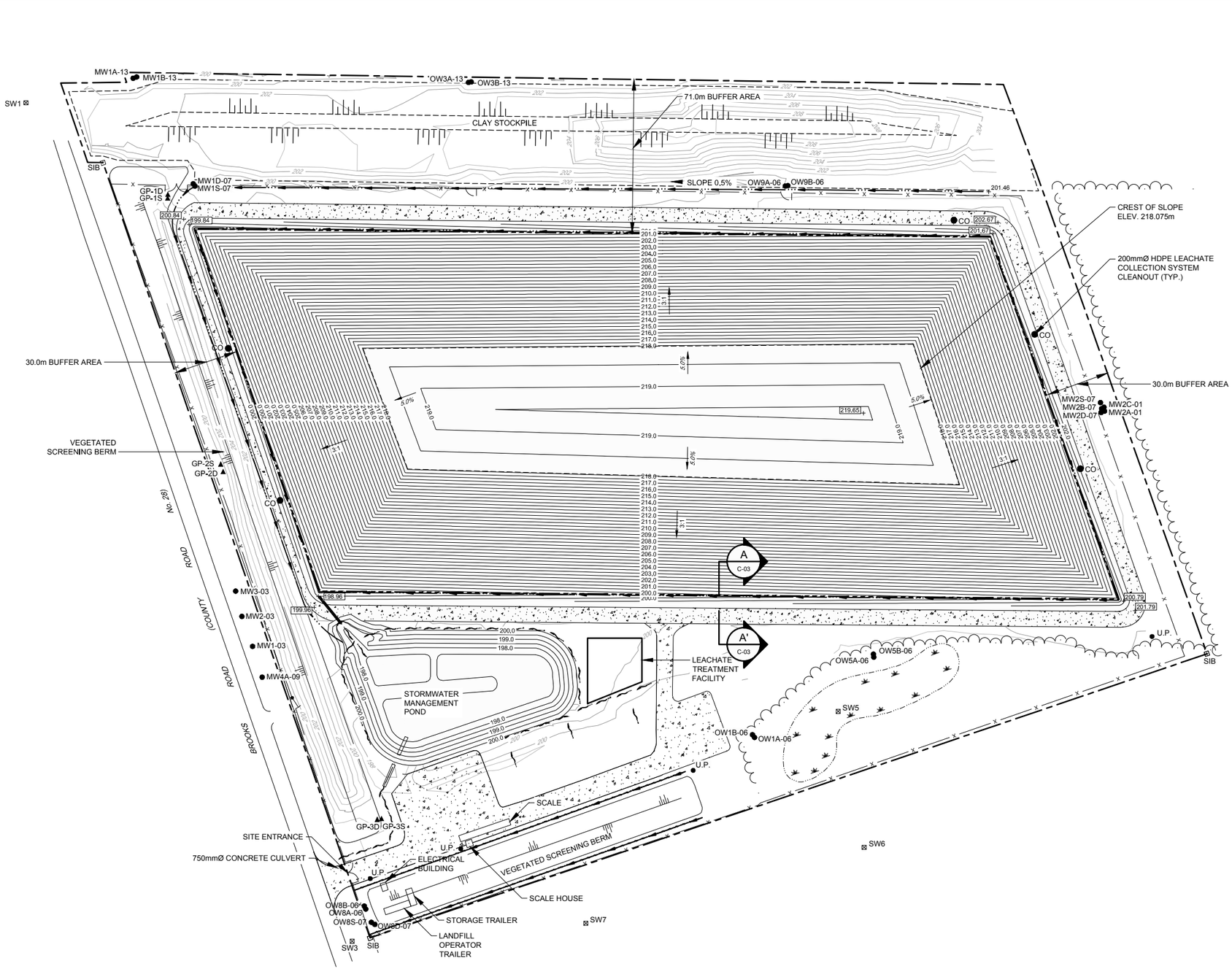
CONCEPTUAL DESIGN REPORT

EXISTING CONDITIONS INTERIM CLOSURE

GHD

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project Nº: 18235-20	Report Nº: 051	Drawing Nº: C-01



No.	Revision	Date	Initial

LEGEND

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- TOP OF FINAL COVER CONTOUR (0.5m INTERVAL (m AMSL))
- 202 — GROUND CONTOUR (2.0m INTERVAL)
- GROUND CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- APPROVED LIMIT OF WASTE
- x — EXISTING FENCELINE
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- PERIMETER DITCH
- TREELINE
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- SWAMPY AREA
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- SIB — STANDARD IRON BAR
- OW1B-06 — OBSERVATION WELL
- MW2A-01 — MONITORING WELL
- SW6 — SURFACE WATER MONITORING
- GP-3S — GAS PROBE
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

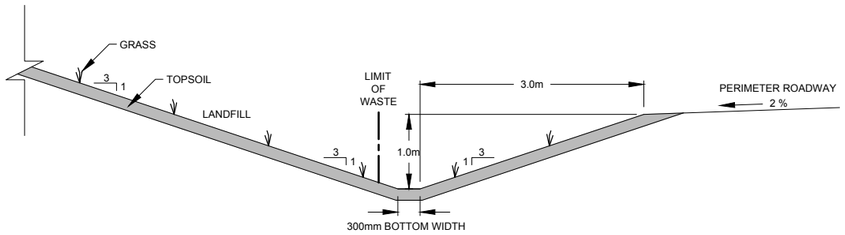
VERTICAL EXPANSION ALTERNATIVE 1

GHD

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project N°: 18235-20	Report N°: 051	Drawing N°: C-02

18235-20(051)CI-WA002 JAN 19/2016



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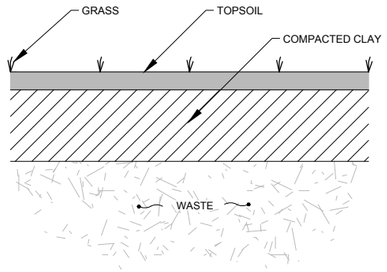

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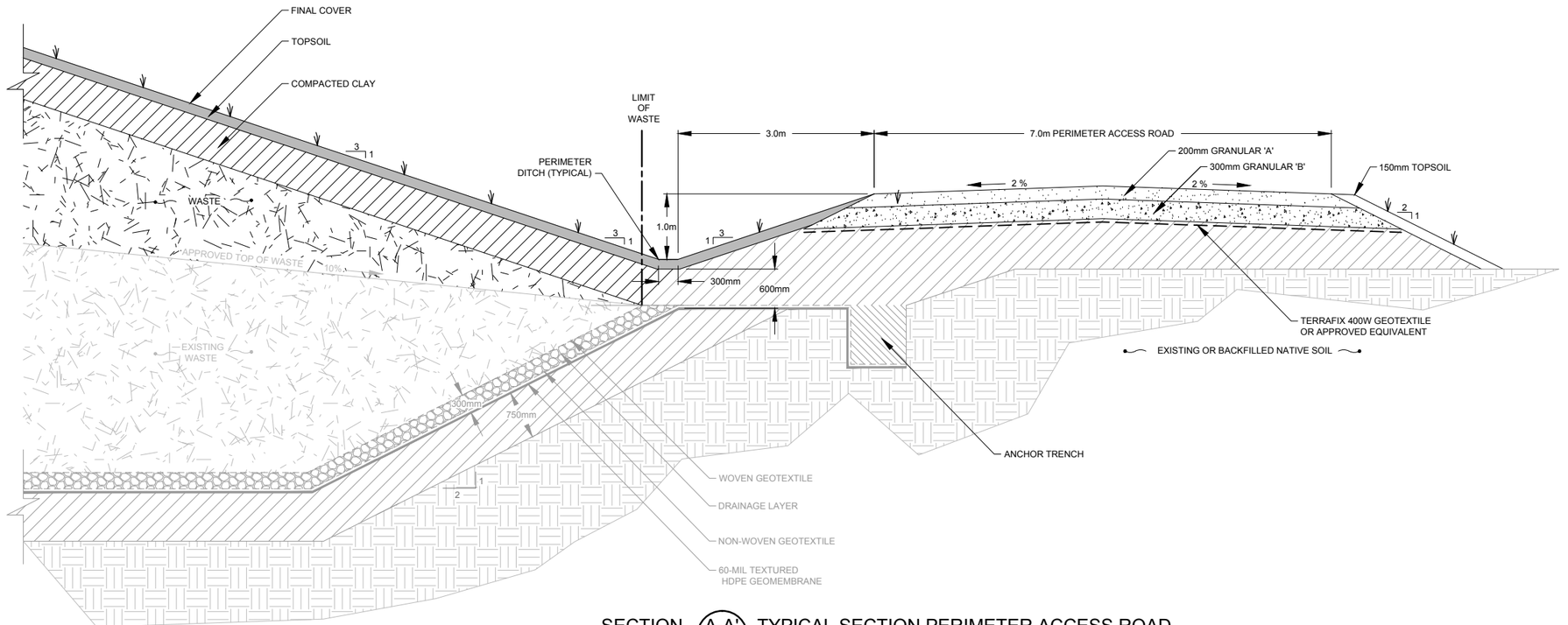

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No.	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

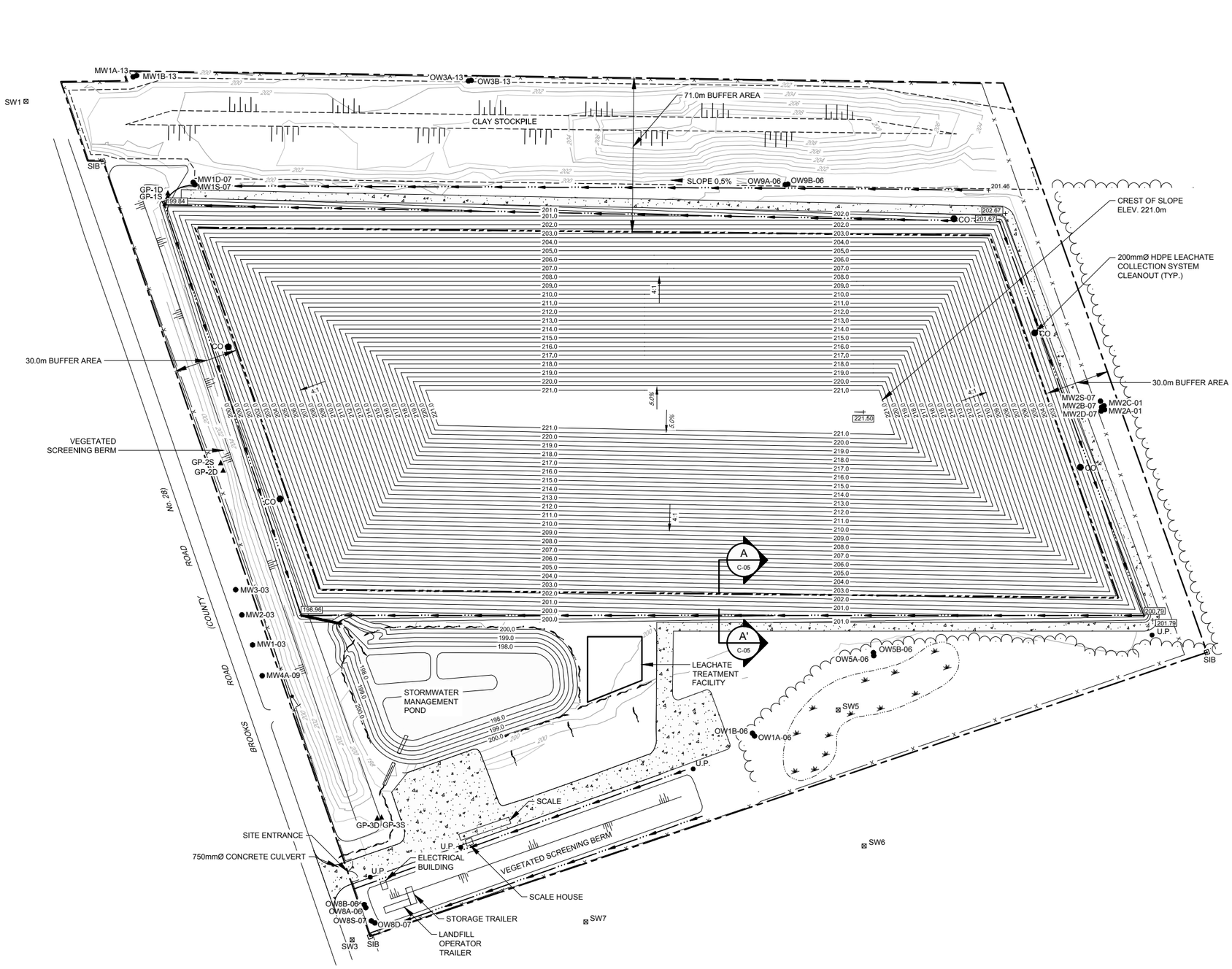
CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION
ALTERNATIVE 1 DETAILS

.

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project No: 18235-20	Report No: 051	Drawing No: C-03



No.	Revision	Date	Initial

LEGEND

- 202.0 — TOP OF FINAL COVER CONTOUR (1.0m INTERVAL (m AMSL))
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- SW6 — SURFACE WATER MONITORING
- GP-3S — GAS PROBE
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SCALE VERIFICATION

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Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

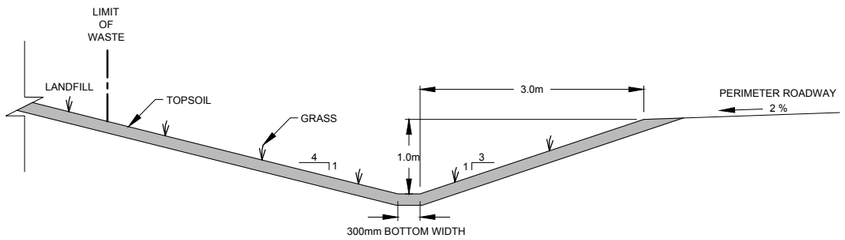
VERTICAL EXPANSION ALTERNATIVE 2

GHD

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project N°: 18235-20	Report N°: 051	Drawing N°: C-04

18235-20(051)CI-WA004 JAN 19/2016



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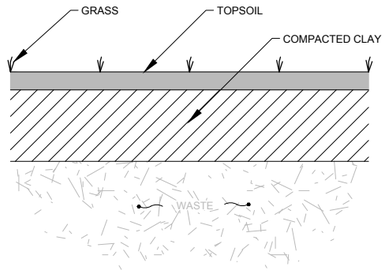

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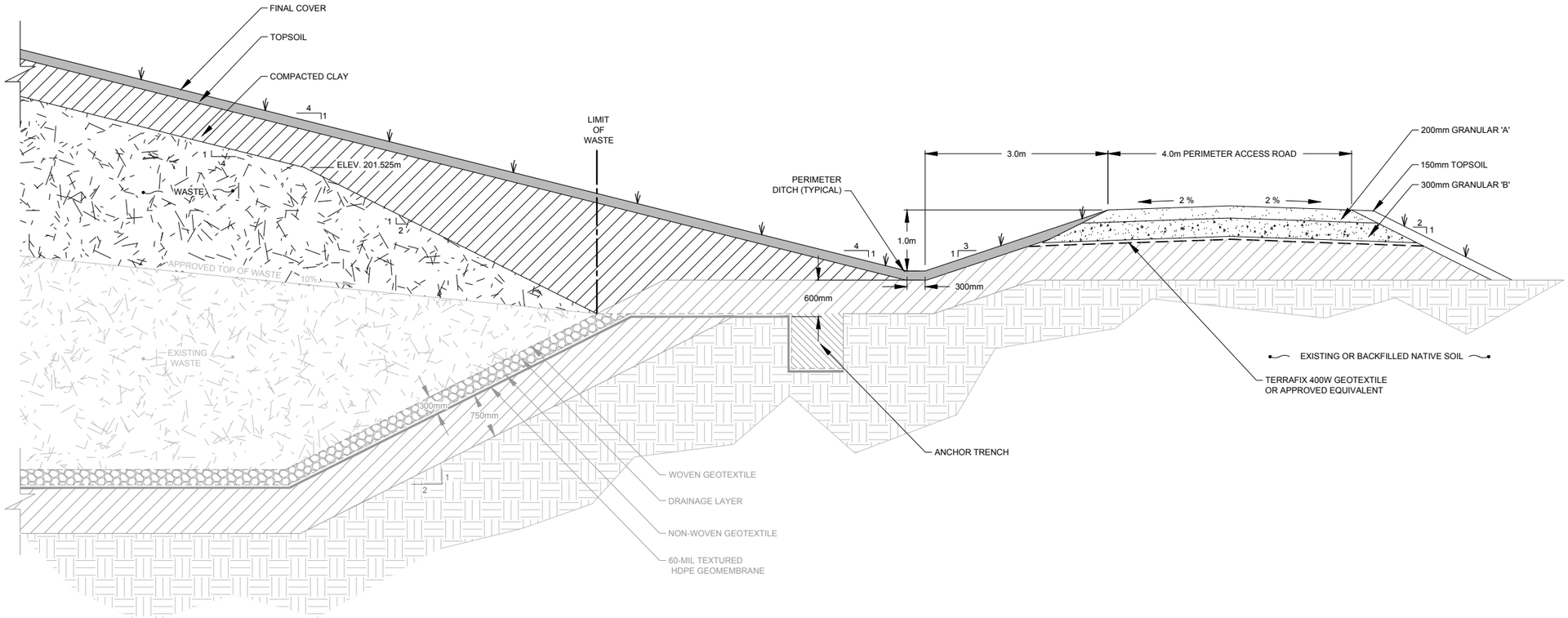

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1:40 C-04

No.	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION
ALTERNATIVE 2 DETAILS

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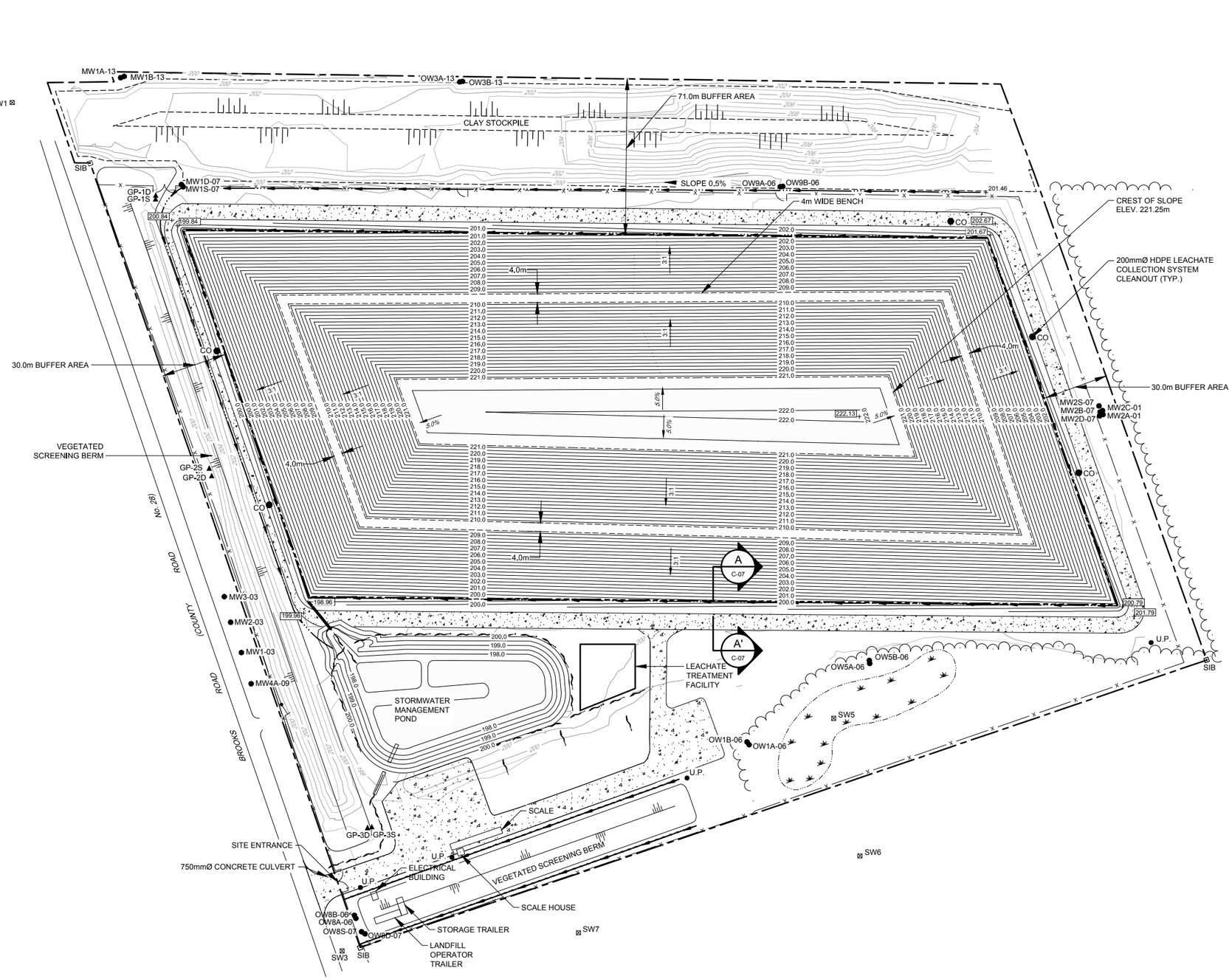
Source Reference:

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project No: 18235-20	Report No: 051	Drawing No: C-05



No.	Revision	Date	Initial

LEGEND

- 202.0 — TOP OF FINAL COVER CONTOUR (1.0m INTERVAL (m AMSL))
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BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

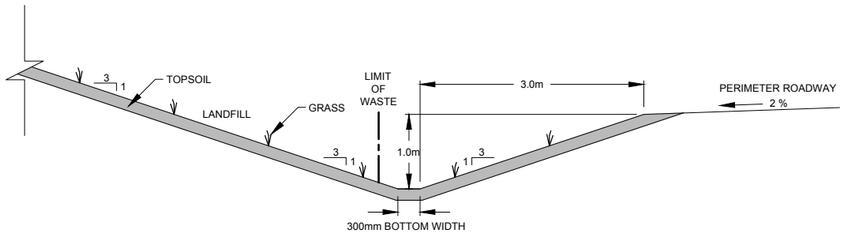
VERTICAL EXPANSION
ALTERNATIVE 3

GHD

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project N°: 18235-20	Report N°: 051	Drawing N°: C-06

18235-20(051)CI-WA006 JAN 19/2016



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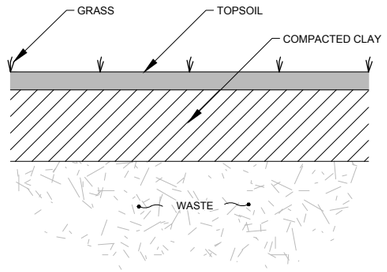

DETAIL 2 FINAL COVER
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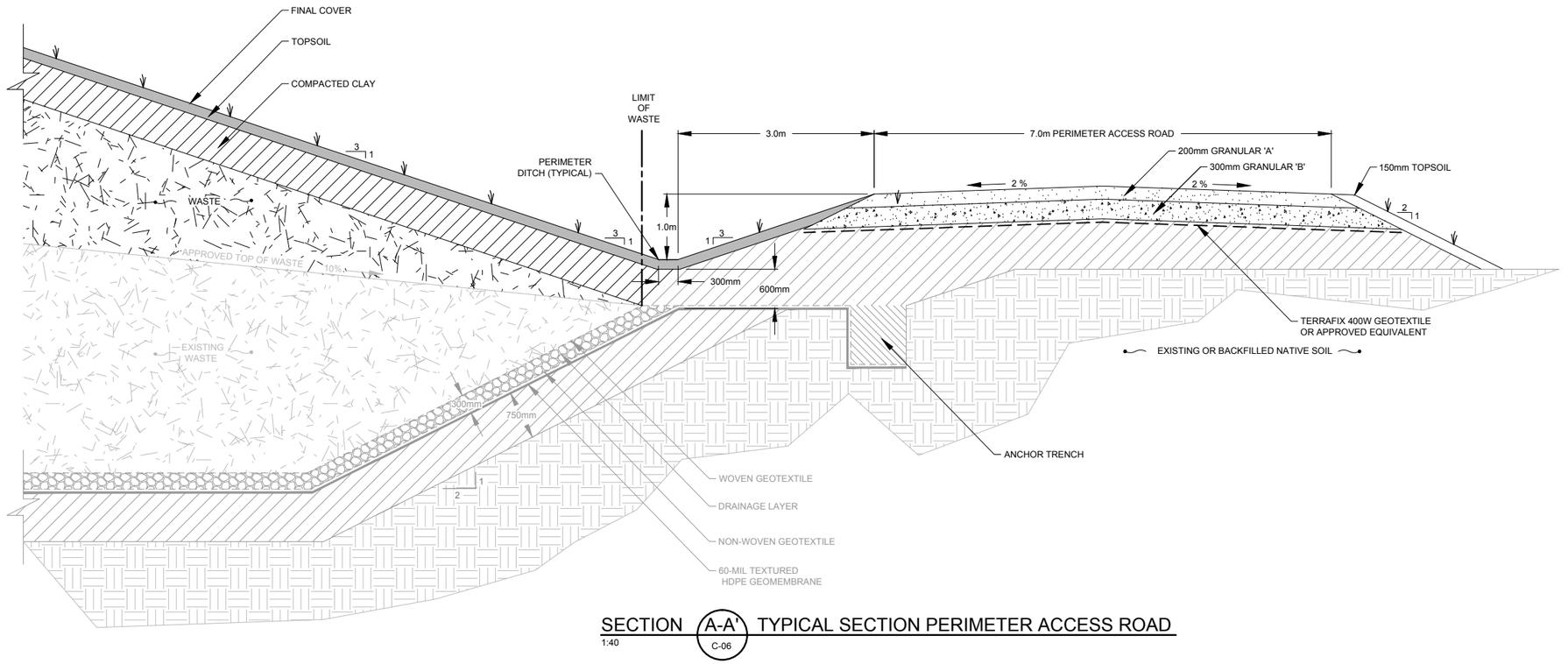

SECTION A-A' TYPICAL SECTION PERIMETER ACCESS ROAD
1:40 C-06

No.	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION
ALTERNATIVE 3 DETAILS

.

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project No: 18235-20	Report No: 051	Drawing No: C-07

Appendix A

2013 Stormwater Management Plan

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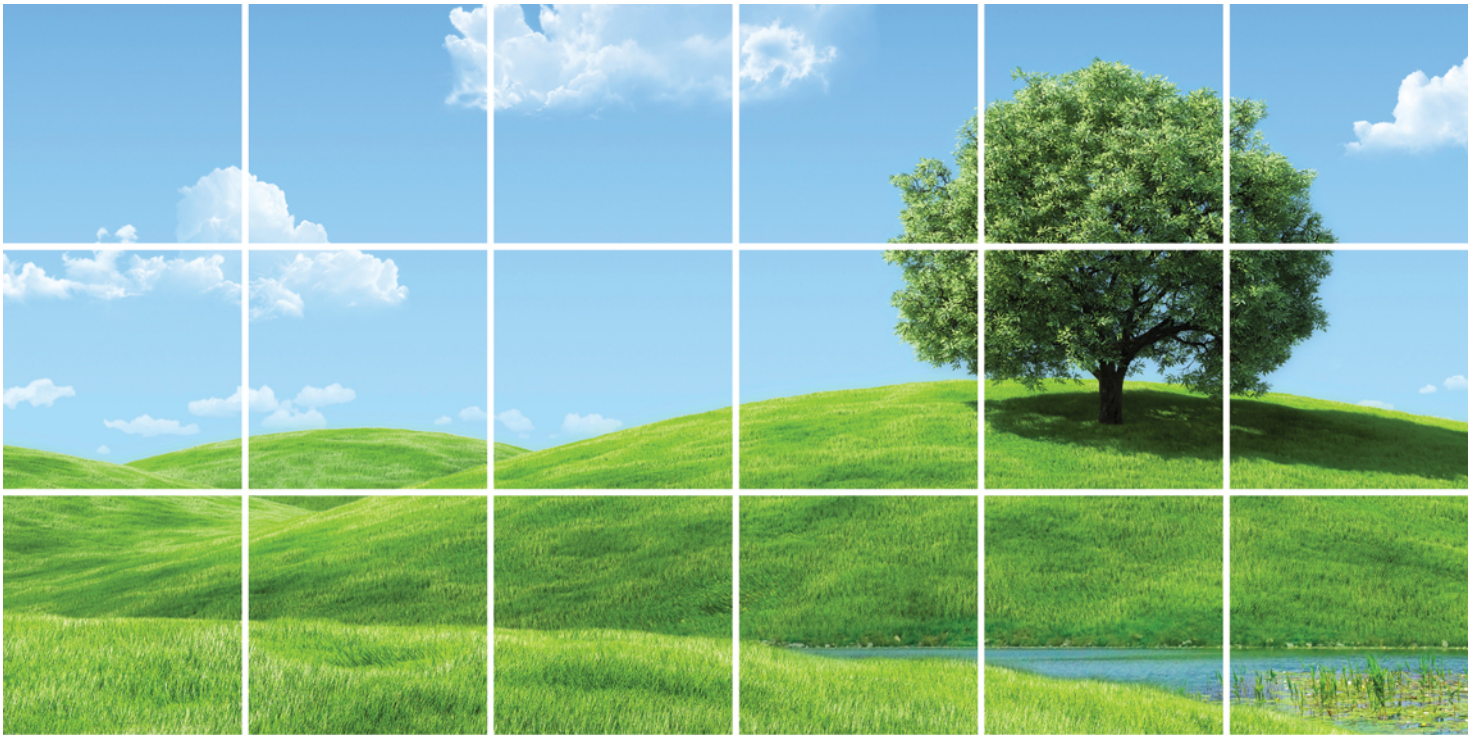


FINAL REPORT

STORMWATER MANAGEMENT PLAN

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Prepared for: 2270386 Ontario Limited

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

September 2013 • #018235
Report Number:40

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF TABLES
(Following Text)

LIST OF APPENDICES

LIST OF DRAWINGS

(Entire Drawing Package Not Provided, Bound Separately)

1.0 INTRODUCTION

This report, prepared by Conestoga-Rovers & Associates Limited (CRA) on behalf of Brooks Road Environmental c/o 2270386 Ontario Limited (BRE) (Owner, Proponent), presents the Stormwater Management Plan (SWM Plan) for the Brooks Road Landfill (Site) located at 160 Brooks Road in Cayuga, Haldimand County, Ontario. The Site is legally described as Part of Lot 24, Concession I-N.T.R., of the former North Cayuga Township, former Regional Municipality of Haldimand-Norfolk, and now Haldimand County. A Site location map is provided on Figure 1.

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302 (dated May 5, 2004), has an approved fill rate of 500 tonnes per day and a capacity of 624,065 m^3 (including waste, daily cover and interim cover). The Site was originally approved as a local landfill site in 1971, with amendments approved by the Ministry of the Environment (MOE) in 1974, 1979, 2002, 2004, 2005, 2007, 2011, 2012, and 2013.

The Site also operates under an amended Industrial Sewage Works Certificate of Approval Number 8371-6X9L6B (dated February 20, 2007) for the conveyance and discharge of stormwater runoff and leachate collection and disposal system.

The purpose of this report is to present an updated SWM Plan for the Site that is consistent with the current landfill design. The SWM Plan has been completed to support an application for an amended ECA for Industrial Sewage Works for the Site. CRA has reviewed the available background information, current landfill design, and conducted consultation with the MOE to obtain a full understanding of the work required.

This report does not address any changes to the leachate collection and disposal system. The Owner submitted an application to amend the design and operation of the leachate collection and disposal system. This application was submitted on March 16, 2013 (MOE Reference #5565-967NGT).

The SWM Plan was developed with reference to the Ontario Ministry of the Environment (MOE) Storm Water Management Planning and Design Manual (dated March 2003) and other applicable guidance documents.

1.1 PRELIMINARY CONSULTATION

Prior to the completion of the designs for SWM works on Site, CRA met with the MOE for pre-application consultation at a number of on-Site biweekly progress meetings for the Site Decommissioning and Stage 2A Construction project. Copies of the meeting minutes are included in Appendix A.

2.0 SITE BACKGROUND

2.1 SITE LOCATION

The Site is licensed to receive waste from all of Ontario but receives most of its post-diversion Industrial, Commercial, Institutional (IC&I) solid non-hazardous waste from within Haldimand County. The 12.4 hectares (ha) Site contains an approved fill area of approximately 6.07 ha.

The Site is irregular in shape and is located in a predominantly undeveloped area. The Site is currently surrounded by:

- Undeveloped land to the north. The former Canadian Southern Railway right-of-way directly to the north was purchased by the Owner in 2003 and has been utilized as a clean clay stockpile area since 2005
- Brooks Road to the west, and beyond by undeveloped and cultivated land
- Undeveloped and cultivated land to the south and east

This Site is not located in an area of development as defined by the Niagara Escarpment Planning and Development Act (NEPDA) and is not located on the Oak Ridges Moraine Conservation Area as defined by the Oak Ridges Moraine Conservation Plan (ORMCP).

2.2 SITE SETTING

The geographic, geologic, and hydrogeologic framework for the Site and surrounding area have been previously described in a report entitled Hydrogeologic Performance Assessment (dated October 2002), prepared by CRA. The previously reported information regarding the Site setting is summarized in the following sections.

Site Topography and Drainage

The Site is located within the Haldimand Clay Plain which is characterized by level topography and relatively poor drainage. The Site is located within jurisdiction of the Grand River Conservation Authority. The Site ultimately discharges runoff to the roadside ditch along the east side of Brooks Road which drains in a southerly direction through a culvert under the Canadian National Railway rail bed and empties into a small apparently natural stream channel which is the head waters of Norton Creek. Other drainage from adjacent lands to the west of Brooks Road also flows in culverts under Brooks Road to provide surface runoff to Norton Creek. Other surface runoff contributions include ephemeral streams on lands south of the Site that enter Norton Creek via culverts under the CNR rail bed. Norton Creek discharges directly to the Grand River.

Site Geology

The overburden geology is relatively uniform beneath the Site. In general the Site is characterized by a thick (14 to 18 m) glaciolacustrine layer of stratified silty clay, silty clay till and varied clays, underlain by a thin (1 to 3 m) discontinuous layer of silty sand till with varying concentrations of gravel and clay. The bedrock is encountered at depths varying from 15.2 to 20.2 m bgs. A thin surficial deposit of topsoil is generally observed at the surface of the Site, with the exception of the southwestern portion, where refuse associated with historical waste disposal activities in the original landfill area (OLA) was observed.

The decommissioning of the OLA commenced in August 2012 and was completed in early July 2013. The decommissioned area was backfilled using on-Site native silty clay and graded to facilitate drainage.

The silty clay deposits are described as being locally fractured (weathered) from the surface down to depths varying from 3 to 5 m bgs, and are characterized as a very stiff to hard unit with low plasticity. At depths in excess of 5 m, the silty clay deposits have little to no fracturing and the consistency of the units decrease to stiff to very stiff.

Underlying the silty clay deposits, a thin discontinuous silty sand till with varying concentration of clay and gravel is encountered across the Site. The silty sand till ranges in thickness from 1 to 3 m and often contains cobbles and/or broken angular bedrock fragments. This deposit is usually well graded with fine to medium grained sand, minor silt and trace clay, and is described as dense to compact, grey and saturated. The silty sand till rests directly over the bedrock.

Bedrock underlying the Site has been described as a fractured shale, dolostone and gypsum of the Salina Formation. The top of bedrock elevation ranges from 180.80 to 185.73 m above mean sea level (AMSL), and forms a small bedrock valley from northwest to southeast across the Site. The small depression is characterized by the thicker silty sand till deposit. Regionally the bedrock topography dips to the south.

Site Hydrogeology

In general, the geologic units identified at the Site have been grouped into two main hydrogeologic units, as follows:

i) An unconfined water table (shallow overburden) unit within the permeable refuse in the OLA and the shallow fractured silty clay (weathered) unit

ii) A confined deep overburden/shallow bedrock aquifer

The shallow overburden unit is essentially a perched water table resting on the impermeable un-weathered clay units. The large variation in hydraulic conductivity between the refuse material and the surrounding silty clay explains the groundwater mounding effect historically observed in the OLA. Now that the waste within the OLA has been decommissioned and the area has been backfilled with silty clay, the shallow overburden unit mound has been effectively removed from the Site. Historically, these two hydrogeological units were separated by a thick (between 9 and 12 m) layer of stratified silty clay, silty clay till, and varied clays which forms an aquitard of very low hydraulic conductivity. Groundwater level data historically gathered from the shallow overburden unit and deeper overburden/shallow bedrock aquifer indicate that the presence of the clay aquitard results in hydraulic separation of the two units. A water head varying from 9.5 to 15 m has been historically measured at the location of nested wells.

Underlying the silty clay aquitard, a confined deep overburden/shallow bedrock aquifer was observed within the lower portion of the silty sand till unit and the shallow fractured bedrock. Groundwater quality and water level data historically gathered from monitoring wells screened within the lower silty sand till unit exhibited similar hydrostatic levels and hydrochemical characteristics which are not substantially different from samples obtained from well nests screened solely with the shallow bedrock. Therefore these two geological units have been generally considered to form one aquifer.

Based on the groundwater data obtained to date, the deep overburden/shallow bedrock aquifer is generally encountered at depths varying from 14 to 17 m bgs. The groundwater flow pattern of this aquifer is generally characterized by a weak gradient and a southerly flow.

2.3 EXISTING SITE CONDITIONS

The existing Site topography (based on the March 2013 topographical survey data) and ancillary features are presented on Drawing 2. The Site works and development currently consists of the following:

- Site Support and Staging Area with a scale and multiple trailers for office staff and storage.
- The landfill is being constructed in three distinct stages named as: Stage 1, Stage 2, Stage 3 and are described as follows:
  - Stage 1 cell construction commenced in December 2006 and was completed in October 2007. The Stage 1 landfill area has an interim cap constructed as per the approved Design and Operations Report (D&O), dated November 2003.
  - Currently Stage 2 has been excavated and approximately 2/3 of the cell has been constructed and lined. The completed portion has been designated as Stage 2A. Stage 2A is currently accepting landfill waste and Stage 2B/3A will be constructed in the future.
  - The Site design provides for three disposal stages that will be constructed in a progressive manner from east (Stage 1) to west (Stage 3). Further information concerning the detailed design of the landfill is provided within the approved D&O.
- The decommissioning of the OLA was completed in early July 2013. This included:
  - The removal of all refuse within the OLA
  - The removal of all impounded water and leachate within the OLA
  - Backfilling of the OLA to match adjacent topography
  - Grading of the OLA to provide adequate drainage
- A series of temporary dewatering sedimentation ponds (TDS Ponds) have been constructed to collect existing Site runoff. The ponds operate in a closed position whereby stormwater is pumped from the ponds to the roadside ditch after water samples meet the trigger parameter requirements detailed in the current Industrial Sewage C of A number 8371-6X9L6B

- A swampy area is located in the south-east corner of the Site. No work is proposed within this area. The area has a relatively small contributing drainage area with no apparent discharge location.
- A series of visual screening berms which also serve to divide site runoff constructed as per the approved D&O Plan

Stormwater runoff from the active landfilling area is collected within the landfill cell as leachate where it is eventually pumped into tankers for off-Site disposal. Stormwater runoff from the capped portion of the Stage 1 landfill cell is directed to the TDS ponds. Stormwater collected to the west of Stage 2A, within the future landfill cell excavation, is manually pumped to the TDS ponds. The surrounding area sheet flows from the Site, ultimately discharging to the east ditch along Brooks Road which forms the headwaters of four areas, identified as Outfall 1 and 2 on Drawing 2.

2.4 REGULATORY SETTING

The landfill currently operates as a waste disposal facility under Permit Number A110302. The D&O for the landfill was originally completed in November 2003. The approved final contours presented in the D&O were updated by Genivar Inc. and approved by the MOE in June 2012.

The Site also operates under an amended Industrial Sewage Works Certificate of Approval Number 8371-6X9L6B (dated February 20, 2007) for the conveyance and discharge of stormwater runoff and leachate collection and disposal system. The Permit is based upon a SWM Plan and subsequent correspondence submitted by CRA in February 2004. This report formed the basis for establishing accepted limits for the total peak runoff discharge from the Site for various rainfall events identified as the Existing Conditions within the original Plan.

At the request of the MOE, an Interim Stormwater Management Plan (ISWMP) was prepared for the Site in January 2012. The purpose of the ISWMP was to improve the existing stormwater management system and increase the overall capacity of the temporary dewatering sedimentation pond (TDS pond). The ISWMP was approved by the MOE on January 3, 2013 and is scheduled for completion in 2013.

The Site is currently at the early stages of completing an individual Environmental Assessment (EA) related to a proposed vertical expansion of the landfill. The vertical capacity expansion being proposed will be for approximately 421,000 m^3 (including waste, daily cover and final cover) of additional capacity, which will be achieved

through a re-engineering of the Site's final contours. The revision of final contours proposed under the EA will also require some redesign of the approved on-Site stormwater management system (due to altered waste slopes). The proposed final contours were considered in this report to prevent the need to revise the stormwater works in the future should the final contours be approved. All changes considered herein will occur within the Site's existing waste footprint and Site boundaries.

3.0 PROPOSED SITE CONDITIONS

3.1 GENERAL DESCRIPTION

The Site development is generally consistent with the original D&O report with respect to the handling and discharge of runoff. The differences between the existing C of A and the Site conditions described below are due to changes in the final contours or topography of the landfill area.

This report provides an updated SWM Plan that considers recent changes to the landfill design. The following three conditions have been assessed:

1. Interim Condition which considers the most recent upgrades to the stormwater conveyance system (ditches, culverts) and modifications to the existing TDS pond.
2. Currently Approved Post Closure Condition which considers the most recently approved post-closure grading plan.
3. Proposed Vertical Expansion Condition which considers the proposed closure plan, currently undergoing an individual EA.

Design drawings have been prepared to support the stormwater management system for the Interim, Currently Approved, and Proposed Vertical Expansion Conditions. These design drawings have been bound separately to this report and comprise a select number of drawings of the larger Design and Operations Plans for the Site.

3.2 DESIGN CRITERIA

The stormwater management system for the Site was designed to provide water quality and water quantity control of surface water runoff. Water quality treatment will be provided through extended detention of the 4-hour duration 25 mm storm event. The stormwater management pond is proposed to provide water quantity control for all storm events up to the 100-year storm, via attenuation of peak flows to below the Existing Condition, as outlined within the original SWM Plan. Estimated runoff from the Regional Storm (Hurricane Hazel) has been assessed to demonstrate safe passage to downstream receivers.

At a minimum, internal drainage ditches were sized to accommodate the peak flow generated from the 3-hour duration 25-year storm, as required by the MOE Guidelines.

3.3 INTERIM CONDITION STORMWATER MANAGEMENT SYSTEM

The MOE requested the ISWMP be developed for the Site. This plan was developed within the CRA technical memo dated January 3, 2013 and consisted of improvements in collecting and routing runoff from the capped portion of the landfill, around the active landfill area, towards the TDS Pond. The ISWMP also consisted of an expansion to the TDS Pond. The ISWMP technical memo has been provided as Appendix B.

Construction activities associated with the ISWMP are scheduled to be completed in September 2013.

3.4 CURRENTLY APPROVED POST CLOSURE CONDITION

The currently approved post-closure Site plan is presented on Drawing 5. Site runoff is discharged from two outfalls located at the Site. Runoff discharging towards Outfall 1 is characterized as an undeveloped area of land in the south-east corner of the Site where no work or changes are being proposed. The remainder of the Site area is directed towards Outfall 2. This SWM Plan provides engineered design for stormwater runoff collected and discharged to Outfall 2, upon final closure of the landfill.

The proposed final layout includes a fully capped landfill with a final cover that consists of a 0.6 m thick soil cover overlain with a 0.15 m topsoil layer and a vegetative cover. The soil cover will consist of on-Site material and/or imported material to provide a cover that will allow a minimum infiltration rate of 0.15 m per year in accordance with O. Reg. 232/98 for an engineered site. The topsoil used in final cover construction will be obtained from on-Site areas stripped in preparation for landfill construction. Runoff generated from the landfill will be collected within a perimeter ditch and directed towards a stormwater management pond (SWM Pond). The SWM Pond has an outlet structure to attenuate peak flows and an emergency spillway to convey excess runoff off-Site during larger storm events. The SWM Pond ultimately discharges towards Outfall 2 which discharges into a roadside drainage ditch along the east side of Brooks Road.

The drainage boundaries for the currently approved post-closure condition are presented on Figure 2. Figure 3 presents the flow schematic for the proposed conditions and illustrates how each catchment is routed to Outfall 1 and Outfall 2.

Catchment 100 will remain undeveloped with the exception of a small portion of the access roads which bound the north and west part of this catchment. This catchment has

sufficient internal storage capacity to retain all surface water runoff resulting from the Regional storm event. Catchment 100 discharges towards Outfall 1 (the swampy area).

Catchments Series 200 (201 through to 210) discharge to the SWM Pond. Catchments 201, 202, 203 and 204 represent the currently approved post-closure landfill cap area. The landfill cap area is encompassed with a perimeter ditch that drains in two directions from the northeast corner of the landfill, to the southwest corner of the landfill. Catchments 201, 202, 203, and 204 drain to the north, west, east and south side perimeter ditches respectively. From the southwest corner of the landfill, the perimeter ditch drains through two 600 mm diameter culvert and an open ditch to the stormwater management pond. Catchment 205 and 206 encompass the area between the landfill perimeter access road and the visual screening berms to the north and west. Catchment 205 and 206 will drain directly to the stormwater management pond via perimeter ditches along the north and west side of the access road. Catchment 207 and 208 encompass the Segregated Recyclable Material Storage Area, Site trailers and scales. This area is a gravel parking lot with numerous bins, trailers, and a weigh scale. This area will sheet flow to the north and runoff will be collected by a drainage ditch that discharges to the SWM Pond. Catchment 209 and 210 encompass the SWM Pond and small undeveloped area east of the SWM Pond. The pond will discharge to the southwest and towards the drainage ditch along Brooks Road which outlets off-Site, known as Outfall 2.

Catchment 301 will also remain undeveloped with the exception of that portion of the visual screening berm that bounds the catchment to the west. Construction of the berm will have an insignificant impact on flows from this catchment.

Catchment 302 will remain largely undeveloped with the exception of a berm that will be constructed to the west of the landfill area. Surface water runoff from Catchment 302 will continue to drain south along the western ditch along Brooks Road to the Site outlet, as in existing conditions. Catchment 303 will be a small area at the southwest corner of the Site formed by a proposed berm and the Site boundary. Surface water runoff from this catchment will drain to the Site discharge point in the western ditch.

3.5 PROPOSED VERTICAL EXPANSION STORMWATER MANAGEMENT SYSTEM

The proposed vertical expansion post-closure Site plan is presented on Figure 4. The proposed vertical expansion condition stormwater conveyance system is very similar to the currently approved system with the exception that the overall landfill height has

increased. Increasing the vertical height of the landfill changes the overall catchment slope.

The drainage boundaries for the proposed vertical expansion condition are presented on Figure 5. Figure 6 presents the flow schematic of the proposed conditions and illustrates how each catchment is routed to Outfall 1 and Outfall 2.

3.6 PROPOSED STORMWATER MANAGEMENT MEASURES

Post-closure stormwater management controls are proposed for each condition to mitigate the effects of increased peak flows due to the landfill development. For the currently approved and proposed vertical expansion conditions these controls will include internal drainage ditches and a stormwater management pond.

A 1-metre deep drainage ditch will be constructed around the perimeter of the landfill area and will convey runoff from the landfill cap and access road to the stormwater management pond. The MOE Guidelines require that all internal drainage ditches have sufficient capacity to convey the peak flows generated from a 25-year design storm, with a continuous overland flow route to convey flows from the 100-year and Regional storm events. The proposed ditches will have capacity to convey flow in excess of that generated by the 100-year or Regional storm. The ditches are proposed to have 4:1 (horizontal:vertical) side slopes on the landfill side, and 3:1 side slopes on the perimeter access road side of the ditches.

The stormwater management pond is proposed in Catchment 210. A wet pond is proposed with a maximum permanent pool depth of 0.6 m. The pond is proposed with 4:1 side slopes, and a berm in the midsection of the pond that will create an extended flow path, which will allow for additional settling of suspended solids. A forebay at the pond inlet is proposed to enhance water quality and capture coarse grained sediments. The pond will receive the discharge from the landfill cap perimeter ditches through two 600 mm diameter concrete culverts and an open swale.

The pond outlet is proposed to consist of a perforated pipe with a 75 mm orifice plate at the permanent pool elevation, an overflow catchbasin located in the pond side slope with an inlet located at the 5-year ponding elevation, and an emergency overflow berm. Surface water runoff volumes up to the 5-year storm event will be discharged via the riser pipe outlet. The outlet structure design will provide 24 hours of extended detention for the 25 mm storm event runoff volume. The control structure will outlet via two 375 mm diameter concrete pipes at an invert of 197.77 m. The riser pipe outlet will be outfitted with a sluice gate to temporarily prevent discharge from the pond up to a

5-year storm event should concerns with stormwater quality arise. The gate will normally remain in the open position. In the event of a spill or if there is a potential to release impacted water (i.e., an oily sheen is visible in the pond), the gate shall be closed and the impacted waters shall be contained. The waters shall be tested and disposed of in accordance with the appropriate means and methods.

The proposed stormwater management pond will have a permanent pool volume of 1,266 m^3 and a total live storage volume in excess of 5,502 m^3. For the proposed vertical expansion conditions the pond will meet requirements for discharge with total off-Site discharge for the Regional storm event calculated to be 0.82 m^3/s. As outlined by the MOE Guidelines, the stormwater management pond will have sufficient capacity to detain the runoff from all storm events up to and including the Regional storm event. This volume is in excess of the MOE Draft Stormwater Management Planning and Design Manual (November, 1999) requirements for Level I (Enhanced) protection.

The proposed stormwater management construction details are presented on Drawings 12 and 13.

4.0 HYDROLOGIC ANALYSIS

The following hydrologic analysis was completed to calculate peak flows and runoff volumes from the Site under various storm event conditions. The computer model PCSWMM 2012 Version 5.0.022 was used to complete the analysis. Distinct design storm hyetographs were created in PCSWMM, based on the Environment Canada's Rainfall Intensity Duration Frequency (IDF) Values for the Hamilton Airport. The 2-, 5-, 10-, 25-, 50-, and 100-year 24-hour, SCS Type-2 distribution, storm events were considered in the hydrologic modelling to provide a design basis for on-Site SWM features (quantity control). The IDF Values for the each of these storm events are summarized in Table 1.

CRA also assessed the performance of the water quality management features using the 25-mm, 4-hour duration storm, consistent with MOE's "Storm Water Management Practices – Planning and Design Manual" (2003).

CRA has developed two model scenarios identified as follows:

1. The Currently Approved Post-Closure condition.
2. The Proposed Vertical Expansion condition

These modelling scenarios were compared to the results obtained from the original SWM Report for the Existing Condition and the Interim Condition (as presented within Appendix B).

4.1 MODELLING RESULTS

The stormwater management pond and drainage ditches were designed based on accepted methodologies, calculations, and analytical tools using the hydrologic model PCSWMM. Hydrologic modelling output for the currently approved condition is provided in Appendix C, and for the proposed vertical expansion is provided in Appendix D. Supporting engineering calculations are provided in Appendix E.

The hydrologic model was used to calculate the surface water runoff volumes for the Site under the various conditions.

Table 2 summarizes the model input parameters for the currently approved post-closure condition. Table 3 summarizes the model input parameters for the proposed vertical expansion condition.

Table 4 presents the calculated runoff peak flow rates for proposed vertical expansion conditions and compares them to the existing condition. The peak flows represent the overland runoff peak flows for the various catchments, with the off-site discharge peak flows presented as the Outlet peak flow values. The runoff peak flows for all storm events less than the 100-Year event decrease from existing to post-closure conditions, meeting the requirements set out in the MOE Guidelines. The Regional Storm Event generates a slightly higher peak flow as a result of the proposed development. The 75 mm-diameter orifice outlet provides in excess of 24 hours of extended detention of the 25 mm storm event runoff volume.

Table 5 summarizes the runoff volumes calculated for each catchment under the currently approved and proposed vertical expansion conditions and compares them to the existing condition. Because some surface water remains within certain catchments, the total Site runoff volume does not represent the total volume of surface water runoff actually discharged off site.

Table 6 summarizes pond performance showing peak inflows and outflows, maximum ponding elevations, and maximum storage volumes for the currently approved and proposed vertical expansion condition.

5.0 EROSION AND SEDIMENT CONTROL PLAN

The stormwater management pond was designed to promote settling of suspended particulate and to minimize re-suspension of the solid matter. The settling action will reduce suspended soil particles and other pollutants, which may be in particulate form and/or adhered to the soil particles.

The perimeter ditching network and stormwater management pond will be maintained by removal of collected sediment on an "as-required" basis to ensure that the ditching and pond continue to operate as designed. Accumulated sediment will be removed when the storage capacity of a channel or the pond is reduced by one third. All sediment removed during the operating life of the landfill will be returned to the active disposal area. Subsequent to landfill closure, all dredged sediments will be returned to the landfill and placed as final cover soil. Zones where sediments are placed as part of final cover activities shall be bounded by silt fence until such time as the vegetation has reached 70 percent of the native background density. Sediment transport from the landfill area will decrease as the vegetative cover over completed areas of the landfill is established.

Additional measures will also be employed to minimize sediment transport at the source and prevent runoff that has contacted landfilled waste, which may contain particulate and/or soluble pollutants, from migrating from the landfill area. These measures are as follows:

- temporary soil berms will be utilized throughout the active landfill disposal area to prevent runoff from leaving waste areas and to direct upgradient runoff around the active disposal area
- all water that has contacted landfilled waste will be treated as leachate and will be drained by a leachate system, pumped and transported off-Site for disposal
- rock and straw bale check dams and/or silt fences will be utilized in drainage swales and on slopes to enhance erosion and sedimentation control during and immediately after construction phases in locations where necessary

6.0 MONITORING PLANS

The Site is currently staffed full-time by landfill staff to oversee Site operations. Regular visual inspections shall be made on a monthly basis during active construction activities to assess the effectiveness of the erosion and sediment control measures implemented, and to conduct any required maintenance activities. After the period of active construction activities has been completed (final installation of the landfill cap), regular visual inspections shall be made on a bi-monthly basis until adequate Site stabilization is achieved.

Erosion and sediment controls shall be maintained until all disturbed areas of the Site, including the pond and swales, have fully stabilized and vegetated areas have achieved 70 percent of the native background density of growth.

The condition of all swales, culverts, vegetation, infiltration basin outlet, and outflow channels leading to the Brooks Road drainage ditch and off Site will be noted at regular intervals. Should any defects be identified, appropriate corrective actions will be scheduled and tracked. Regular maintenance of SWM Plan features and unscheduled corrective actions will be conducted during appropriate seasons and concurrent with other Site operations.

7.0 CONCLUSION

The proposed stormwater management measures meet the requirements set out by the MOE Guidelines.

The proposed stormwater management measures as described in this Stormwater Management Plan are based on the modeling and design calculations described in this report. These proposed measures consist of drainage ditches and a stormwater management pond. The internal drainage ditches and stormwater management pond are adequately sized to accommodate the peak flows and runoff volumes for the 25-year and Regional storm events respectively. The total off-site peak discharge rates for post-closure conditions will be less than existing conditions for all storm events.

Should you have any questions on the above, please do not hesitate to contact us.

All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

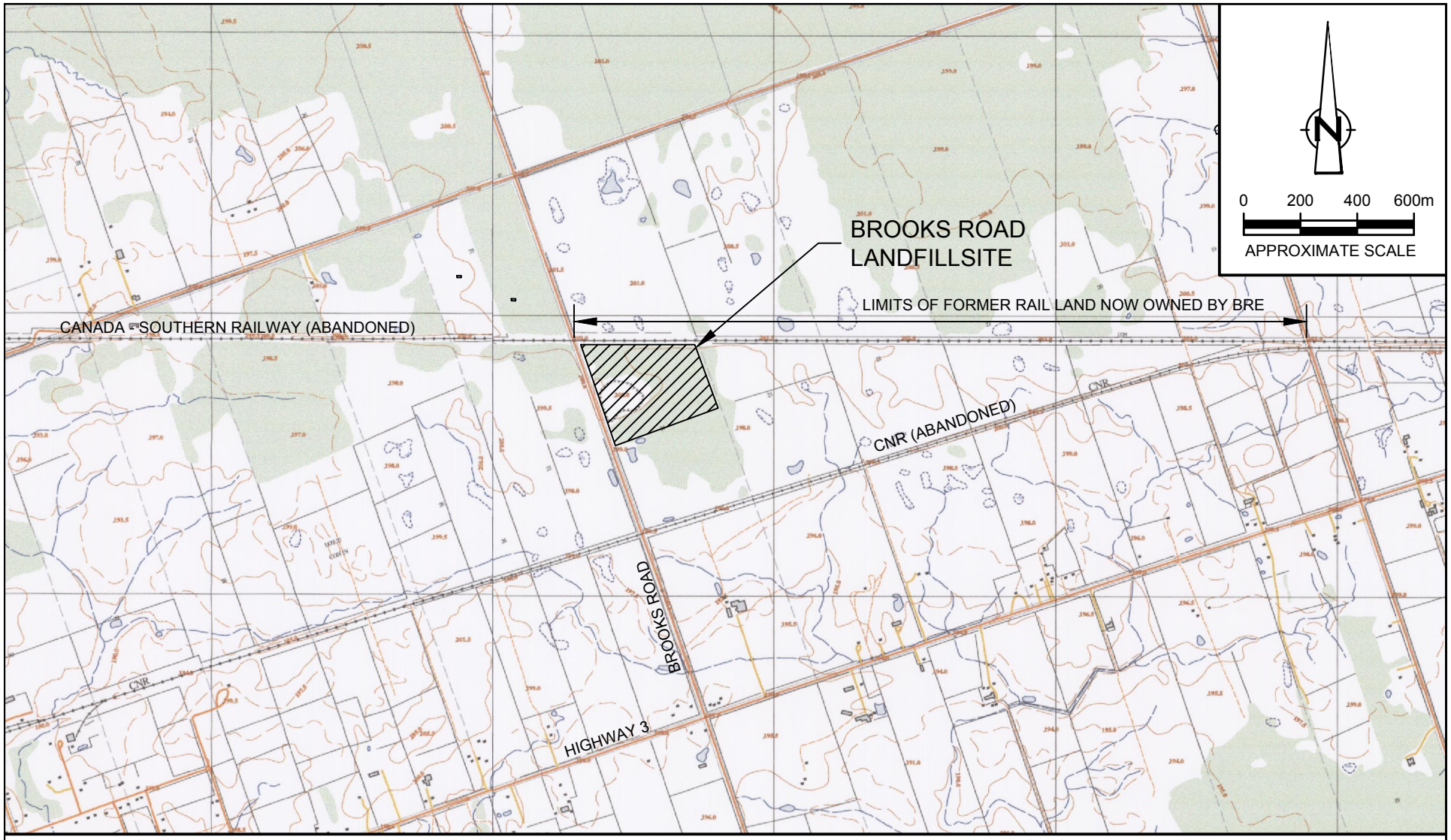
Gregory D. Ferraro, P. Eng.

Paul Farquarson, C.E.T.

8.0 REFERENCES

Conestoga-Rovers & Associates, "*Hydrogeologic Performance Assessment*" *dated October 2002*

Ontario Ministry of the Environment, "*Stormwater Management Planning and Design Manual*" dated March 2003.



SOURCE: MINISTRY OF NATURAL RESOURCES
SHEETS: 10 17 5900 47550 & 10 17 5950 47550

figure 1

SITE LOCATION MAP
BROOKS ROAD LANDFILL
Haldimand County, Ontario

18235-00(040)GN-WA001 SEP 10/2013

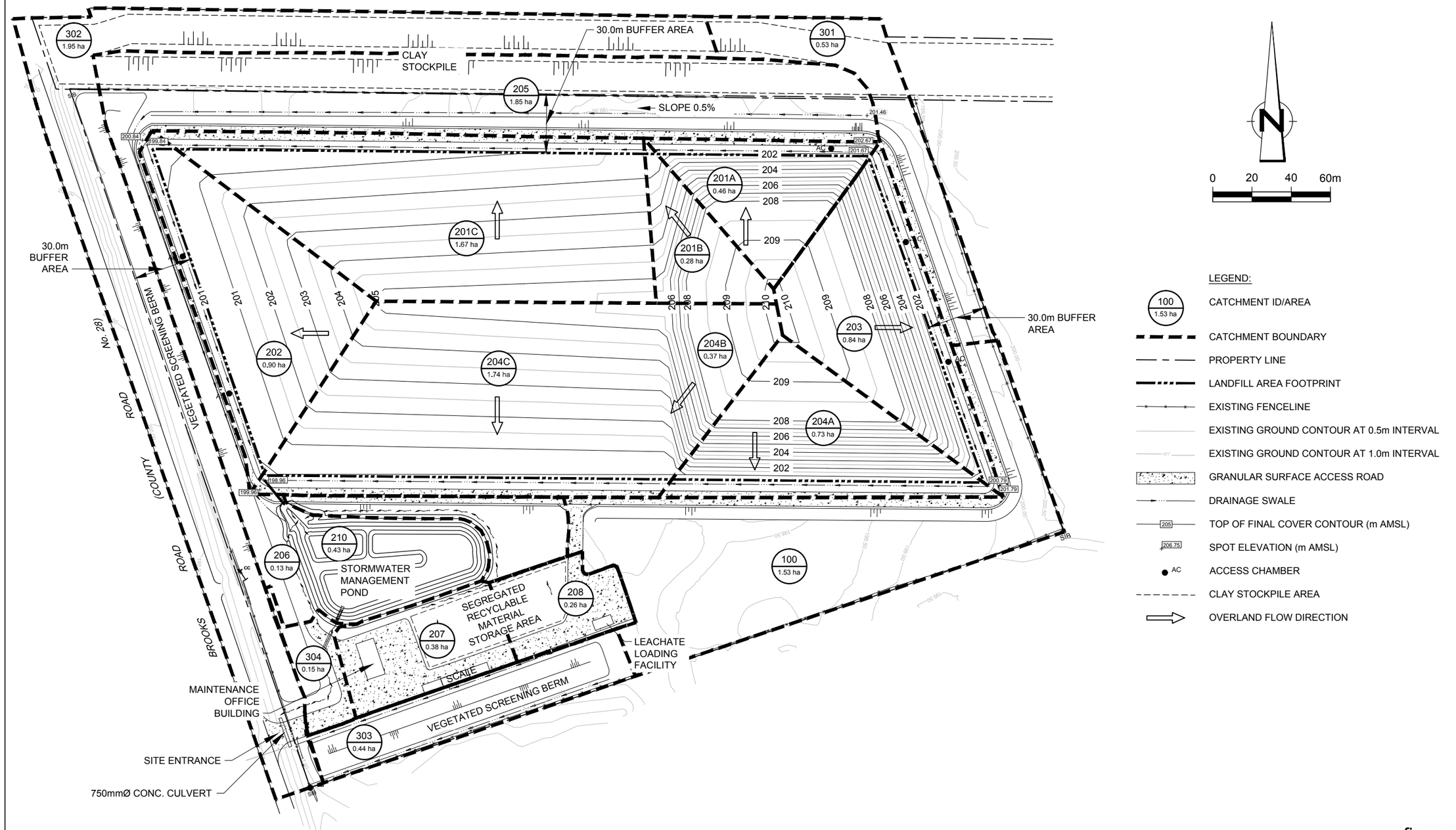


figure 2

CURRENTLY APPROVED POST CLOSURE CONDITION CATCHMENT DELINEATION
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

18235-00(040)GN-WA002 SEP 5/2013

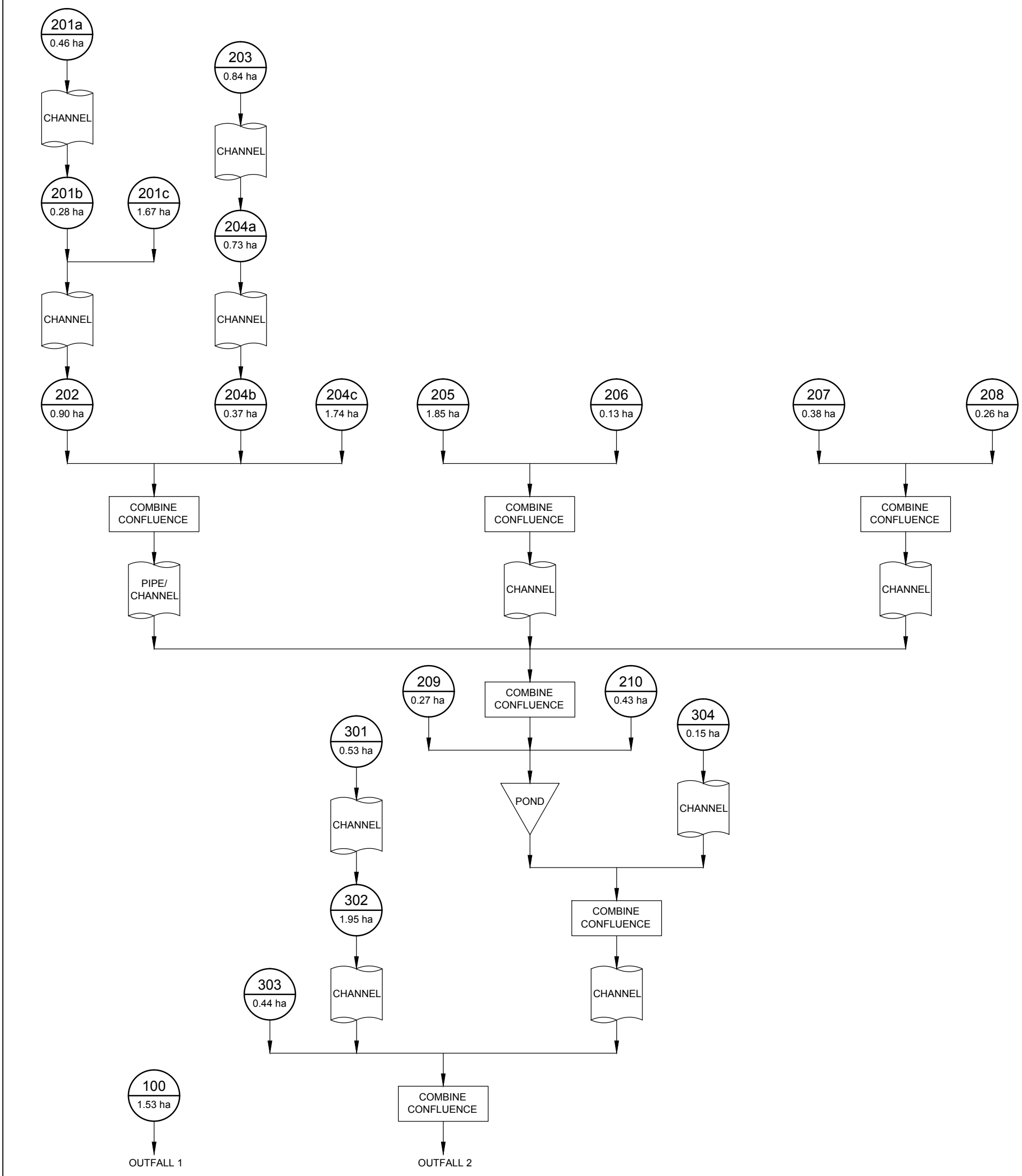


figure 3

CURRENTLY APPROVED POST CLOSURE CONDITION FLOW SCHEMATIC
BROOKS ROAD LANDFILL

Haldimand Country, Ontario

18235-00(040)GN-WA003 JUN 18/2013

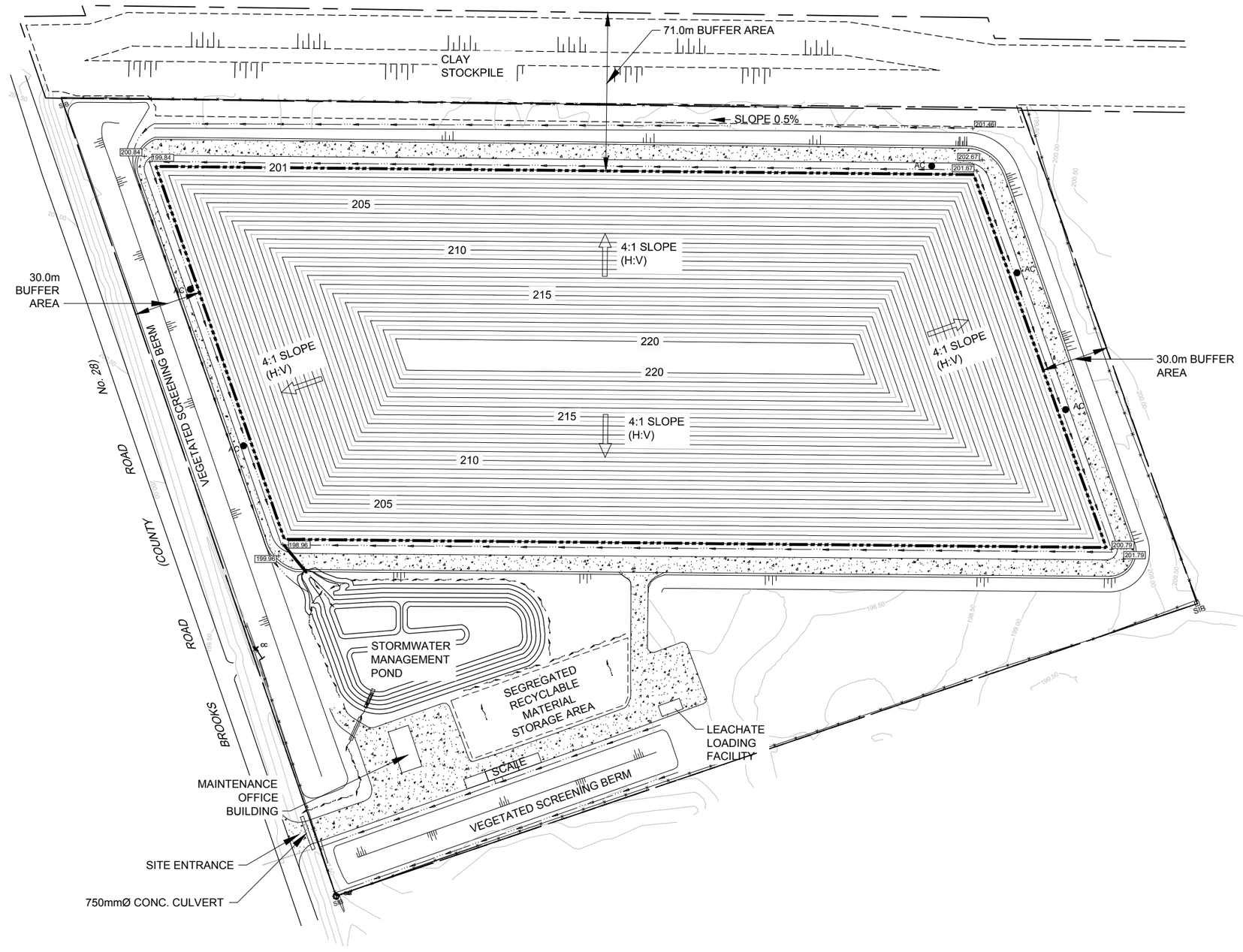


figure 4

PROPOSED FINAL CONTOURS
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

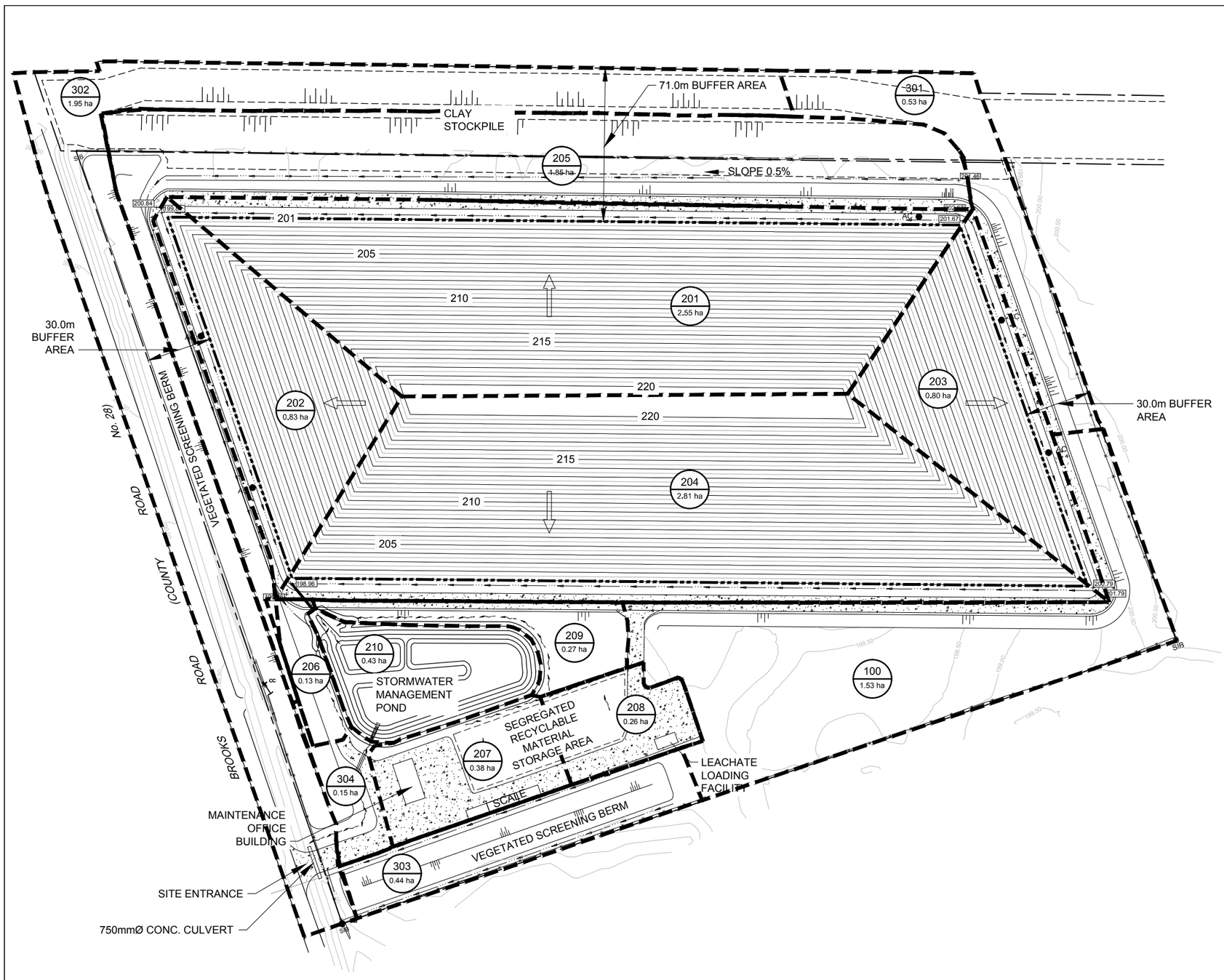


figure 5

PROPOSED VERTICAL EXPANSION CONDITION CATCHMENT DELINEATION
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

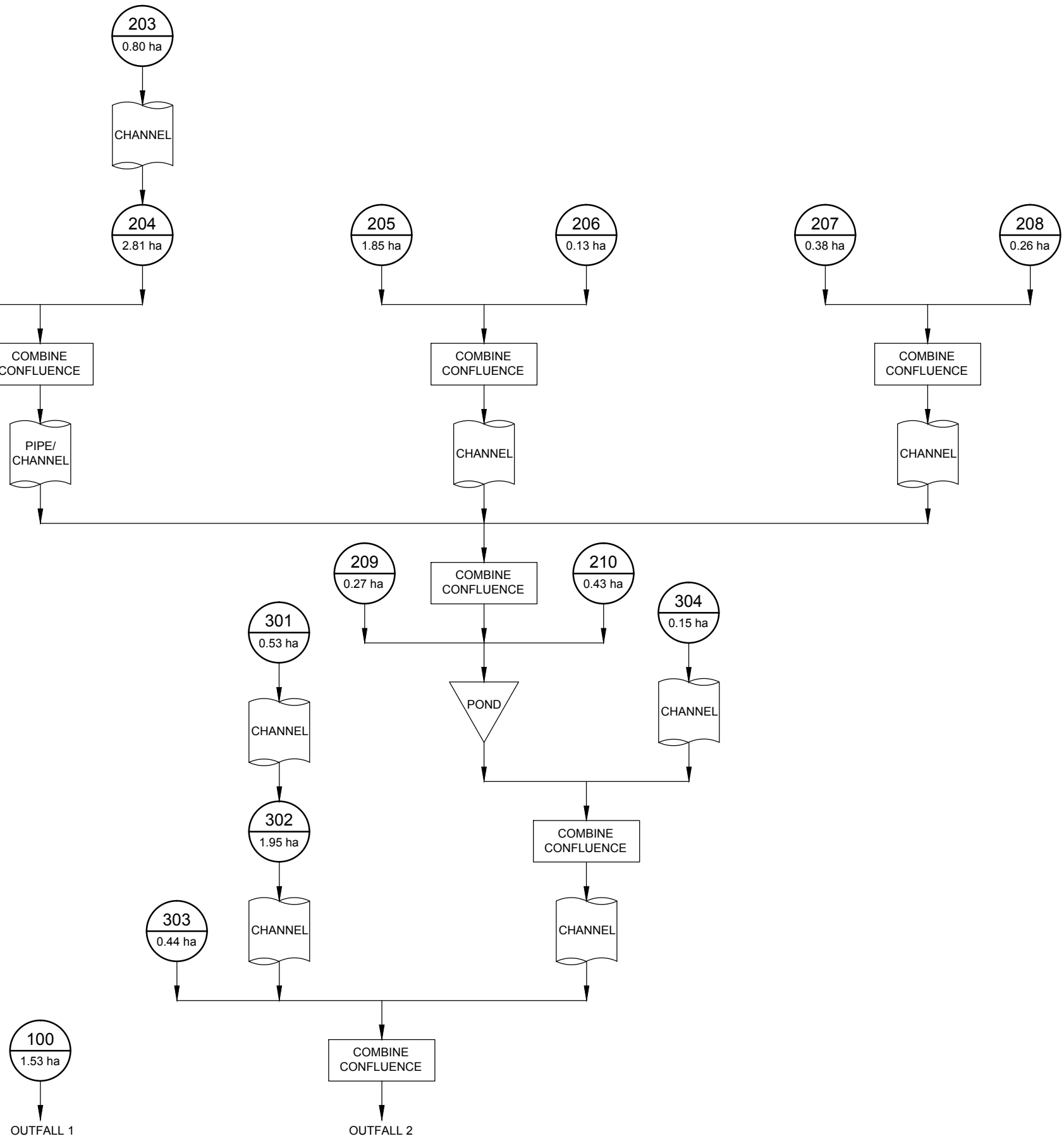


figure 6

PROPOSED VERTICAL EXPANSION CONDITION FLOW SCHEMATIC
BROOKS ROAD LANDFILL
Haldimand Country, Ontario

18235-00(040)GN-WA006 JUN 18/2013

TABLE 1

CITY OF HAMILTON DESIGN STORM PARAMETERS
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Design Storm	*Depth (mm)*	*Duration (hours)*	*Timestep (min.)*
25 mm	25	4	5
2-Year	34.2	3	5
5-Year	50.2	3	5
10-Year	60.8	3	5
25-Year	74.2	3	5
50-Year	84.1	3	5
100-Year	124.7	24	15
Regional (Hurricane Hazel)	212	12	15

Notes:

1. Storms based on Hamilton Airport data - Environment Canada Atmospheric Environment Service.

TABLE 2

CURRENTLY APPROVED POST CLOSURE CONDITION SUBCATCHMENT PARAMETERS
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Catchment ID	*Area*	*Flow Length*	*Slope*	*Impervious Area*	*Manning's*		*Depression Storage*		*Zero Imperv*	*Infiltration Parameters*	
					Impervious	*Pervious*	*Impervious*	*Pervious*		*Drying Time*	*SCS Curve*
	(ha)	*(m)*	*(%)*	*(%)*			*(mm)*	*(mm)*	*(%)*	*(days)*	*Number*
100	1.53	31	2	0	0.015	0.4	2	7	0	7	79
201a	0.46	61	13	5	0.015	0.33	2	10	0	7	73
201b	0.28	37	13	5	0.015	0.33	2	10	0	7	73
201c	1.67	81	8	5	0.015	0.33	2	10	0	7	73
202	0.90	86	7	7	0.015	0.33	2	10	0	7	73
203	0.84	84	12	5	0.015	0.33	2	10	0	4	72
204a	0.73	61	13	8	0.015	0.33	2	10	0	7	73
204b	0.37	31	13	8	0.015	0.33	2	10	0	7	73
204c	1.74	88	7	8	0.015	0.33	2	10	0	7	73
205	1.85	41	50	0	0.015	0.35	2	10	0	7	74
206	0.13	38	2	5	0.015	0.4	2	10	0	7	72
207	0.38	60	2	95	0.015	0.27	2	10	0	7	98
208	0.26	52	2	95	0.015	0.27	2	10	0	7	98
209	0.27	40	2	5	0.015	0.27	2	10	0	7	72
210	0.43	9	10	100	0.015	0.33	2	10	0	7	98
301	0.53	15	4	0	0.015	0.35	2	7	0	7	79
302	1.95	25	1	0	0.015	0.4	2	7	0	7	79
303	0.44	110	50	0	0.015	0.4	2	6	0	7	74
304	0.15	16	3	20	0.015	0.27	2	10	0	7	84
Total	14.91										

TABLE 3

PROPOSED VERTICAL EXPANSION POST CLOSURE CONDITION SUBCATCHMENT PARAMETERS
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Catchment ID	*Area*	*Flow Length*	*Slope*	*Impervious Area*	*Manning's*		*Depression Storage*		*Zero Imperv*	*Infiltration Parameters*	
					Impervious	*Pervious*	*Impervious*	*Pervious*		*Drying Time*	*SCS Curve*
	(ha)	*(m)*	*(%)*	*(%)*			*(mm)*	*(mm)*	*(%)*	*(days)*	*Number*
100	1.53	31	2	0	0.015	0.4	2	7	0	7	79
201	2.62	85	25	5	0.015	0.33	2	10	0	7	73
202	0.85	89	25	7	0.015	0.33	2	10	0	7	73
203	0.88	84	25	5	0.015	0.33	2	10	0	4	72
204	2.64	83	25	8	0.015	0.33	2	10	0	7	73
205	1.85	41	50	0	0.015	0.35	2	10	0	7	74
206	0.13	38	2	5	0.015	0.4	2	10	0	7	72
207	0.38	60	2	95	0.015	0.27	2	10	0	7	98
208	0.26	52	2	95	0.015	0.27	2	10	0	7	98
209	0.27	40	2	5	0.015	0.27	2	10	0	7	72
210	0.43	9	10	100	0.015	0.33	2	10	0	7	98
301	0.53	15	4	0	0.015	0.35	2	7	0	7	79
302	1.95	25	1	0	0.015	0.4	2	7	0	7	79
303	0.44	110	50	0	0.015	0.4	2	6	0	7	74
304	0.15	16	3	20	0.015	0.27	2	10	0	7	84
Total	14.91										

TABLE 4

SUMMARY OF RUNOFF PEAK FLOWS RATES
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (3 hr) (m^3/s)	*5-Year (3 hr) (m^3/s)*	*10-Year (3 hr) (m^3/s)*	*25-Year (3 hr) (m^3/s)*	*50-Year (3 hr) (m^3/s)*	*100-Year (3 hr) (m^3/s)*	*Regional (m^3/s)*	*4hr-25mm (m^3/s)*
Existing Conditions								
Site Total	0.11	0.29	0.45	0.70	0.90	0.98	0.94	--
Catchment Name								
Currently Approved Condition								
100	0.01	0.04	0.09	0.17	0.24	0.32	0.20	0.000
201a	0.00	0.01	0.02	0.04	0.07	0.10	0.06	0.004
201b	0.00	0.00	0.02	0.04	0.05	0.07	0.04	0.002
201c	0.01	0.02	0.05	0.12	0.18	0.29	0.21	0.014
202	0.01	0.02	0.03	0.07	0.10	0.15	0.11	0.011
203	0.01	0.01	0.03	0.06	0.09	0.15	0.10	0.007
204a	0.01	0.02	0.04	0.08	0.11	0.16	0.09	0.010
204b	0.01	0.01	0.03	0.06	0.08	0.09	0.05	0.005
204c	0.02	0.04	0.07	0.13	0.19	0.30	0.22	0.024
205	0.00	0.03	0.13	0.29	0.40	0.47	0.24	0.000
206	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.001
207	0.07	0.10	0.12	0.14	0.16	0.15	0.06	0.062
208	0.05	0.07	0.08	0.10	0.11	0.10	0.04	0.042
209	0.00	0.00	0.01	0.02	0.03	0.05	0.03	0.002
210	0.08	0.11	0.13	0.16	0.18	0.16	0.06	0.074
301	0.00	0.03	0.07	0.11	0.14	0.15	0.07	0.000
302	0.01	0.05	0.10	0.19	0.27	0.39	0.25	0.000
303	0.00	0.01	0.03	0.05	0.07	0.09	0.06	0.000
304	0.01	0.02	0.03	0.04	0.05	0.05	0.02	0.005
Site Total	0.02	0.08	0.22	0.33	0.40	0.52	1.06	0.003
Proposed Vertical Expansion Condition								
100	0.01	0.040	0.09	0.17	0.24	0.32	0.20	0.000
201	0.02	0.039	0.11	0.25	0.38	0.56	0.33	0.022
202	0.01	0.017	0.04	0.09	0.13	0.18	0.11	0.010
203	0.01	0.012	0.03	0.08	0.12	0.18	0.11	0.008
204	0.04	0.060	0.14	0.29	0.42	0.59	0.34	0.036
205	0.00	0.033	0.13	0.29	0.40	0.47	0.24	0.000
206	0.00	0.002	0.00	0.01	0.01	0.02	0.02	0.001
207	0.07	0.097	0.12	0.14	0.16	0.15	0.06	0.062
208	0.05	0.067	0.08	0.10	0.11	0.10	0.04	0.042
209	0.00	0.004	0.01	0.02	0.03	0.05	0.03	0.002
210	0.08	0.110	0.13	0.16	0.18	0.16	0.06	0.074
301	0.00	0.035	0.07	0.11	0.14	0.15	0.07	0.000
302	0.01	0.046	0.10	0.19	0.27	0.39	0.25	0.000
303	0.00	0.011	0.03	0.05	0.07	0.09	0.06	0.000
304	0.01	0.018	0.03	0.04	0.05	0.05	0.02	0.005
Site Total	0.02	0.08	0.24	0.33	0.40	0.51	1.06	0.003

TABLE 5

SUMMARY OF RUNOFF VOLUMES
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (3 hr) (m^3)	*5-Year (3 hr)* (m^3)	*10-Year (3 hr)* (m^3)	*25-Year (3 hr)* (m^3)	*50-Year (3 hr)* (m^3)	*100-Year (3 hr)* (m^3)	*Regional* (m^3)	*4hr-25mm* (m^3)
Existing Conditions								
Site Total	1,119	2,375	3,340	4,659	5,697	10,232	20,999	--
Catchment Name								
Currently Approved Condition								
100	40	190	300	450	570	1100	2320	0
201a	10	40	70	110	140	290	640	10
201b	0	20	40	70	90	180	390	0
201c	30	120	230	380	500	1040	2300	20
202	20	70	130	210	280	570	1250	10
203	10	60	110	190	240	510	1140	10
204a	20	70	120	180	240	470	1030	10
204b	10	40	60	100	120	240	520	10
204c	50	150	260	420	540	1120	2440	30
205	0	130	260	430	560	1150	2560	0
206	0	10	20	30	40	80	180	0
207	120	180	220	270	310	460	800	90
208	80	120	150	190	210	320	540	60
209	0	20	40	60	80	170	370	0
210	140	210	250	310	350	530	900	100
301	20	70	110	160	210	390	810	0
302	50	230	370	570	720	1400	2950	0
303	10	50	70	110	140	290	620	0
304	10	30	50	60	80	130	260	10
Site Total	620	1,810	2,860	4,300	5,420	10,440	22,020	360
Proposed Vertical Expansion Condition								
100	40	190	300	450	570	1120	2320	0
201	40	210	380	620	800	1670	3630	30
202	20	70	130	210	270	550	1190	10
203	10	70	120	200	260	550	1200	10
204	70	250	420	660	850	1740	3720	50
205	0	130	260	430	560	1160	2560	0
206	0	10	20	30	40	80	180	0
207	120	180	220	270	310	470	800	90
208	80	120	150	190	210	320	540	60
209	0	20	40	60	80	170	370	0
210	140	210	250	310	350	530	900	100
301	20	70	110	160	210	390	810	0
302	50	230	370	570	720	1430	2950	0
303	10	50	70	110	140	290	620	0
304	10	30	50	60	80	130	260	10
Site Total	610	1,840	2,890	4,330	5,450	10,600	22,050	360

TABLE 6

SUMMARY OF STORMWATER MANAGEMENT POND PERFORMANCE
STORMWATER MANAGMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Currently Approved Condition

Design Storm	*Peak Inflow (m^3/s)*	*Peak Outflow (m^3/s)*	*Maximum Depth (m)*	*Maximum Elevation (m AMSL)*	*Maximum Volume (m^3)*
2-Year (3 hr)	0.267	0.004	0.16	198.01	458
5-Year (3 hr)	0.342	0.052	0.34	198.19	1,040
10-Year (3 hr)	0.431	0.155	0.390	198.24	1,208
25-Year (3 hr)	0.589	0.229	0.510	198.36	1,631
50-Year (3 hr)	0.725	0.284	0.630	198.48	2,067
100-Year (3 hr)	1.100	0.362	0.850	198.70	2,885
Regional	1.167	0.832	1.500	199.35	5,657
4hr-25mm	0.258	0.003	0.110	197.96	319

Proposed Vertical Expansion

Design Storm	*Peak Inflow (m^3/s)*	*Peak Outflow (m^3/s)*	*Maximum Depth (m)*	*Maximum Elevation (m AMSL)*	*Maximum Volume (m^3)*
2-Year (3 hr)	0.260	0.004	0.16	198.01	451
5-Year (3 hr)	0.333	0.056	0.34	198.19	1,047
10-Year (3 hr)	0.416	0.172	0.390	198.24	1,208
25-Year (3 hr)	0.547	0.240	0.510	198.36	1,630
50-Year (3 hr)	0.682	0.287	0.640	198.49	2,091
100-Year (3 hr)	1.055	0.365	0.850	198.70	2,894
Regional	1.159	0.815	1.490	199.34	5,630
4hr-25mm	0.255	0.003	0.110	197.96	313

APPENDIX A

PRE-APPLICATION CONSULTATION RECORDS

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited CONTRACT NO.: 018235 (33)

RE: Progress Meeting No. 6

LOCATION: Brooks Road Landfill Site DATE: November 01, 2012 TIME: 1:00 pm

Participants:

Reid Robertson (BRE)	Allison Butcher (MOE)	Paul Zizek (Tervita)	Jordan Wilson (Tervita)
Dan Roberts (Tervita)	Peter Kemp (CRA)	Dan Turner (CRA)	

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	Richard Weldon (BRE)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the October 16, 2012 Progress Meeting No. 5 were reviewed. The following items were noted: • Drainage stone submittal has been submitted by Tervita and approved by CRA • Geotextile roll certificates have been submitted by Tervita and under review by CRA • Tervita to submit finalized Off-Site Transportation and Disposal Plan	 CRA Tervita
2.	**Work progress and Construction Progress Schedule** An updated construction schedule is provided as an attachment to the minutes. Key changes include: • HDPE liner installation anticipated to begin November 12, 2012 and complete November 21, 2012 • Current schedule anticipates cell completion on December 11, 2012	
3.	**Field Observations, Problems, and Decisions** Weather over the past week has caused significant delays due to high volumes of precipitation. Wet weather conditions have pushed the construction schedule back approximately 1 week. Accumulated water in the Stage 2A cell is being pumped to the TDS pond. The pond will be sampled this Friday and Reid will have a quicker turnaround time applied to the sample results in order to discharge water to the roadside ditch sooner.	

Item	*Description*	*Action By*
3.	**<u>Field Observations, Problems, and Decisions</u> (cont'd)** Zizek – Will look into bringing in a second packer to work on the south slope for the compacted clay liner (CCL). Using this approach would not reduce the working days necessary for cell completion, but would act as a contingency to ensure that there are no delays associated with subsequent HDPE liner installation. Approximately 2 to 3 days are required to decommission the estimated 1,500 cubic metres of waste in the Phase 1 Decommissioning Area that is above the remaining clay to be excavated for Stage 2A cell construction. This quantity is in addition to the estimated 10,000 cubic metres of waste in the Phase 1 area that is outside of the clay excavation area. The 1,500 cubic metres of waste will be directly hauled and disposed of in the Stage 1 cell. Kemp – Proposes to temporarily stockpile the remaining 10,000 cubic metres of waste in the Stage 1 cell, as opposed to the Phase 2 Decommissioning Area, with the intention of moving the waste into the Stage 2A cell when completed. Ideally, the waste would be moved into the Stage 2A cell after an appropriate lift of incoming waste were placed on the base of the cell in order to optimize the leachate collection system. The additional benefit would be significant time savings associated with decommissioning the Phase 2 area.	Tervita
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** If wet weather conditions persist, further delays can be expected. No other problems were identified at this time.	
5.	**<u>Submittals Schedule and Status of Submittals</u>** Tervita to submit finalized Off-Site Transportation and Disposal Plan	
6.	**<u>Health and Safety Concerns</u>** No health and safety concerns were identified at this time. Open excavation areas have been promptly taped off and appropriate signage has been set up.	
7.	**<u>Maintenance of Progress Schedule</u>** The construction schedule has been updated to reflect delays associated with unfavourable weather conditions. Zizek – A proposed shutdown has been built into the construction schedule at Christmas time. Actual days for shutdown will be contingent on work progress to date.	
8.	**<u>Effect of Proposed Changes on Progress Schedule and Coordination</u>** There are no proposed changes at this time.	

CONESTOGA-ROVERS & ASSOCIATES

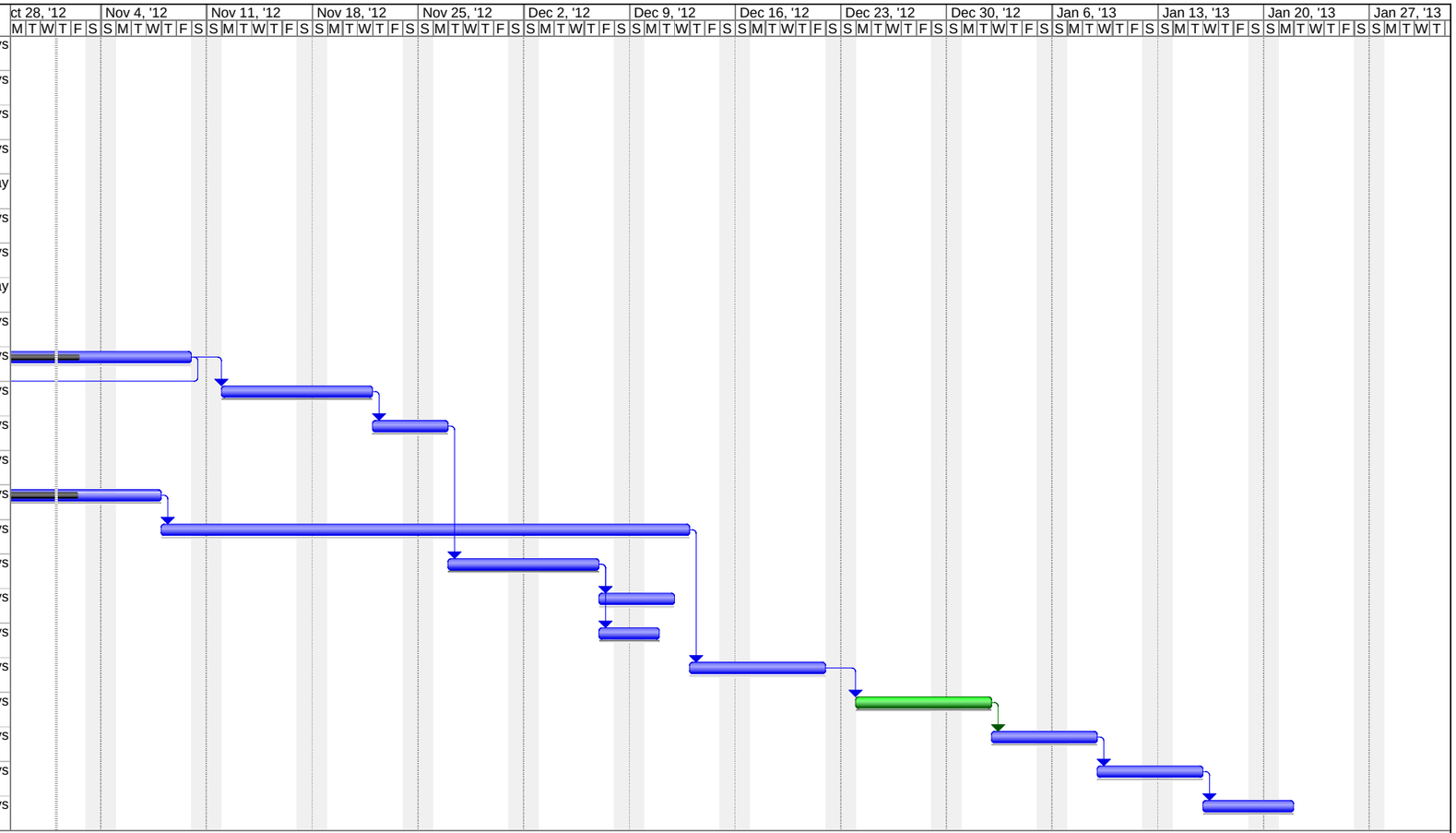
Item	*Description*	*Action By*
9.	**Contract Administration** Payment Certificate 3 has been executed. Tervita will provide Payment Certificate 4 for CRA review on Friday November 9, 2012.	
10.	**Other Business Relating to the Work** Butcher – Noted that groundwater sampling is to be completed this month at the Site. Asked whether any decision has been made regarding the damaged wells on the northern perimeter of the site. Also noted that there may be a damaged well at the southeastern portion of the Site. Kemp – The location of the damaged wells and the subsurface soil conditions in which they are installed needs to be assessed to determine whether the wells can be moved. The concern with reinstalling the wells in the same locations is that there is a risk of reoccurring damage. Butcher – A proposal may be submitted to the MOE detailing the reinstallation of the groundwater monitoring wells. Butcher – Noted some exposed waste at the north end of the Stage 1 cell due to heavy rainfall. Robertson – Has discussed the exposed waste with Tervita and cover material will be placed over the exposed area. Kemp – Due to weather conditions, the site survey required for the Interim Stormwater Management Plan has been delayed. Is it possible to adjust the submission time of the Interim Stormwater Management Plan? Butcher – May be able to adjust the submission time to accommodate the delay. Peter Kemp to send an email detailing the proposed delay.	CRA CRA

☒ Attachments: Updated Project Schedule

Prepared By: Dan Turner and Peter Kemp Date Issued: November 9, 2012

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

ID	Task Name	Duration
1	Notice to Proceed	0 days
2	Mobilization and Startup (includes silt fencing/straw bale check dams)	5 days
3	Clearing and grubbing	3 days
4	Set-up of staging and decon for first stage of waste excavation	2 days
5	Completion of east temporary berm	1 day
6	Bulk Clay Excavation (approximately 9,000 m3)	5 days
7	Direct haul of 9000 m3 of waste to Cell 1 (including 500 m3 of possible segregation)	7 days
8	Completion of temporary berm along west and south extents of waste removed	1 day
9	Excavate and stockpile on-site approximately 39,000 m3 of native clay	19 days
10	Construction of Compacted Clay Layer	27 days
11	HDPE liner	8 days
12	Non-woven geotextile	3 days
13	Completion of temporary divider berm as per drawing C-03	2 days
14	Excavate 5000 m3 of waste and stockpile on Phase 2	14 days
15	Excavate and stockpile on-site approximately 43,000 m3 of native clay	25 days
16	Drainage layer material/Leachate pipe installation	8 days
17	Woven geotextile	3 days
18	Video inspection of leachate collection system pipe	2 days
19	Excavate remaining 10000 m3 of waste and stockpile on Phase 2	7 days
20	Christmas Break	7 days
21	Backfill and grading of decommissioning areas	5 days
22	Hydroseeding	5 days
23	Demobilization and closeout	4 days



Project: Draft Brooks Actual Schedule
Date: Thu 11/1/12

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited CONTRACT NO.: 018235 (33)

RE: Progress Meeting No. 9

LOCATION: Brooks Road Landfill Site DATE: December 11, 2012 TIME: 9:30 am

Participants:

Richard Weldon (BRE)	Reid Robertson (BRE)	Paul Zizek (Tervita)	Dan Roberts (Tervita)
Allison Butcher (MOE)	Peter Kemp (CRA)	Dan Turner (CRA)	

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	John Beals (MOE)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the November 27, 2012 Progress Meeting No. 8 were reviewed. The following items were noted:	
	• Tervita to submit finalized Off-Site Transportation and Disposal Plan.	Tervita
	• CRA has received comments from the MOE regarding the Interim Stormwater Management Plan (ISWMP). CRA to address comments and resubmit to the MOE.	CRA
	• Tervita confirmed receipt of payment for Payment Certificate 4.	
	• MOE has provided a letter detailing an allowance for temporary stockpiling of historical waste on the Stage 1 cell.	
	• CRA and Tervita will discuss the required change order for removal of Phase II Decommissioning Area waste.	CRA/Tervita
	• CRA and Tervita have discussed the temporary separation berm design between Stage 2A and 2B. The berm will not be modified from the original design.	
	• The leachate collection pipes have been installed in Stage 2A. The northern pipe was installed at a modified slope due to the Stage 1 pipe being constructed at a higher elevation than designed.	
	• Tervita has submitted QA/QC information for HDPE liner installation from Terrafix to CRA with the exception of the required subgrade acceptance forms. Tervita to submit the remaining information from Terrafix.	Tervita
	• Tervita has submitted some gradation samples for the drainage stone and will continue to submit samples as they are received.	Tervita

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
1.	**<u>Review of Previous Meeting Minutes</u> (cont'd)**	
	• Payment Certificate 5 has been submitted to CRA and a recommendation for payment will be issued pending receipt of statutory declaration from Tervita.	Tervita
	• Tervita to submit costs for cleaning leachate collection system piping for CRA to develop a change order. Cleaning of leachate collection pipes to be done in conjunction with the video inspection of the leachate collection pipes.	Tervita
	• Six soil gas probes have been installed at the site. MOE requested a drawing showing the locations of the installed probes, as well as a letter detailing the reasoning for installing six probes instead of the eight stipulated in the approved Design and Operations Report (CRA, 2003). MOE also noted that the letter can contain a request for revised landfill gas monitoring frequency as was previously discussed by CRA.	CRA
2.	**<u>Work progress and Construction Progress Schedule</u>** Zizek – Detailed progress to date and expected completion times • The drainage stone in the base of the cell will be graded today and tomorrow • Leachate pipes have been installed • Drainage stone placement on sideslopes is taking longer than expected. • Cell completion is anticipated for mid next week • It will likely take 1 week to construct a ramp of waste into Stage 2A Weldon – Requested 3 days' notice of cell completion.	Tervita
3.	**<u>Field Observations, Problems, and Decisions</u>** Turner – While attempting to push stone up the northern sideslope, the non-woven geotextile pulled down and the HDPE liner was damaged. The damage has been repaired however Tervita will need a new method for stone placement to prevent further damage. Zizek/Roberts – The anchor trenches will be backfilled to prevent geotextile movement and the stone will be placed halfway up the slope in a 1-metre-thick lift before slowly pushing stone up the remaining portion of the slope. There is potential to bring in another dozer to expedite the process.	
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** No problems were identified at this time.	
5.	**<u>Submittals Schedule and Status of Submittals</u>**	
	• Tervita to submit finalized Off-Site Transportation and Disposal Plan	Tervita
	• Tervita to submit Terrafix subgrade acceptance forms to CRA	Tervita
	• Tervita to submit gradation testing for drainage stone to CRA	Tervita

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
6.	**Health and Safety Concerns** No health and safety concerns were identified at this time.	
7.	**Maintenance of Progress Schedule** No maintenance is required on the progress schedule at this time.	
8.	**Effect of Proposed Changes on Progress Schedule and Coordination** There are no proposed changes at this time.	
9.	**Contract Administration** Payment Certificate 5 statutory declaration will be submitted Wednesday, December 12. A change order will be developed for Phase II decommissioning. A change order will be developed for cleaning of leachate pipes concurrently with the video inspection.	Tervita CRA/Tervita CRA/Tervita
10.	**Other Business Relating to the Work** No other business was identified at this time	

☐ Attachments: _____

Prepared By: Dan Turner and Peter Kemp Date Issued: January 7, 2012

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited

CONTRACT NO.: 018235 (33)

RE: Construction Progress Meeting No. 12

LOCATION: Brooks Road Landfill Site

DATE: February 14, 2013

TIME: 11:00 AM

Participants:

Richard Weldon (BRE)	Reid Robertson (BRE)	Doug Robinson (BRE)	Paul Zizek (Tervita)
Jordan Wilson (Tervita)	Allison Butcher (MOE)	Peter Kemp (CRA)	Dan Turner (CRA)

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	Joel Rider (Tervita)
		John Beals (MOE)	Dan Roberts (Tervita)	Brad Farnand (MOE)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the January 30, 2013 Progress Meeting No. 11 were reviewed. The following items were noted:	
	• The MOE district office has received the letter application to revise the landfill gas monitoring frequency. Allison Butcher to check on status of request with Approvals Branch.	MOE
	• Tervita completed repairs upon returning to work after unfavourable weather conditions including: placing cover over exposed Phase II waste, reconstructing divider berm in the vicinity of the disposal trench, and completing the final panel of woven geotextile on the north sideslope.	
	• Tervita has provided an updated construction schedule	
	• CRA has developed a Change Order for Stage 1 grading of waste to final contours and interim cover application. Brooks Road to review and approve the Change Order.	BRE
	• Brooks Road to send PLC minutes to CRA and develop action item list for distribution to PLC prior to next meeting.	BRE
	• Brooks Road to develop Terms of Reference for PLC meeting	BRE
	• CRA requested MOE notes from PLC meeting. Butcher to send notes to Kemp	MOE
	• Robinson – Noted that the application for alternative daily cover is broad and may take more time to approve. Requested that Butcher look into the possibility of pre-approving tarps as an alternative daily cover in the interim.	

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
1.	**<u>Review of Previous Meeting Minutes</u> (cont'd)**	
	• Butcher – Will look into possibility of pre-approval	MOE
	• Three Baker tanks have arrived on-Site and Brooks Road intends to store leachate in the tanks until a leachate treatment system is installed on-Site. Brooks Road is looking into an insulation material for the tanks comprised of agricultural material.	
	• Butcher – Would like to talk to agricultural group of MOE about feasibility of using this material as insulation.	
	• Wilson – Could use submersible pumps to keep stored leachate from freezing.	
	• CRA estimated that approximately 1,000,000 litres of leachate is present in the landfill when the leachate level is at 60 cm.	
	• CRA requested information on leachate quantity trucked off-Site in order to estimate the leachate generation rate. BRE to supply trucking invoices.	BRE
2.	**<u>Work progress and Construction Progress Schedule</u>** Zizek – Detailed progress to date and expected completion times: • Phase I decommissioning will be completed today • Phase II decommissioning scheduled to begin Monday • Item 18 in the attached schedule (excavation of remaining Stage 2 clay) includes approximately 11,000 m^3. This material will be used to backfill decommissioned areas. • Contract Works, including Stage 1 waste grading/interim capping and ISWMP Works, are scheduled to be complete at the end of June Weldon – Wants interim capping works expedited to minimize leachate generation.	
3.	**<u>Field Observations, Problems, and Decisions</u>** Zizek – Weather conditions have prevented Tervita from working 7 out of 20 days in January. Turner – A small amount of exposed waste noted in Phase II has been covered. Area E and C wastes from drum staging pad have been relocated to the Stage 1 cell based on sample results characterizing the waste as non-hazardous. At the request of the MOE, the area where the waste was disposed of was measured out and logged in CRA field notes. Robinson – Requested Tervita leave a clay berm at the northern access point to Stage 1 to prevent runoff.	
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** No problems were identified at this time	

Item	*Description*	*Action By*
5.	**Submittals Schedule and Status of Submittals**	
	• Tervita to submit finalized Off-Site Transportation Plan (carry over)	Tervita
	• Tervita to submit remaining gradation test results for drainage stone	Tervita
	• Tervita to submit costs for cleaning leachate pipes for CRA to develop a change order.	Tervita
6.	**Health and Safety Concerns** No health and safety concerns were identified at this time.	
7.	**Maintenance of Progress Schedule** No maintenance is required on the progress schedule at this time	
8.	**Effect of Proposed Changes on Progress Schedule and Coordination** There are no proposed changes at this time	
9.	**Contract Administration**	
	• CRA to develop RFQ for ISWMP Works	CRA
	• CRA to review Payment Certificate 7 and provide recommendation for payment	CRA
	• Tervita to submit Payment Certificate 8 for CRA review	Tervita
10.	**Other Business Relating to the Work** Butcher – Inquired about the operational status of the wells on the northern Site boundary and the one well at the eastern boundary. Also inquired if there were plans for reinstallation. Kemp – Genivar would have determined if the eastern well is still useable during the previous sampling round. The wells in the north will be reinstalled prior to the next sampling event (May 2013). Butcher – Brooks Road requires approval if the wells are to move locations. Butcher – Inquired about the status of the fencing repairs. Robertson – Contractors were here to repair fencing and install gate but the weather prevented access to the northwest area of the site. They will be returning soon to complete the repairs. Butcher – The ISWMP Works and Stage 1 waste grading/interim capping was scheduled to start in February. Is this still the case? Kemp – Weather delays have pushed the schedule back for the ISWMP and Stage 1 Works. The Works are still scheduled to be completed following waste decommissioning.	

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
11.	**Next Meeting** Tuesday March 5, 2013 at 10:00 am.	

☐ Attachments: _____

Prepared By: Dan Turner and Peter Kemp Date Issued: March 4, 2013

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

CONESTOGA-ROVERS & ASSOCIATES

MEETING MINUTES

Reference No. 018235

PROJECT: Site Decommissioning and Stage 2A Construction

OWNER: Brooks Road Environmental c/o 2270386 Ontario Limited CONTRACT NO.: 018235 (33)

RE: Construction Progress Meeting No. 14

LOCATION: Brooks Road Landfill Site DATE: March 21, 2013 TIME: 11:00 AM

Participants:

Mark Collins (BRE)	Brad Farnand (MOE)	Paul Zizek (Tervita)	Joel Rider (Tervita)
Peter Kemp (CRA)	Dan Turner (CRA)		

Distribution:	Attendees	Greg Ferraro (CRA)	Don Campbell (CRA)	John Beals (MOE)
		Richard Weldon (BRE)	Dan Roberts (Tervita)	Jordan Wilson (Tervita)

Item	*Description*	*Action By*
1.	**Review of Previous Meeting Minutes** The meeting minutes from the March 5, 2013 Progress Meeting No. 13 were reviewed. The following items were noted: • Brad Farnand spoke with Dickson regarding the letter application for alternative daily cover. Dickson confirmed that he has the application and is aware that the approval of tarps is considered a priority for Brooks Road. Brad suggested that BRE call Dickson for an update. • Tervita has submitted the remaining gradation test results for the drainage stone. • CRA will provide Tervita with the ISWMP request for quotation by end of day. • Paul Zizek confirmed that BRE has paid Payment Certificates 7 and 8. • CRA has revised the Payment Certificate template to incorporate Change Orders 5 and 6. • Tervita has submitted Payment Certificate 9 for CRA review. • CRA is currently reviewing historical monitoring data to update the Site Monitoring Plan. • The northwestern perimeter gate has been repaired and the fence repairs are underway. • MOE requested notice of confirmatory sampling in the vicinity of TP4-2 (where waste was characterized as hazardous for lead). The waste excavation and confirmatory sampling in this area is scheduled for Monday, March 25.	BRE

Item	*Description*	*Action By*
2.	**<u>Work progress and Construction Progress Schedule</u>** Zizek – Detailed progress to date and expected completion times: - The Phase II decommissioning is 90 percent complete. Estimated to be 3 days of waste excavation remaining. - Exposing 1-metre of woven geotextile around the perimeter of the Stage 1 cell will be completed today. - Cut and fill of Stage 1 waste will be completed tomorrow. - The interim capping of Stage 1 will commence Monday and is estimated to be complete in 1 week. The packer will arrive on Monday, March 25. - Backfilling of decommissioned areas will be completed between other tasks. Turner – Noted that a confirmatory soil sample did not pass O. Reg 511/09 Table 2 standards for hot water extractable boron. This area requires further excavation and re-sampling prior to backfilling. Kemp – There is a potential for waste to be present in the right of way in the northwest corner of the Phase II Decommissioning Area. CRA has an excavation/occupation permit form to be completed prior to work in the right of way. CRA will send information to Tervita.	CRA
3.	**<u>Field Observations, Problems, and Decisions</u>** Turner – After commencing the waste excavation in the vicinity of Area A, free product was observed and CRA determined that further waste characterization was required in this area. Tervita and CRA completed test pits in the area to collect samples for waste characterization in place to minimize the handling requirements. Sample results will determine the required end location for the waste streams. All liquid waste in this area will be pumped into tanks for off-Site disposal. Collins – Some exposed waste in the Stage 2A cell in the vicinity of Tervita's work area requires cover by end of day.	
4.	**<u>Problems Having Potential to Impede Planned Progress</u>** No problems were identified at this time	
5.	**<u>Submittals Schedule and Status of Submittals</u>** • Tervita to submit finalized Off-Site Transportation Plan (Tervita currently in discussion with CRA) • Tervita to submit costs for cleaning leachate pipes for CRA to develop a change order. Zizek noted that the inspection could be moved to a later date if the Stage 2B cell is going to be lined.	Tervita Tervita

CONESTOGA-ROVERS & ASSOCIATES

Item	*Description*	*Action By*
6.	**Health and Safety Concerns** Turner – Work in Area A requires Level C PPE. A JSA has been prepared by Tervita and reviewed by all parties involved in work in this area.	
7.	**Maintenance of Progress Schedule** No maintenance is required on the progress schedule at this time	
8.	**Effect of Proposed Changes on Progress Schedule and Coordination** The ISWMP work will require an updated schedule. To be completed once Tervita provides a quote.	
9.	**Contract Administration** • CRA to develop an RFQ for ISWMP Works by end of day • CRA to review Payment Certificate 9 • Zizek inquired about starting an RFQ for Stage 2B work to provide more time for pricing	 CRA CRA
10.	**Other Business Relating to the Work** Rider – The silt fencing along the western boundary of the Phase II Decommissioning Area will be moved to the property boundary Farnand – Inquired about the status of the secondary containment around the Baker tanks. Collins – Richard Weldon is considering the decision to keep the Baker tanks and complete the secondary containment or remove the tanks.	
11.	**Next Meeting** April 8, 2013 at 11:00 am.	

☐ Attachments: _____

Prepared By: Dan Turner, Peter Kemp Date Issued: April 1, 2013

This confirms and records CRA's interpretation of the discussions which occurred and our understanding reached during this meeting. Unless notified in writing within 3 days of the date issued, we will assume that the following interpretation or description is complete and accurate.

APPENDIX B

TECHNICAL MEMO – UPDATED INTERIM STORMWATER MANAGMENT PLAN
(JANUARY 3, 2013)

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

TECHNICAL MEMORANDUM

TO:	Richard Weldon (Brooks Road Environmental c/o 2270386 Ontario Limited)	REF. NO.:	018235-10
FROM:	Peter Kemp/mg/82rev3 P.K.	DATE:	January 3, 2013
CC:	Greg Ferraro		
RE:	**Updated Interim Stormwater Management Plan Brooks Road Landfill Site Haldimand County, Ontario**		

1.0 INTRODUCTION

An interim stormwater management plan (ISWMP) has been developed for the Brooks Road Landfill (Site) in response to the Ministry of the Environment (MOE) request for an ISWMP to be implemented at the Site until the permanent stormwater management plan (PSWMP) is implemented. The ISWMP has been developed to manage surface water runoff discharging from the Site through use of the approved temporary dewatering sedimentation (TDS) pond. This memo presents the ISWMP as updated to address the MOE comments received on the initial ISWMP submitted on November 28, 2012, the revised ISWMP submitted on December 14, 2012, and the revised ISWMP submitted on December 20, 2012.

Upon completion of the OLA decommissioning work, the PSWMP will be implemented commencing with the stormwater management pond in the southwest corner of the Site. The PSWMP that was approved for the Site until June 9, 2009 is provided in the approved Design and Operations Report (CRA, 2003). An application to renew the approval for the PSWMP will be submitted to the MOE Approvals Branch by March 31, 2013.

2.0 OBJECTIVES

The ISWMP for the Site has been developed in accordance with the design requirements of O. Reg. 232/98. The primary objectives of the ISWMP are to:

- Ensure that no stormwater runoff will enter the Brooks Road ditch from the Site under the worst historic regional storm scenario (Hurricane Hazel)
- Control surface water runoff from the Site into active disposal areas in order to minimize surface water contacting refuse
- Minimize potential or on-Site and sediment loading to the downstream water course

The receiving off-Site drainage courses are described in Section 4.6.2 of the approved Design and Operation Report (CRA, 2003).

3.0 DESIGN CRITERIA

The ISWMP design consists of perimeter ditches, culverts, an upgraded TDS pond, and associated works to meet the requirements of the Amended Certificate of Approval Number 8371-6X9LB, issued on February 20, 2007 (C of A). The design basis is consistent with the PSWMP contained in the approved Design and Operations Report (CRA, 2003). In the Design and Operations Report, the runoff from the final post-closure catchment areas was calculated using the hydrological model MIDUSS 4.72. In the present design the latest PCSWMM Version 5.1.1279 Professional was used to calculate the runoff using the same catchment parameters as in MIDUSS, providing approximately the same unit peak runoff and total volume per area. The catchment parameters used in the model are the contributing drainage area, catchment slope, sheet flow, length, width, Manning's 'n', percent impervious, soil infiltration rates, depression storage and the weighted Curve Number (CN) infiltration method.

The ditches and four culverts were sized to accommodate the peak flow generated from the 3-hour-duration, 25-year storm, as required by the MOE Guidelines. All drainage ditches were sized to have a 0.3-m bottom width with a minimum of a 1-meter depth and 3:1 side slopes (horizontal:vertical). The proposed culverts are designed to have a 450-mm-internal-diameter HDPE pipe with smooth internal walls. Both the ditches and culverts have the capacity to pass the Regional Storm (Hurricane Hazel) without flooding. All culvert inlets, outlets and steeply sloping channels are adequately lined with riprap and turf reinforcement mats in one location to prevent erosion.

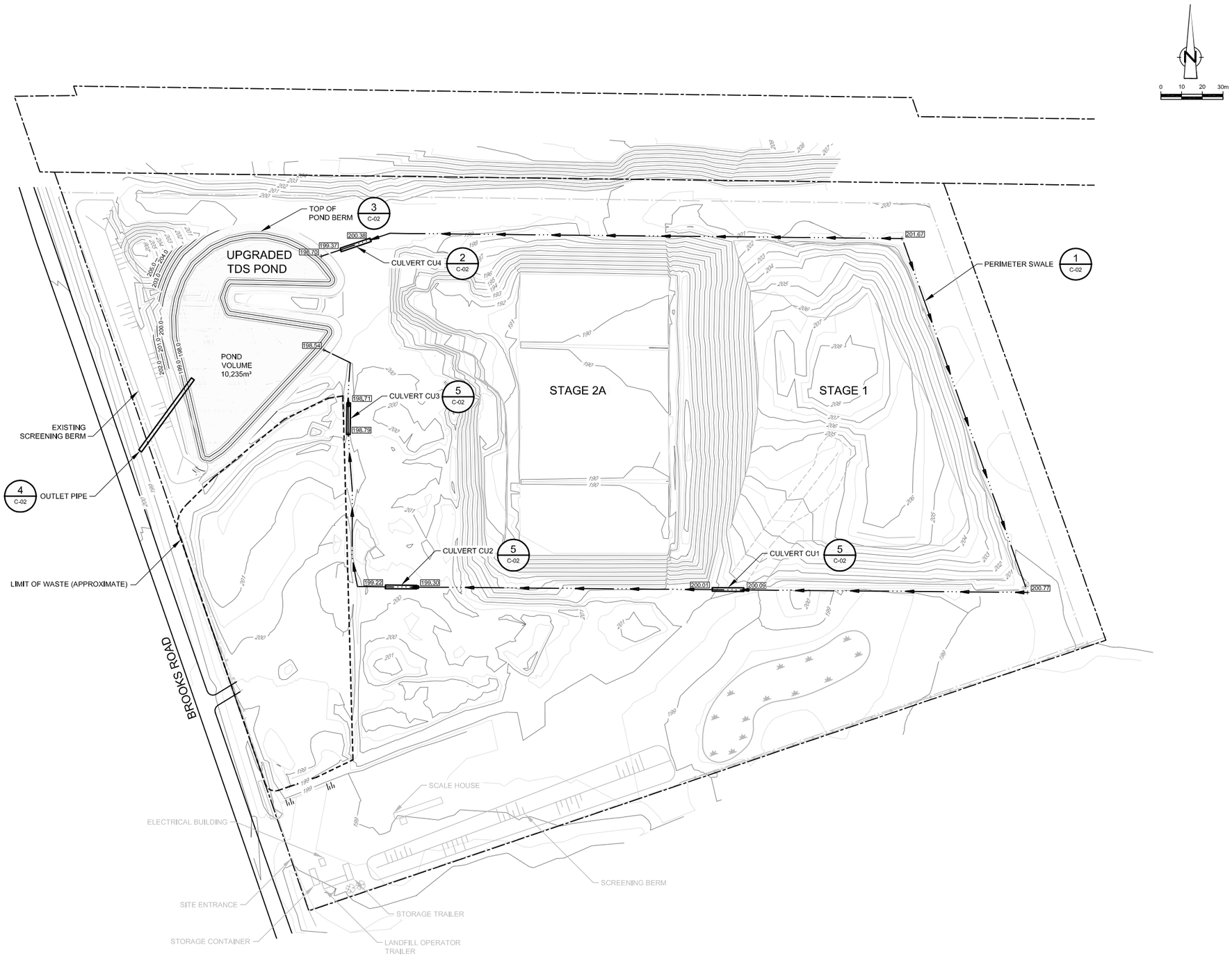
The upgraded TDS pond was designed to meet, or exceed the requirements of the above mentioned C of A. The required pond volume was calculated to be 10,235 m^3 in order to contain the total volume of stormwater runoff under the Regional Storm to prevent any flow discharging to the adjacent Brooks Road ditch shown in Drawing C-01. A 300-mm HDPE outlet pipe was selected as an emergency overflow spillway as an added factor of safety. The pond will be lined with riprap at the two inlets to prevent any erosion. The pond internal and external side slopes are designed to have a slope of 2:1 (horizontal: vertical).

4.0 MODELING RESULTS

The upgraded TDS pond, drainage ditches, and culverts were designed based on accepted methodologies, calculations and analytical tools using PCSWMM Professional. The outputs of the model for the 25-year storm and Regional Storm are provided in Attachment 1. Seven design storms were used in the hydrological modeling as shown in Table 1. These events were based on precipitation data as provided by the Atmospheric Environmental Service, Canada. The hydrologic model was used to calculate the surface water runoff volume and peak flows for the Site.

Table 2 summarizes the model input parameters and Tables 3 and 4 present the calculated runoff volumes and peak flow rates, respectively. Table 5 presents the calculated pond performance. Drawings C-01 and C-02 show the upgraded TDS pond, culverts, and ditch layout and design details, respectively.

We trust the design as presented herein is sufficient to satisfy the MOE's request. Should you have any questions on this design or require further information, please do not hesitate to contact us.



LEGEND

- DRAINAGE SWALE
- PROPOSED CULVERT
- POND CONTOUR - 0.5m INTERVAL
- 200.0 POND CONTOUR - 1.0m INTERVAL
- PROPERTY LINE
- LIMIT OF WASTE (APPROXIMATE)
- EXISTING POST AND WIRE FENCE
- GROUND CONTOUR - 0.5m INTERVAL
- 200.0 GROUND CONTOUR - 1.0m INTERVAL
- CHAINLINK FENCE
- GRAVEL ROADWAY
- CULVERT
- LOW AREA

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

INTERIM STORMWATER MANAGEMENT PLAN	14 DEC 2012	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

INTERIM STORMWATER MANAGEMENT PLAN

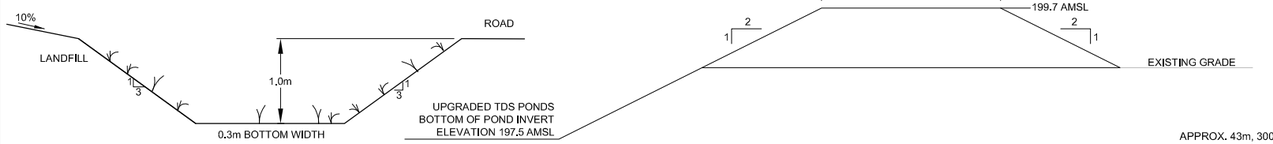
SITE DRAINAGE PLAN

CONESTOGA-ROVERS & ASSOCIATES

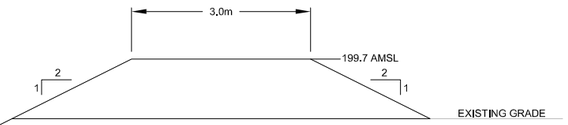
Source Reference:

Project Manager:	Reviewed By:	Date:	
G. FERRARO	G.FERRARO	DECEMBER 2012	
Scale: 1:1000	Project №: 18235-00	Report №: MEMO082	Drawing №: C-01

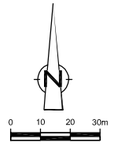
18235-00(MEMO082)CI-WA001 DEC 14/2012

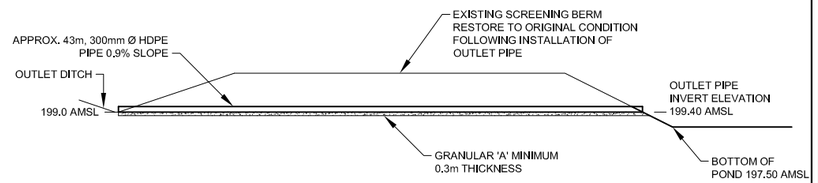


DETAIL 1 TYPICAL PERIMETER SWALE SECTION
NTS C-01

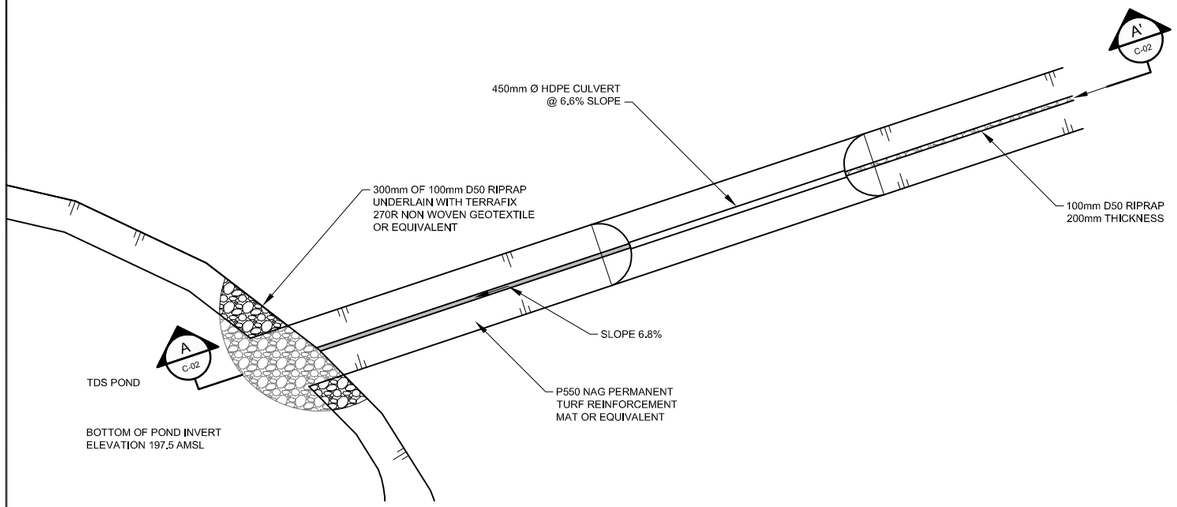


DETAIL 3 TOP OF POND BERM
NTS C-01

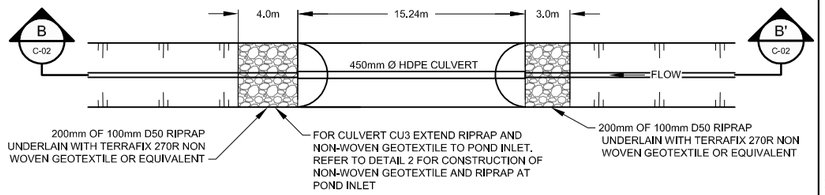




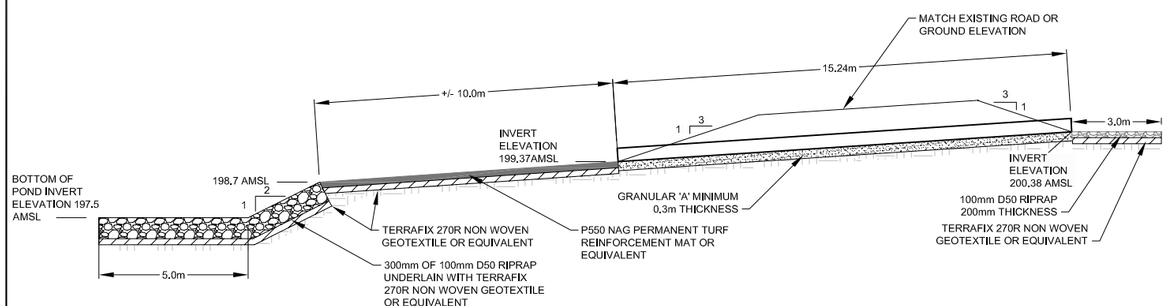
DETAIL 4 OUTLET PIPE
NTS C-01



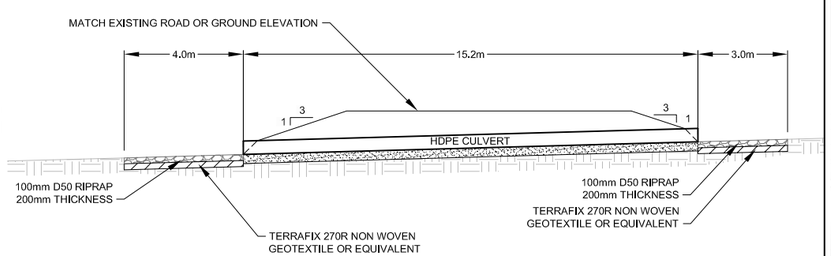
DETAIL 2 CULVERT 4 AND POND INLET
NTS C-01



DETAIL 5 CULVERTS CU1, CU2, & CU3
NTS C-01



SECTION A-A' CULVERT 4 AND POND INLET



SECTION B-B' CULVERTS CU1, CU2, & CU3

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

INTERIM STORMWATER MANAGEMENT PLAN	14 DEC 2012	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

INTERIM STORMWATER MANAGEMENT PLAN

SITE DRAINAGE PLAN DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G. FERRARO	G.FERRARO	DECEMBER 2012	
Scale: AS NOTED	Project No: 18235-00	Report No: MEMO082	Drawing No: C-02

TABLE 1

CITY OF HAMILTON DESIGN STORM PARAMETERS
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Design Storm	*Depth (mm)*	*Duration (hours)*	*Timestep (min.)*
2-Year	34.2	3	5
5-Year	50.2	3	5
10-Year	60.8	3	5
25-Year	74.2	3	5
50-Year	84.1	3	5
100-Year	124.7	24	15
Regional (Hurricane Hazel)	212	12	15

Notes:

1. Storms based on Hamilton Airport data - Environment Canada Atmospheric Environment Service.
2. Hyetographs created based on SCS Type II distribution.

TABLE 2

INTERIM CONDITIONS SUBCATCHMENT PARAMETERS
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Subcatchment	*Area (hectares)*	*Flow Length (metres)*	*Slope (%)*	*Impervious Area (%)*	*CN*[1]	*Manning's 'n'*	*Initial Abstraction (mm)*
201	2.13	67	10.0	5	71/98	0.33/0.015	10.37/2.00
203	0.81	48	10.0	5	71/98	0.33/0.015	10.37/2.00
204_1	1.02	65	10.0	8	71/98	0.33/0.015	10.37/2.00
204_2	1.500	50	10.0	8	71/98	0.33/0.015	10.37/2.00
100_Pond	0.56	-	-	100	-	-	-
Total	**6.02**						

Notes:

1. Soil Conservation Service (SCS) Curve Number.
2. 400/na denotes pervious/impervious area parameter.

TABLE 3

SUMMARY OF RUNOFF VOLUMES
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (m^3)	*5-Year* (m^3)	*10-Year* (m^3)	*25-Year* (m^3)	*50-Year* (m^3)	*100-Year* (m^3)	*Regional* (m^3)
201	30	150	290	470	620	1,310	2,910
203	10	60	110	180	240	500	1,110
204_1	30	90	160	250	320	660	1,440
204_2	40	140	240	370	480	970	2,120
100_Pond	190	280	340	420	470	700	1,190
Site Total	300	720	1,140	1,690	2,130	4,140	8,770

Notes:

1. Site Total runoff volume does not represent total volume of surface water discharged offsite.

TABLE 4

SUMMARY OF RUNOFF PEAK FLOW RATES
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	2-Year (m^3/s)	*5-Year* (m^3/s)	*10-Year* (m^3/s)	*25-Year* (m^3/s)	*50-Year* (m^3/s)	*100-Year* (m^3/s)	*Regional* (m^3/s)
201	0.0186	0.0283	0.0769	0.1670	0.2570	0.4100	0.27
203	0.0070	0.0100	0.0320	0.0779	0.1180	0.1740	0.10
204_1	0.0142	0.0220	0.0463	0.0970	0.1420	0.2110	0.13
204_2	0.0209	0.0329	0.0763	0.1640	0.2390	0.3370	0.19
100_Pond	_	_	_	_	_	_	_
Pond Outlet	0	0	0	0	0	0	0

TABLE 5

SUMMARY OF POND PERFORMANCE
INTERIM STORMWATER MANAGEMENT PLAN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Design Storm	*Inflow* (m^3/s)	*Outflow* (m^3/s)	*Maximum Elevation* (*m AMSL*)	*Storage* (m^3)
2-Year	0.17	0	197.57	304
5-Year	0.22	0	197.65	718
10-Year	0.28	0	197.74	1,131
25-Year	0.47	0	197.87	1,699
50-Year	0.57	0	197.96	2,140
100-Year	0.88	0	198.38	4,100
Regional	0.75	0	199.38	8,761

ATTACHMENT 1

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

****
Element Count
****
Number of rain gages 7
Number of subcatchments ... 5
Number of nodes 17
Number of links 16
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.81	170.00	5.00	10.0000	Huricane_Hazel	J9
201	2.13	320.00	5.00	10.0000	Huricane_Hazel	J1
100_Pond	0.56	600.00	100.00	50.0000	Huricane_Hazel	3
204_1	1.02	157.00	8.00	10.0000	Huricane_Hazel	J13
204_2	1.50	300.00	8.00	10.0000	Huricane_Hazel	J11

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	199.15	1.00	0.0	
J4	JUNCTION	198.62	1.00	0.0	
J5	JUNCTION	198.54	1.16	0.0	
J6	JUNCTION	199.37	1.00	0.0	
J7	JUNCTION	200.38	1.00	0.0	
J8	JUNCTION	198.70	1.00	0.0	
J9	JUNCTION	201.67	1.00	0.0	
J10	JUNCTION	198.79	1.00	0.0	
J11	JUNCTION	198.71	1.00	0.0	
J12	JUNCTION	200.09	1.00	0.0	
J13	JUNCTION	200.01	1.00	0.0	
J14	JUNCTION	199.30	1.00	0.0	
J15	JUNCTION	199.22	1.00	0.0	
J16	OUTFALL	199.00	0.30	0.0	
3	STORAGE	197.50	2.20	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2	J12	CONDUIT	136.6	0.4978	0.0500
C2	J12	J13	CONDUIT	15.2	0.5053	0.0130
C3	J13	J14	CONDUIT	142.2	0.5013	0.0500
C4	J14	J15	CONDUIT	15.2	0.5249	0.0130
C5	J15	J3	CONDUIT	13.1	0.5038	0.0500
C6	J3	J10	CONDUIT	73.1	0.4995	0.0500
C7	J10	J11	CONDUIT	15.2	0.4987	0.0130
C8	J11	J4	CONDUIT	19.4	0.5000	0.0500
C9	J4	J5	CONDUIT	14.3	0.5307	0.0500
C10	J9	J2	CONDUIT	179.8	0.5007	0.0500
C11	J1	J7	CONDUIT	257.4	0.5011	0.0500
C13	J6	J8	CONDUIT	9.9	6.7970	0.0500
C12	J7	J6	CONDUIT	15.2	6.6419	0.0130
C14	J8	3	CONDUIT	40.2	2.9842	0.0500
C15	J5	3	CONDUIT	35.0	2.9736	0.0500
C16	3	J16	CONDUIT	42.0	0.5000	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2926.34
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	202.67
C3	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.60
C4	CIRCULAR	0.45	0.16	0.11	0.45	1	206.58
C5	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2944.06
C6	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2931.29
C7	CIRCULAR	0.45	0.16	0.11	0.45	1	201.35
C8	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2932.89
C9	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	3021.67
C10	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2934.93
C11	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.19
C13	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	10813.53
C12	CIRCULAR	0.45	0.16	0.11	0.45	1	734.82
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C15	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C16	CIRCULAR	0.30	0.07	0.07	0.30	1	68.38

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.276	212.000
Evaporation Loss	0.000	0.000
Infiltration Loss	0.394	65.391
Surface Runoff	0.876	145.528
Final Surface Storage	0.007	1.138
Continuity Error (%)	-0.027	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.876	8.761
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.094	0.939
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.782	7.821
Continuity Error (%)	0.008	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C2 (3)
Link C4 (1)
Link C7 (1)

Routing Time Step Summary

Minimum Time Step	:	1.00 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS
203	212.00	0.00	0.00	73.79	137.07	1.11	101.87
201	212.00	0.00	0.00	74.20	136.65	2.91	266.10
100_Pond	212.00	0.00	0.00	0.00	212.02	1.19	82.44
204_1	212.00	0.00	0.00	69.94	140.80	1.44	129.37
204_2	212.00	0.00	0.00	69.66	141.10	2.12	191.14

Node Depth Summary

****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.13	0.54	202.21	0 10:15
J2	JUNCTION	0.06	0.25	201.02	0 10:16
J3	JUNCTION	0.09	0.35	199.51	0 10:19
J4	JUNCTION	0.11	0.39	199.01	0 10:15
J5	JUNCTION	0.00	0.01	198.55	0 10:15
J6	JUNCTION	0.06	0.26	199.63	0 10:16
J7	JUNCTION	0.04	0.19	200.57	0 10:16
J8	JUNCTION	0.00	0.01	198.71	0 10:16
J9	JUNCTION	0.06	0.25	201.92	0 10:15
J10	JUNCTION	0.10	0.52	199.31	0 10:22
J11	JUNCTION	0.11	0.45	199.16	0 10:15
J12	JUNCTION	0.06	0.31	200.40	0 10:19
J13	JUNCTION	0.09	0.36	200.37	0 10:15
J14	JUNCTION	0.10	0.52	199.82	0 10:18
J15	JUNCTION	0.08	0.35	199.57	0 10:18
J16	OUTFALL	0.06	0.18	199.18	0 12:54
3	STORAGE	1.14	1.95	199.45	0 12:54

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	266.10	266.10	0 10:14	2.911	2.911
J2	JUNCTION	0.00	101.52	0 10:15	0.000	1.112
J3	JUNCTION	0.00	224.32	0 10:18	0.000	2.546
J4	JUNCTION	0.00	409.26	0 10:15	0.000	4.663
J5	JUNCTION	0.00	409.10	0 10:15	0.000	4.663
J6	JUNCTION	0.00	263.12	0 10:16	0.000	2.911
J7	JUNCTION	0.00	263.64	0 10:15	0.000	2.911
J8	JUNCTION	0.00	263.12	0 10:16	0.000	2.911
J9	JUNCTION	101.87	101.87	0 10:14	1.110	1.110
J10	JUNCTION	0.00	224.10	0 10:19	0.000	2.547
J11	JUNCTION	191.14	409.47	0 10:14	2.117	4.663
J12	JUNCTION	0.00	100.80	0 10:16	0.000	1.111
J13	JUNCTION	129.37	228.86	0 10:14	1.436	2.546
J14	JUNCTION	0.00	227.90	0 10:15	0.000	2.548
J15	JUNCTION	0.00	224.35	0 10:18	0.000	2.546
J16	OUTFALL	0.00	44.96	0 12:54	0.000	0.939
3	STORAGE	82.44	753.68	0 10:14	1.187	8.761

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
3	5.006	52	0	8.527	89	0 12:54	44.96

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
J16	52.52	20.69	44.96	0.939
System	52.52	20.69	44.96	0.939

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	100.80	0 10:16	0.34	0.03	0.28
C2	CONDUIT	100.17	0 10:19	0.87	0.49	0.74
C3	CONDUIT	227.90	0 10:15	0.36	0.08	0.44
C4	CONDUIT	224.35	0 10:18	1.50	1.09	0.89
C5	CONDUIT	224.32	0 10:18	0.47	0.08	0.35
C6	CONDUIT	224.10	0 10:19	0.34	0.08	0.43
C7	CONDUIT	223.04	0 10:22	1.41	1.11	1.00
C8	CONDUIT	409.26	0 10:15	0.62	0.14	0.42
C9	CONDUIT	409.10	0 10:15	2.29	0.14	0.20
C10	CONDUIT	101.52	0 10:15	0.38	0.03	0.25
C11	CONDUIT	263.64	0 10:15	0.53	0.09	0.36
C13	CONDUIT	263.12	0 10:16	2.86	0.02	0.13
C12	CONDUIT	263.12	0 10:16	3.39	0.36	0.49
C14	DUMMY	263.12	0 10:16			
C15	DUMMY	409.10	0 10:15			
C16	CONDUIT	44.96	0 12:54	0.87	0.66	0.69

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C1	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.18	0.0000
C2	1.00	0.02	0.01	0.00	0.96	0.00	0.00	0.00	0.40	0.0005
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000
C4	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.56	0.0003
C5	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.22	0.0000
C6	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.18	0.0000
C7	1.00	0.02	0.02	0.00	0.96	0.00	0.00	0.00	0.46	0.0002
C8	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.20	0.0000
C9	1.00	0.03	0.00	0.00	0.64	0.34	0.00	0.00	0.71	0.0000
C10	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.16	0.0000
C11	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.23	0.0000

C13	1.00	0.03	0.00	0.00	0.24	0.73	0.00	0.00	1.60	0.0000
C12	1.00	0.03	0.00	0.00	0.23	0.74	0.00	0.00	1.81	0.0000
C16	1.00	0.47	0.00	0.00	0.53	0.00	0.00	0.00	0.38	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C4	0.01	0.01	0.01	0.53	0.01
C7	0.01	0.01	0.01	0.64	0.01
C14	24.00	24.00	24.00	24.00	0.01
C15	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Tue Nov 27 19:41:18 2012
Analysis ended on: Tue Nov 27 19:41:22 2012
Total elapsed time: 00:00:04

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

****
Element Count
****
Number of rain gages 7
Number of subcatchments ... 5
Number of nodes 17
Number of links 16
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.81	170.00	5.00	10.0000	25Yr	J9
201	2.13	320.00	5.00	10.0000	25Yr	J1
100_Pond	0.56	600.00	100.00	50.0000	25Yr	3
204_1	1.02	157.00	8.00	10.0000	25Yr	J13
204_2	1.50	300.00	8.00	10.0000	25Yr	J11

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	199.15	1.00	0.0	
J4	JUNCTION	198.62	1.00	0.0	
J5	JUNCTION	198.54	1.16	0.0	
J6	JUNCTION	199.37	1.00	0.0	
J7	JUNCTION	200.38	1.00	0.0	
J8	JUNCTION	198.70	1.00	0.0	
J9	JUNCTION	201.67	1.00	0.0	
J10	JUNCTION	198.79	1.00	0.0	
J11	JUNCTION	198.71	1.00	0.0	
J12	JUNCTION	200.09	1.00	0.0	
J13	JUNCTION	200.01	1.00	0.0	
J14	JUNCTION	199.30	1.00	0.0	
J15	JUNCTION	199.22	1.00	0.0	
J16	OUTFALL	199.00	0.30	0.0	
3	STORAGE	197.50	2.20	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2	J12	CONDUIT	136.6	0.4978	0.0500
C2	J12	J13	CONDUIT	15.2	0.5053	0.0130
C3	J13	J14	CONDUIT	142.2	0.5013	0.0500
C4	J14	J15	CONDUIT	15.2	0.5249	0.0130
C5	J15	J3	CONDUIT	13.1	0.5038	0.0500
C6	J3	J10	CONDUIT	73.1	0.4995	0.0500
C7	J10	J11	CONDUIT	15.2	0.4987	0.0130
C8	J11	J4	CONDUIT	19.4	0.5000	0.0500
C9	J4	J5	CONDUIT	14.3	0.5307	0.0500
C10	J9	J2	CONDUIT	179.8	0.5007	0.0500
C11	J1	J7	CONDUIT	257.4	0.5011	0.0500
C13	J6	J8	CONDUIT	9.9	6.7970	0.0500
C12	J7	J6	CONDUIT	15.2	6.6419	0.0130
C14	J8	3	CONDUIT	40.2	2.9842	0.0500
C15	J5	3	CONDUIT	35.0	2.9736	0.0500
C16	3	J16	CONDUIT	42.0	0.5000	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2926.34
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	202.67
C3	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.60
C4	CIRCULAR	0.45	0.16	0.11	0.45	1	206.58
C5	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2944.06
C6	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2931.29
C7	CIRCULAR	0.45	0.16	0.11	0.45	1	201.35
C8	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2932.89
C9	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	3021.67
C10	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2934.93
C11	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	2936.19
C13	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	10813.53
C12	CIRCULAR	0.45	0.16	0.11	0.45	1	734.82
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C15	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C16	CIRCULAR	0.30	0.07	0.07	0.30	1	68.38

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.447	74.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.271	45.056
Surface Runoff	0.170	28.230
Final Surface Storage	0.007	1.103
Continuity Error (%)	-0.254	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.170	1.699
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.000	0.000
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.170	1.699
Continuity Error (%)	0.011	

Highest Continuity Errors

Node J2 (1.19%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C2 (1)

Routing Time Step Summary

Minimum Time Step	:	1.00 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS
203	74.20	0.00	0.00	50.43	22.73	0.18	77.85
201	74.20	0.00	0.00	50.92	22.24	0.47	167.38
100_Pond	74.20	0.00	0.00	0.00	74.22	0.42	212.02
204_1	74.20	0.00	0.00	48.56	24.62	0.25	96.95
204_2	74.20	0.00	0.00	48.26	24.99	0.37	163.81

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	hr:min
J1	JUNCTION	0.03	0.39	202.06	0	01:42
J2	JUNCTION	0.01	0.19	200.96	0	01:50
J3	JUNCTION	0.02	0.25	199.40	0	01:55
J4	JUNCTION	0.03	0.29	198.91	0	01:36
J5	JUNCTION	0.00	0.00	198.54	0	01:36
J6	JUNCTION	0.01	0.18	199.55	0	01:46
J7	JUNCTION	0.01	0.12	200.50	0	01:46
J8	JUNCTION	0.00	0.00	198.70	0	01:46
J9	JUNCTION	0.01	0.25	201.92	0	01:38
J10	JUNCTION	0.03	0.31	199.10	0	01:59
J11	JUNCTION	0.03	0.33	199.04	0	01:36
J12	JUNCTION	0.02	0.19	200.28	0	01:40
J13	JUNCTION	0.02	0.26	200.27	0	01:38
J14	JUNCTION	0.03	0.31	199.61	0	01:53
J15	JUNCTION	0.02	0.25	199.47	0	01:54
J16	OUTFALL	0.00	0.00	199.00	0	00:00
3	STORAGE	0.35	0.39	197.89	1	00:00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	167.30	167.30	0	01:35	0.474	0.474
J2	JUNCTION	0.00	62.96	0	01:42	0.000	0.186
J3	JUNCTION	0.00	100.03	0	01:53	0.000	0.435
J4	JUNCTION	0.00	186.47	0	01:36	0.000	0.810
J5	JUNCTION	0.00	185.70	0	01:37	0.000	0.810
J6	JUNCTION	0.00	112.44	0	01:46	0.000	0.474
J7	JUNCTION	0.00	113.25	0	01:44	0.000	0.475
J8	JUNCTION	0.00	112.44	0	01:46	0.000	0.474
J9	JUNCTION	77.81	77.81	0	01:35	0.184	0.184
J10	JUNCTION	0.00	99.73	0	01:55	0.000	0.435
J11	JUNCTION	163.71	187.20	0	01:36	0.375	0.810
J12	JUNCTION	0.00	50.85	0	01:50	0.000	0.187
J13	JUNCTION	96.89	104.89	0	01:45	0.251	0.438
J14	JUNCTION	0.00	107.50	0	01:41	0.000	0.437
J15	JUNCTION	0.00	100.07	0	01:53	0.000	0.435
J16	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
3	STORAGE	212.02	428.80	0	01:35	0.416	1.699

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
3	1.550	16	0	1.699	18	1 00:00	0.00

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
J16	0.00	0.00	0.00	0.000
System	0.00	0.00	0.00	0.000

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	50.85	0 01:50	0.32	0.02	0.18
C2	CONDUIT	51.41	0 01:52	0.68	0.25	0.50
C3	CONDUIT	107.50	0 01:41	0.39	0.04	0.28
C4	CONDUIT	100.07	0 01:53	1.07	0.48	0.62
C5	CONDUIT	100.03	0 01:53	0.41	0.03	0.25
C6	CONDUIT	99.73	0 01:55	0.35	0.03	0.28
C7	CONDUIT	98.01	0 01:53	0.95	0.49	0.68
C8	CONDUIT	186.47	0 01:36	0.49	0.06	0.31
C9	CONDUIT	185.70	0 01:37	1.68	0.06	0.15
C10	CONDUIT	62.96	0 01:42	0.35	0.02	0.20
C11	CONDUIT	113.25	0 01:44	0.42	0.04	0.25
C13	CONDUIT	112.44	0 01:46	2.16	0.01	0.09
C12	CONDUIT	112.44	0 01:46	2.47	0.15	0.33
C14	DUMMY	112.44	0 01:46			
C15	DUMMY	185.70	0 01:37			
C16	CONDUIT	0.00	0 00:00	0.00	0.00	0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C2	1.00	0.01	0.01	0.00	0.97	0.00	0.00	0.00	0.32	0.0001
C3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.0000
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.46	0.0001
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.15	0.0000
C6	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.01	0.01	0.00	0.97	0.00	0.00	0.00	0.46	0.0001

C8	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.12	0.0000
C9	1.00	0.01	0.00	0.00	0.89	0.10	0.00	0.00	0.30	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.07	0.0000
C11	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
C13	1.00	0.02	0.00	0.00	0.64	0.34	0.00	0.00	0.76	0.0000
C12	1.00	0.02	0.00	0.00	0.62	0.36	0.00	0.00	0.97	0.0000
C16	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C14	24.00	24.00	24.00	24.00	0.01
C15	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Wed Nov 28 13:54:49 2012
Analysis ended on: Wed Nov 28 13:54:53 2012
Total elapsed time: 00:00:04

APPENDIX C

CURRENTLY APPROVED FINAL CONTOURS CONDITION HYDROLOGIC MODEL INPUT AND OUTPUT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	2YR	J9
210	0.43	500.00	100.00	10.0000	2YR	SWM_Pond
201c	1.67	205.00	5.00	8.0000	2YR	J24
202	0.90	105.00	7.00	7.0000	2YR	J7
100	1.53	500.00	0.00	2.0000	2YR	Out1
208	0.26	50.00	95.00	2.0000	2YR	J8
207	0.38	63.00	95.00	2.0000	2YR	J8
206	0.13	34.00	5.00	2.0000	2YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	2YR	J10
205	1.85	450.00	0.00	50.0000	2YR	J20
303	0.44	40.00	0.00	50.0000	2YR	J21
304	0.15	95.00	20.00	3.0000	2YR	J13
301	0.53	350.00	0.00	4.0000	2YR	J4
302	1.95	770.00	0.00	1.0000	2YR	J6
201a	0.46	76.00	5.00	13.0000	2YR	J9
204c	1.74	198.00	8.00	7.0000	2YR	J25
204b	0.37	119.00	8.00	13.0000	2YR	J25
204a	0.73	119.00	8.00	13.0000	2YR	J2
201b	0.28	76.00	5.00	13.0000	2YR	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.510	34.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.428	28.692
Surface Runoff	0.063	4.244
Final Surface Storage	0.019	1.284
Continuity Error (%)	-0.061	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.063	0.633
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.039	0.389
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.024	0.244
Continuity Error (%)	0.010	

Highest Continuity Errors

Node J19 (2.43%)
Node J25 (-1.40%)
Node J5 (1.36%)
Node J24 (-1.08%)

Time-Step Critical Elements

Link P1 (2.31%)

Highest Flow Instability Indexes

Link C19 (10)

****
Routing Time Step Summary
****
Minimum Time Step   :   0.50 sec
Average Time Step   :   0.99 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	34.20	0.00	0.00	31.39	1.62	0.01	7.33	0.047
210	34.20	0.00	0.00	0.00	32.33	0.14	75.03	0.945
201c	34.20	0.00	0.00	31.39	1.62	0.03	14.57	0.047
202	34.20	0.00	0.00	30.73	2.26	0.02	10.99	0.066
100	34.20	0.00	0.00	30.22	2.80	0.04	7.86	0.082
208	34.20	0.00	0.00	0.26	31.83	0.08	45.23	0.931
207	34.20	0.00	0.00	0.26	31.82	0.12	66.05	0.930
206	34.20	0.00	0.00	31.39	1.62	0.00	1.13	0.047
209	34.20	0.00	0.00	31.39	1.62	0.00	2.36	0.047
205	34.20	0.00	0.00	32.99	0.00	0.00	0.00	0.000
303	34.20	0.00	0.00	30.92	2.12	0.01	1.91	0.062
304	34.20	0.00	0.00	23.64	9.25	0.01	5.24	0.270
301	34.20	0.00	0.00	29.34	3.66	0.02	4.03	0.107
302	34.20	0.00	0.00	30.32	2.66	0.05	9.45	0.078
201a	34.20	0.00	0.00	31.39	1.62	0.01	4.01	0.047
204c	34.20	0.00	0.00	30.40	2.59	0.05	24.29	0.076
204b	34.20	0.00	0.00	30.40	2.59	0.01	5.16	0.076
204a	34.20	0.00	0.00	30.40	2.59	0.02	10.19	0.076
201b	34.20	0.00	0.00	31.39	1.62	0.00	2.44	0.047

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min

J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.01	0.10	200.87	0	01:37
J3	JUNCTION	0.01	0.12	199.08	0	01:41
J6	JUNCTION	0.01	0.06	198.86	0	03:09
J10	JUNCTION	0.02	0.33	198.93	0	01:26
J4	JUNCTION	0.00	0.06	200.56	0	02:18
J7	JUNCTION	0.01	0.10	199.94	0	01:38
J11	JUNCTION	0.00	0.00	198.30	0	01:26
J9	JUNCTION	0.00	0.08	201.75	0	01:35
J5	JUNCTION	0.00	0.04	200.04	0	03:04
J8	JUNCTION	0.01	0.24	199.14	0	01:35
J18	JUNCTION	0.12	0.16	198.00	0	03:38
J12	JUNCTION	0.04	0.05	197.90	0	03:39
J13	JUNCTION	0.03	0.06	197.80	0	01:35
J14	JUNCTION	0.03	0.03	197.80	0	03:50
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.00	0.00	201.46	0	00:00
J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.05	0.11	197.72	0	03:23
J21	JUNCTION	0.03	0.07	197.52	0	03:17
J16	JUNCTION	0.05	0.05	198.37	0	02:09
J23	JUNCTION	0.03	0.06	197.60	0	03:23
J24	JUNCTION	0.00	0.09	201.16	0	01:36
J25	JUNCTION	0.01	0.16	200.11	0	01:36
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.03	197.38	0	03:17
SWM_Pond	STORAGE	0.11	0.16	198.01	0	03:38

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	10.19	20.90	0 01:34	0.019	0.040
J3	JUNCTION	0.00	55.38	0 01:38	0.000	0.148
J6	JUNCTION	9.45	12.65	0 03:00	0.052	0.071
J10	JUNCTION	2.36	113.35	0 01:35	0.004	0.208
J4	JUNCTION	4.03	4.03	0 02:19	0.019	0.019
J7	JUNCTION	10.99	24.86	0 01:34	0.020	0.052
J11	JUNCTION	0.00	178.13	0 01:26	0.000	0.208

J9	JUNCTION	11.34	11.34	0	01:34	0.021	0.021
J5	JUNCTION	0.00	4.41	0	02:31	0.000	0.020
J8	JUNCTION	111.28	111.28	0	01:34	0.204	0.204
J18	JUNCTION	0.00	3.87	0	03:38	0.000	0.262
J12	JUNCTION	0.00	3.87	0	03:38	0.000	0.262
J13	JUNCTION	5.24	6.59	0	01:34	0.014	0.275
J14	JUNCTION	0.00	3.87	0	03:39	0.000	0.262
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	15.88	0	03:06	0.000	0.346
J21	JUNCTION	1.91	15.23	0	03:16	0.009	0.346
J16	JUNCTION	0.00	51.79	0	01:41	0.000	0.146
J23	JUNCTION	0.00	14.39	0	03:23	0.000	0.337
J24	JUNCTION	17.01	17.01	0	01:25	0.032	0.032
J25	JUNCTION	29.46	45.16	0	01:34	0.055	0.094
Out1	OUTFALL	7.86	7.86	0	02:49	0.043	0.043
Out2	OUTFALL	0.00	15.22	0	03:17	0.000	0.346
SWM_Pond	STORAGE	76.17	266.74	0	01:26	0.141	0.495

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	5.28	0.014	1.486

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average Volume	Avg Pcnt	E&I Pcnt	Maximum Volume	Max Pcnt	Time of Max Occurrence	Maximum Outflow

Storage Unit	1000 m3	Full	Loss	1000 m3	Full	days	hr:min	LPS
SWM_Pond	0.326	5	0	0.458	7	0	03:38	3.87

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	11.78	4.27	7.86	0.043
Out2	94.23	4.26	15.22	0.346
System	53.00	8.53	22.33	0.389

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.24	0	01:26			
C3	CONDUIT	3.31	0	03:04	0.10	0.01	0.10
C1_1	CONDUIT	16.43	0	01:37	0.17	0.01	0.17
C5	CONDUIT	18.19	0	01:38	0.24	0.01	0.15
C7	CONDUIT	111.00	0	01:35	0.42	0.17	0.55
C10	CONDUIT	10.74	0	01:35	0.22	0.01	0.11
C6	CONDUIT	11.22	0	03:09	0.13	0.01	0.11
C8	CONDUIT	178.13	0	01:26	1.42	0.27	0.33
C15	CONDUIT	51.79	0	01:41	1.94	0.05	0.18
C2	CONDUIT	4.41	0	02:31	0.15	0.01	0.09
C12	CONDUIT	3.87	0	03:39	0.29	0.02	0.11
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.04
C14	CONDUIT	3.87	0	03:50	0.14	0.00	0.06
C17	CONDUIT	6.46	0	01:36	0.18	0.00	0.10
P1	CONDUIT	3.87	0	03:38	0.28	0.62	1.00
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	14.39	0	03:23	0.50	0.02	0.12
C20	CONDUIT	15.22	0	03:17	0.33	0.01	0.07

C16	DUMMY	51.79	0	01:41			
C22	CONDUIT	14.38	0	03:24	0.23	0.01	0.09
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C4_2	CONDUIT	14.06	0	01:36	0.24	0.01	0.13
C1_2	CONDUIT	37.21	0	01:37	0.34	0.02	0.19
C11	ORIFICE	3.87	0	03:38			1.00
2	ORIFICE	0.00	0	00:00			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.06	0.01	0.00	0.93	0.00	0.00	0.00	0.09	0.0000
C1_1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.16	0.0000
C7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.06	0.0000
C6	1.00	0.03	0.04	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.18	0.0000
C15	1.00	0.03	0.00	0.00	0.92	0.05	0.00	0.00	0.18	0.0000
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.05	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.03	0.00	0.95	0.00	0.00	0.00	0.23	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.16	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.68	0.0000
C20	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.40	0.0000
C22	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.25	0.0000
C4_1	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.08	0.0000
C1_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.0000

****
Conduit Surcharge Summary
****

	Hours	Hours

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Above Full Normal Flow	Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
P1	3.25	3.25	3.25	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:23:41 2013
Analysis ended on: Thu Jul 11 15:23:43 2013
Total elapsed time: 00:00:02

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	5YR	J9
210	0.43	500.00	100.00	10.0000	5YR	SWM_Pond
201c	1.67	205.00	5.00	8.0000	5YR	J24
202	0.90	105.00	7.00	7.0000	5YR	J7
100	1.53	500.00	0.00	2.0000	5YR	Out1
208	0.26	50.00	95.00	2.0000	5YR	J8
207	0.38	63.00	95.00	2.0000	5YR	J8
206	0.13	34.00	5.00	2.0000	5YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	5YR	J10
205	1.85	450.00	0.00	50.0000	5YR	J20
303	0.44	40.00	0.00	50.0000	5YR	J21
304	0.15	95.00	20.00	3.0000	5YR	J13
301	0.53	350.00	0.00	4.0000	5YR	J4
302	1.95	770.00	0.00	1.0000	5YR	J6
201a	0.46	76.00	5.00	13.0000	5YR	J9
204c	1.74	198.00	8.00	7.0000	5YR	J25
204b	0.37	119.00	8.00	13.0000	5YR	J25
204a	0.73	119.00	8.00	13.0000	5YR	J2
201b	0.28	76.00	5.00	13.0000	5YR	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.748	50.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.549	36.788
Surface Runoff	0.182	12.188
Final Surface Storage	0.019	1.305
Continuity Error (%)	-0.161	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.182	1.817
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.120	1.202
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.062	0.616
Continuity Error (%)	-0.003	

Highest Continuity Errors

Node J5 (1.84%)
Node J19 (1.68%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)
Link C22 (3)
Link C12 (1)

****
Routing Time Step Summary
****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	50.20	0.00	0.00	41.92	7.07	0.06	11.42	0.141
210	50.20	0.00	0.00	0.00	48.38	0.21	110.14	0.964
201c	50.20	0.00	0.00	41.62	7.40	0.12	23.60	0.147
202	50.20	0.00	0.00	40.89	8.14	0.07	17.20	0.162
100	50.20	0.00	0.00	36.79	12.23	0.19	39.52	0.244
208	50.20	0.00	0.00	0.26	47.91	0.12	66.52	0.954
207	50.20	0.00	0.00	0.26	47.91	0.18	97.19	0.954
206	50.20	0.00	0.00	42.23	6.71	0.01	1.74	0.134
209	50.20	0.00	0.00	41.92	7.13	0.02	3.68	0.142
205	50.20	0.00	0.00	41.79	7.28	0.13	32.86	0.145
303	50.20	0.00	0.00	38.82	10.27	0.05	10.79	0.205
304	50.20	0.00	0.00	27.41	21.72	0.03	17.97	0.433
301	50.20	0.00	0.00	35.60	13.56	0.07	34.92	0.270
302	50.20	0.00	0.00	37.03	11.98	0.23	45.69	0.239
201a	50.20	0.00	0.00	41.04	8.00	0.04	6.93	0.159
204c	50.20	0.00	0.00	40.45	8.55	0.15	37.64	0.170
204b	50.20	0.00	0.00	39.17	9.84	0.04	9.19	0.196
204a	50.20	0.00	0.00	39.74	9.29	0.07	16.59	0.185
201b	50.20	0.00	0.00	40.60	8.43	0.02	4.62	0.168

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min

J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.01	0.12	200.89	0	01:37
J3	JUNCTION	0.02	0.16	199.12	0	01:43
J6	JUNCTION	0.02	0.14	198.94	0	02:18
J10	JUNCTION	0.02	0.32	198.92	0	01:22
J4	JUNCTION	0.01	0.17	200.67	0	01:43
J7	JUNCTION	0.02	0.13	199.97	0	01:38
J11	JUNCTION	0.00	0.00	198.30	0	01:22
J9	JUNCTION	0.01	0.10	201.77	0	01:35
J5	JUNCTION	0.01	0.09	200.09	0	02:07
J8	JUNCTION	0.01	0.28	199.18	0	01:35
J18	JUNCTION	0.25	0.34	198.18	0	03:29
J12	JUNCTION	0.06	0.13	197.98	0	03:29
J13	JUNCTION	0.05	0.14	197.88	0	03:31
J14	JUNCTION	0.04	0.14	197.91	0	03:30
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.02	0.18	201.64	0	02:33
J22	JUNCTION	0.00	0.00	198.50	0	02:33
J19	JUNCTION	0.08	0.19	197.80	0	03:30
J21	JUNCTION	0.05	0.15	197.60	0	03:29
J16	JUNCTION	0.06	0.07	198.39	0	03:51
J23	JUNCTION	0.05	0.16	197.70	0	03:30
J24	JUNCTION	0.01	0.11	201.18	0	01:36
J25	JUNCTION	0.02	0.20	200.15	0	01:37
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.09	197.44	0	03:29
SWM_Pond	STORAGE	0.24	0.34	198.19	0	03:29

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	16.59	33.24	0 01:34	0.068	0.164
J3	JUNCTION	0.00	89.46	0 01:38	0.000	0.571
J6	JUNCTION	45.69	55.09	0 01:59	0.234	0.305
J10	JUNCTION	3.68	167.25	0 01:34	0.019	0.326
J4	JUNCTION	34.91	34.91	0 01:35	0.072	0.072
J7	JUNCTION	17.20	39.19	0 01:34	0.073	0.221
J11	JUNCTION	0.00	177.23	0 01:23	0.000	0.326

J9	JUNCTION	18.35	18.35	0	01:34	0.096	0.096
J5	JUNCTION	0.00	24.20	0	01:48	0.000	0.073
J8	JUNCTION	163.71	163.71	0	01:34	0.307	0.307
J18	JUNCTION	0.00	5.76	0	02:52	0.000	0.422
J12	JUNCTION	0.00	51.80	0	03:29	0.000	0.646
J13	JUNCTION	17.95	51.84	0	03:30	0.033	0.678
J14	JUNCTION	0.00	51.79	0	03:29	0.000	0.646
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	32.86	32.86	0	01:50	0.135	0.135
J22	JUNCTION	0.00	20.29	0	02:33	0.000	0.134
J19	JUNCTION	0.00	74.97	0	03:26	0.000	0.985
J21	JUNCTION	10.79	75.46	0	03:28	0.045	1.015
J16	JUNCTION	0.00	82.22	0	01:43	0.000	0.570
J23	JUNCTION	0.00	74.29	0	03:30	0.000	0.968
J24	JUNCTION	28.22	28.22	0	01:34	0.147	0.147
J25	JUNCTION	46.82	71.83	0	01:34	0.185	0.349
Out1	OUTFALL	39.52	39.52	0	01:35	0.187	0.187
Out2	OUTFALL	0.00	75.45	0	03:29	0.000	1.015
SWM_Pond	STORAGE	111.85	342.16	0	01:34	0.217	1.247

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.36	0.189	1.311

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average Volume	Avg Pcnt	E&I Pcnt	Maximum Volume	Max Pcnt	Time of Max Occurrence	Maximum Outflow

Storage Unit	1000 m3	Full	Loss	1000 m3	Full	days	hr:min	LPS
SWM_Pond	0.737	12	0	1.040	16	0	03:29	51.80

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	13.32	16.29	39.52	0.187
Out2	94.88	12.38	75.45	1.015
System	54.10	28.67	92.88	1.202

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	177.33	0	01:23			
C3	CONDUIT	14.64	0	02:07	0.16	0.03	0.23
C1_1	CONDUIT	26.51	0	01:37	0.21	0.01	0.21
C5	CONDUIT	29.60	0	01:38	0.28	0.01	0.19
C7	CONDUIT	163.57	0	01:35	0.47	0.25	0.59
C10	CONDUIT	16.78	0	01:35	0.24	0.01	0.14
C6	CONDUIT	48.65	0	02:18	0.24	0.03	0.22
C8	CONDUIT	177.23	0	01:23	1.42	0.27	0.33
C15	CONDUIT	82.22	0	01:43	2.13	0.08	0.20
C2	CONDUIT	24.20	0	01:48	0.27	0.04	0.22
C12	CONDUIT	51.79	0	03:29	0.71	0.25	0.37
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.18
C14	CONDUIT	51.70	0	03:30	0.31	0.03	0.19
C17	CONDUIT	51.80	0	03:31	0.26	0.03	0.22
P1	CONDUIT	5.76	0	02:52	0.33	0.93	1.00
C18	CONDUIT	20.29	0	02:33	0.29	0.01	0.12
C21	DUMMY	20.29	0	02:33			
C19	CONDUIT	74.29	0	03:30	1.07	0.10	0.23
C20	CONDUIT	75.45	0	03:29	0.58	0.03	0.16

C16	DUMMY	82.22	0	01:43			
C22	CONDUIT	74.29	0	03:30	0.41	0.04	0.20
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C4_2	CONDUIT	22.63	0	01:36	0.27	0.01	0.16
C1_2	CONDUIT	59.87	0	01:38	0.38	0.03	0.23
C11	ORIFICE	5.76	0	02:52			1.00
2	ORIFICE	46.50	0	03:29			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.09	0.0000
C1_1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C6	1.00	0.02	0.04	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C8	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.19	0.0000
C15	1.00	0.02	0.00	0.00	0.85	0.13	0.00	0.00	0.38	0.0001
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.53	0.0003
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.03	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.16	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.21	0.0000
C19	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.67	0.0004
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.44	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.28	0.0000
C4_1	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000

****
Conduit Surcharge Summary
****

	Hours	Hours

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Above Full Normal Flow	Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
P1	22.33	22.33	22.33	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:24:49 2013
Analysis ended on: Thu Jul 11 15:24:52 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	10Yr	J9
210	0.43	500.00	100.00	10.0000	10Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	10Yr	J24
202	0.90	105.00	7.00	7.0000	10Yr	J7
100	1.53	500.00	0.00	2.0000	10Yr	Out1
208	0.26	50.00	95.00	2.0000	10Yr	J8
207	0.38	63.00	95.00	2.0000	10Yr	J8
206	0.13	34.00	5.00	2.0000	10Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	10Yr	J10
205	1.85	450.00	0.00	50.0000	10Yr	J20
303	0.44	40.00	0.00	50.0000	10Yr	J21
304	0.15	95.00	20.00	3.0000	10Yr	J13
301	0.53	350.00	0.00	4.0000	10Yr	J4
302	1.95	770.00	0.00	1.0000	10Yr	J6
201a	0.46	76.00	5.00	13.0000	10Yr	J9
204c	1.74	198.00	8.00	7.0000	10Yr	J25
204b	0.37	119.00	8.00	13.0000	10Yr	J25
204a	0.73	119.00	8.00	13.0000	10Yr	J2
201b	0.28	76.00	5.00	13.0000	10Yr	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.907	60.800
Evaporation Loss	0.000	0.000
Infiltration Loss	0.603	40.457
Surface Runoff	0.286	19.170
Final Surface Storage	0.019	1.301
Continuity Error (%)	-0.211	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.286	2.858
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.224	2.239
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.062	0.619
Continuity Error (%)	0.001	

Highest Continuity Errors

Node J5 (2.34%)
Node J6 (-1.71%)
Node J19 (1.11%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (2)
Link C22 (2)
Link C12 (1)

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	60.80	0.00	0.00	46.31	13.29	0.11	26.88	0.219
210	60.80	0.00	0.00	0.00	58.93	0.25	133.40	0.969
201c	60.80	0.00	0.00	45.84	13.72	0.23	53.33	0.226
202	60.80	0.00	0.00	45.03	14.51	0.13	32.77	0.239
100	60.80	0.00	0.00	40.15	19.49	0.30	88.84	0.320
208	60.80	0.00	0.00	0.26	58.56	0.15	80.60	0.963
207	60.80	0.00	0.00	0.26	58.57	0.22	117.78	0.963
206	60.80	0.00	0.00	46.79	12.81	0.02	3.63	0.211
209	60.80	0.00	0.00	46.31	13.37	0.04	8.87	0.220
205	60.80	0.00	0.00	45.96	13.86	0.26	128.60	0.228
303	60.80	0.00	0.00	43.01	16.68	0.07	25.12	0.274
304	60.80	0.00	0.00	29.23	30.51	0.05	28.95	0.502
301	60.80	0.00	0.00	38.93	20.94	0.11	66.68	0.344
302	60.80	0.00	0.00	40.52	19.21	0.37	99.77	0.316
201a	60.80	0.00	0.00	45.23	14.48	0.07	19.48	0.238
204c	60.80	0.00	0.00	44.69	14.97	0.26	68.15	0.246
204b	60.80	0.00	0.00	43.20	16.58	0.06	26.48	0.273
204a	60.80	0.00	0.00	43.80	15.91	0.12	37.41	0.262
201b	60.80	0.00	0.00	44.76	15.01	0.04	15.84	0.247

****
Node Depth Summary
****

	Average Depth	Maximum Depth	Maximum HGL	Time of Max Occurrence

Node	Type	Meters	Meters	Meters	days	hr:min
J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.02	0.17	200.94	0	01:50
J3	JUNCTION	0.03	0.28	199.24	0	01:58
J6	JUNCTION	0.02	0.19	198.99	0	02:05
J10	JUNCTION	0.03	0.34	198.94	0	01:35
J4	JUNCTION	0.01	0.24	200.74	0	01:39
J7	JUNCTION	0.02	0.18	200.02	0	01:56
J11	JUNCTION	0.00	0.00	198.30	0	01:18
J9	JUNCTION	0.01	0.14	201.81	0	01:38
J5	JUNCTION	0.01	0.12	200.12	0	01:58
J8	JUNCTION	0.02	0.30	199.20	0	01:35
J18	JUNCTION	0.25	0.39	198.23	0	02:58
J12	JUNCTION	0.07	0.31	198.16	0	02:58
J13	JUNCTION	0.06	0.27	198.01	0	02:51
J14	JUNCTION	0.06	0.26	198.03	0	02:54
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.03	0.26	201.72	0	02:03
J22	JUNCTION	0.00	0.00	198.50	0	02:03
J19	JUNCTION	0.09	0.35	197.96	0	02:49
J21	JUNCTION	0.06	0.23	197.68	0	02:48
J16	JUNCTION	0.06	0.07	198.39	0	04:00
J23	JUNCTION	0.06	0.27	197.81	0	02:49
J24	JUNCTION	0.02	0.16	201.23	0	01:39
J25	JUNCTION	0.02	0.25	200.20	0	01:39
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.03	0.16	197.51	0	02:48
SWM_Pond	STORAGE	0.25	0.39	198.24	0	02:58

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J2	JUNCTION	37.41	69.14	0	01:35	0.116	0.295
J3	JUNCTION	0.00	183.51	0	01:43	0.000	1.022
J6	JUNCTION	99.77	104.17	0	01:50	0.375	0.485
J10	JUNCTION	8.87	207.13	0	01:35	0.036	0.411
J4	JUNCTION	66.68	66.68	0	01:35	0.111	0.111
J7	JUNCTION	32.77	71.95	0	01:36	0.131	0.403

J11	JUNCTION	0.00	205.80	0	01:35	0.000	0.411
J9	JUNCTION	46.36	46.36	0	01:35	0.178	0.178
J5	JUNCTION	0.00	47.75	0	01:42	0.000	0.113
J8	JUNCTION	198.37	198.37	0	01:34	0.375	0.375
J18	JUNCTION	0.00	5.77	0	02:05	0.000	0.414
J12	JUNCTION	0.00	155.49	0	02:58	0.000	1.351
J13	JUNCTION	28.95	157.62	0	02:58	0.046	1.396
J14	JUNCTION	0.00	155.49	0	02:58	0.000	1.351
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	128.60	128.60	0	01:35	0.257	0.257
J22	JUNCTION	0.00	43.25	0	02:03	0.000	0.256
J19	JUNCTION	0.00	216.03	0	02:41	0.000	1.888
J21	JUNCTION	25.12	219.54	0	02:48	0.073	1.941
J16	JUNCTION	0.00	166.70	0	01:58	0.000	1.018
J23	JUNCTION	0.00	213.09	0	02:49	0.000	1.867
J24	JUNCTION	69.17	69.17	0	01:35	0.271	0.271
J25	JUNCTION	94.62	133.38	0	01:35	0.322	0.616
Out1	OUTFALL	88.84	88.84	0	01:35	0.298	0.298
Out2	OUTFALL	0.00	219.54	0	02:48	0.000	1.941
SWM_Pond	STORAGE	137.02	431.04	0	01:35	0.270	1.955

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.43	0.244	1.256

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average	Avg	E&I	Maximum	Max	Time of Max	Maximum

Storage Unit	Volume 1000 m3	Pcnt Full	Pcnt Loss	Volume 1000 m3	Pcnt Full	Occurrence days hr:min	Outflow LPS
SWM_Pond	0.765	12	0	1.208	19	0 02:58	155.49

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	14.03	24.62	88.84	0.298
Out2	95.28	23.57	219.54	1.941
System	54.66	48.19	247.00	2.239

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	205.80	0 01:35			
C3	CONDUIT	26.70	0 01:58	0.18	0.05	0.31
C1_1	CONDUIT	54.21	0 01:50	0.28	0.03	0.28
C5	CONDUIT	64.58	0 01:56	0.32	0.03	0.31
C7	CONDUIT	198.27	0 01:35	0.51	0.31	0.64
C10	CONDUIT	36.95	0 01:38	0.31	0.02	0.20
C6	CONDUIT	87.99	0 02:05	0.34	0.05	0.34
C8	CONDUIT	205.80	0 01:35	1.49	0.32	0.34
C15	CONDUIT	166.70	0 01:58	2.21	0.16	0.32
C2	CONDUIT	47.75	0 01:42	0.33	0.08	0.31
C12	CONDUIT	155.49	0 02:58	0.87	0.75	0.75
C13	CONDUIT	0.00	0 00:00	0.00	0.00	0.33
C14	CONDUIT	155.59	0 02:59	0.39	0.09	0.35
C17	CONDUIT	157.79	0 02:59	0.31	0.09	0.41
P1	CONDUIT	5.77	0 02:05	0.33	0.93	1.00
C18	CONDUIT	43.25	0 02:03	0.36	0.02	0.18
C21	DUMMY	43.25	0 02:03			
C19	CONDUIT	213.09	0 02:49	1.29	0.29	0.41

C20	CONDUIT	219.54	0	02:48	0.82	0.08	0.27
C16	DUMMY	166.70	0	01:58			
C22	CONDUIT	213.09	0	02:49	0.57	0.10	0.33
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C4_2	CONDUIT	47.69	0	01:39	0.35	0.02	0.22
C1_2	CONDUIT	125.54	0	01:43	0.46	0.06	0.33
C11	ORIFICE	5.77	0	02:05			1.00
2	ORIFICE	152.15	0	02:58			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.08	0.0000
C1_1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.0000
C6	1.00	0.02	0.04	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.95	0.03	0.00	0.00	0.20	0.0000
C15	1.00	0.02	0.00	0.00	0.85	0.13	0.00	0.00	0.34	0.0001
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.04	0.00	0.00	0.96	0.01	0.00	0.00	0.53	0.0003
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.03	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.21	0.0000
C19	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.68	0.0002
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.45	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.29	0.0000
C4_1	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
C12	0.01	0.01	0.01	1.30	0.01
P1	22.42	22.42	22.42	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:26:05 2013
Analysis ended on: Thu Jul 11 15:26:08 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	25Yr	J9
210	0.43	500.00	100.00	10.0000	25Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	25Yr	J24
202	0.90	105.00	7.00	7.0000	25Yr	J7
100	1.53	500.00	0.00	2.0000	25Yr	Out1
208	0.26	50.00	95.00	2.0000	25Yr	J8
207	0.38	63.00	95.00	2.0000	25Yr	J8
206	0.13	34.00	5.00	2.0000	25Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	25Yr	J10
205	1.85	450.00	0.00	50.0000	25Yr	J20
303	0.44	40.00	0.00	50.0000	25Yr	J21
304	0.15	95.00	20.00	3.0000	25Yr	J13
301	0.53	350.00	0.00	4.0000	25Yr	J4
302	1.95	770.00	0.00	1.0000	25Yr	J6
201a	0.46	76.00	5.00	13.0000	25Yr	J9
204c	1.74	198.00	8.00	7.0000	25Yr	J25
204b	0.37	119.00	8.00	13.0000	25Yr	J25
204a	0.73	119.00	8.00	13.0000	25Yr	J2
201b	0.28	76.00	5.00	13.0000	25Yr	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.106	74.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.661	44.358
Surface Runoff	0.429	28.802
Final Surface Storage	0.019	1.280
Continuity Error (%)	-0.324	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.429	4.294
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.367	3.670
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.062	0.625
Continuity Error (%)	0.001	

Highest Continuity Errors

Node J5 (2.68%)
Node J6 (-2.57%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C12 (1)

Routing Time Step Summary

****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	74.20	0.00	0.00	51.06	22.05	0.19	61.29	0.297
210	74.20	0.00	0.00	0.00	72.39	0.31	162.80	0.976
201c	74.20	0.00	0.00	50.53	22.63	0.38	116.99	0.305
202	74.20	0.00	0.00	49.62	23.50	0.21	65.37	0.317
100	74.20	0.00	0.00	43.76	29.47	0.45	168.10	0.397
208	74.20	0.00	0.00	0.26	72.04	0.19	98.39	0.971
207	74.20	0.00	0.00	0.26	72.05	0.27	143.78	0.971
206	74.20	0.00	0.00	51.56	21.48	0.03	7.91	0.289
209	74.20	0.00	0.00	51.06	22.14	0.06	20.36	0.298
205	74.20	0.00	0.00	50.44	23.05	0.43	289.79	0.311
303	74.20	0.00	0.00	47.56	25.66	0.11	48.09	0.346
304	74.20	0.00	0.00	31.13	42.27	0.06	41.57	0.570
301	74.20	0.00	0.00	42.30	31.11	0.16	107.42	0.419
302	74.20	0.00	0.00	44.01	29.17	0.57	191.69	0.393
201a	74.20	0.00	0.00	49.73	23.52	0.11	44.71	0.317
204c	74.20	0.00	0.00	49.08	24.00	0.42	131.19	0.323
204b	74.20	0.00	0.00	47.39	25.88	0.10	55.38	0.349
204a	74.20	0.00	0.00	48.16	25.09	0.18	78.21	0.338
201b	74.20	0.00	0.00	49.09	24.15	0.07	35.99	0.325

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.00	201.67	0 00:00

J2	JUNCTION	0.02	0.24	201.01	0	01:42
J3	JUNCTION	0.04	0.44	199.40	0	01:55
J6	JUNCTION	0.02	0.25	199.05	0	01:55
J10	JUNCTION	0.03	0.37	198.97	0	01:35
J4	JUNCTION	0.01	0.30	200.80	0	01:37
J7	JUNCTION	0.02	0.25	200.09	0	01:49
J11	JUNCTION	0.00	0.00	198.30	0	01:35
J9	JUNCTION	0.01	0.21	201.88	0	01:37
J5	JUNCTION	0.01	0.16	200.16	0	01:52
J8	JUNCTION	0.02	0.33	199.23	0	01:35
J18	JUNCTION	0.27	0.51	198.35	0	02:52
J12	JUNCTION	0.09	0.39	198.24	0	02:52
J13	JUNCTION	0.08	0.38	198.12	0	02:39
J14	JUNCTION	0.07	0.37	198.14	0	02:39
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.04	0.37	201.83	0	01:51
J22	JUNCTION	0.00	0.00	198.50	0	01:51
J19	JUNCTION	0.11	0.49	198.10	0	02:37
J21	JUNCTION	0.07	0.28	197.73	0	02:36
J16	JUNCTION	0.05	0.06	198.38	0	04:06
J23	JUNCTION	0.07	0.32	197.86	0	02:37
J24	JUNCTION	0.02	0.23	201.30	0	01:39
J25	JUNCTION	0.03	0.34	200.29	0	01:39
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.04	0.20	197.55	0	02:36
SWM_Pond	STORAGE	0.27	0.51	198.36	0	02:52

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	78.20	155.13	0 01:36	0.183	0.477
J3	JUNCTION	0.00	389.96	0 01:40	0.000	1.656
J6	JUNCTION	191.66	197.56	0 01:35	0.569	0.733
J10	JUNCTION	20.35	262.44	0 01:35	0.060	0.522
J4	JUNCTION	107.41	107.41	0 01:35	0.165	0.165
J7	JUNCTION	65.36	160.69	0 01:38	0.211	0.659
J11	JUNCTION	0.00	259.98	0 01:35	0.000	0.521
J9	JUNCTION	105.98	105.98	0 01:35	0.293	0.293
J5	JUNCTION	0.00	87.15	0 01:39	0.000	0.169

J8	JUNCTION	242.17	242.17	0	01:35	0.461	0.461
J18	JUNCTION	0.00	5.78	0	01:47	0.000	0.412
J12	JUNCTION	0.00	229.47	0	02:52	0.000	2.324
J13	JUNCTION	41.56	232.64	0	02:51	0.063	2.387
J14	JUNCTION	0.00	229.47	0	02:52	0.000	2.325
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	289.73	289.73	0	01:35	0.427	0.427
J22	JUNCTION	0.00	88.45	0	01:51	0.000	0.426
J19	JUNCTION	0.00	327.29	0	02:19	0.000	3.137
J21	JUNCTION	48.08	327.34	0	02:35	0.113	3.219
J16	JUNCTION	0.00	338.19	0	01:55	0.000	1.647
J23	JUNCTION	0.00	317.56	0	02:37	0.000	3.107
J24	JUNCTION	152.95	152.95	0	01:35	0.446	0.446
J25	JUNCTION	186.55	266.91	0	01:35	0.513	0.989
Out1	OUTFALL	168.07	168.07	0	01:35	0.451	0.451
Out2	OUTFALL	0.00	327.34	0	02:36	0.000	3.219
SWM_Pond	STORAGE	170.71	588.50	0	01:35	0.339	2.933

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.49	0.364	1.136

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS

SWM_Pond	0.811	13	0	1.631	26	0	02:52	229.47

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	14.43	36.20	168.07	0.451
Out2	95.71	38.92	327.34	3.219
System	55.07	75.13	370.06	3.670

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	259.98	0	01:35			
C3	CONDUIT	46.12	0	01:52	0.20	0.08	0.41
C1_1	CONDUIT	123.83	0	01:42	0.34	0.06	0.38
C5	CONDUIT	140.24	0	01:49	0.36	0.07	0.46
C7	CONDUIT	242.09	0	01:35	0.54	0.37	0.70
C10	CONDUIT	87.93	0	01:37	0.40	0.04	0.29
C6	CONDUIT	155.84	0	01:55	0.41	0.09	0.46
C8	CONDUIT	259.98	0	01:35	1.63	0.40	0.37
C15	CONDUIT	338.19	0	01:55	2.23	0.33	0.50
C2	CONDUIT	87.15	0	01:39	0.39	0.15	0.40
C12	CONDUIT	229.47	0	02:52	1.04	1.11	0.99
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.46
C14	CONDUIT	229.92	0	02:53	0.39	0.13	0.50
C17	CONDUIT	233.28	0	02:53	0.32	0.13	0.59
P1	CONDUIT	5.78	0	01:47	0.33	0.93	1.00
C18	CONDUIT	88.45	0	01:51	0.45	0.05	0.25
C21	DUMMY	88.45	0	01:51			
C19	CONDUIT	317.56	0	02:37	1.34	0.44	0.54
C20	CONDUIT	327.34	0	02:36	0.92	0.11	0.32
C16	DUMMY	338.19	0	01:55			
C22	CONDUIT	317.56	0	02:37	0.65	0.15	0.40

C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.16
C4_2	CONDUIT	115.38	0	01:39	0.45	0.06	0.32
C1_2	CONDUIT	268.37	0	01:40	0.55	0.13	0.49
C11	ORIFICE	5.78	0	01:47			1.00
2	ORIFICE	225.49	0	02:52			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted /Actual	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.08	0.0000
C1_1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.0000
C6	1.00	0.02	0.04	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.94	0.05	0.00	0.00	0.22	0.0000
C15	1.00	0.02	0.00	0.00	0.84	0.14	0.00	0.00	0.34	0.0001
C2	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.03	0.00	0.00	0.96	0.01	0.00	0.00	0.52	0.0003
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.02	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.21	0.0000
C19	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.67	0.0001
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.46	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.29	0.0000
C4_1	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000

****
Conduit Surcharge Summary
****

	--- Hours Full ---			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited

C9	24.00	24.00	24.00	24.00	0.01
C12	0.01	0.01	0.01	2.45	0.01
P1	22.48	22.48	22.48	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:26:52 2013
Analysis ended on: Thu Jul 11 15:26:55 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	50Yr	J9
210	0.43	500.00	100.00	10.0000	50Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	50Yr	J24
202	0.90	105.00	7.00	7.0000	50Yr	J7
100	1.53	500.00	0.00	2.0000	50Yr	Out1
208	0.26	50.00	95.00	2.0000	50Yr	J8
207	0.38	63.00	95.00	2.0000	50Yr	J8
206	0.13	34.00	5.00	2.0000	50Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	50Yr	J10
205	1.85	450.00	0.00	50.0000	50Yr	J20
303	0.44	40.00	0.00	50.0000	50Yr	J21
304	0.15	95.00	20.00	3.0000	50Yr	J13
301	0.53	350.00	0.00	4.0000	50Yr	J4
302	1.95	770.00	0.00	1.0000	50Yr	J6
201a	0.46	76.00	5.00	13.0000	50Yr	J9
204c	1.74	198.00	8.00	7.0000	50Yr	J25
204b	0.37	119.00	8.00	13.0000	50Yr	J25
204a	0.73	119.00	8.00	13.0000	50Yr	J2
201b	0.28	76.00	5.00	13.0000	50Yr	J24

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.254	84.100
Evaporation Loss	0.000	0.000
Infiltration Loss	0.698	46.801
Surface Runoff	0.541	36.277
Final Surface Storage	0.019	1.291
Continuity Error (%)	-0.321	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.541	5.409
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.478	4.780
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.063	0.629
Continuity Error (%)	0.001	

Highest Continuity Errors

Node J6 (-2.95%)
Node J5 (2.86%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C12 (1)

Routing Time Step Summary

****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	84.10	0.00	0.00	54.11	28.95	0.24	93.61	0.344
210	84.10	0.00	0.00	0.00	82.21	0.35	184.52	0.978
201c	84.10	0.00	0.00	53.42	29.66	0.50	177.02	0.353
202	84.10	0.00	0.00	52.46	30.57	0.28	96.17	0.363
100	84.10	0.00	0.00	45.90	37.24	0.57	235.24	0.443
208	84.10	0.00	0.00	0.26	82.00	0.21	111.53	0.975
207	84.10	0.00	0.00	0.26	82.01	0.31	162.99	0.975
206	84.10	0.00	0.00	54.62	28.35	0.04	12.06	0.337
209	84.10	0.00	0.00	53.95	29.04	0.08	31.07	0.345
205	84.10	0.00	0.00	53.30	30.17	0.56	402.60	0.359
303	84.10	0.00	0.00	50.39	32.72	0.14	67.44	0.389
304	84.10	0.00	0.00	32.30	51.11	0.08	50.26	0.608
301	84.10	0.00	0.00	44.45	38.90	0.21	137.22	0.463
302	84.10	0.00	0.00	46.14	36.93	0.72	270.94	0.439
201a	84.10	0.00	0.00	52.62	30.59	0.14	66.79	0.364
204c	84.10	0.00	0.00	51.89	31.09	0.54	190.49	0.370
204b	84.10	0.00	0.00	50.18	33.07	0.12	77.15	0.393
204a	84.10	0.00	0.00	50.80	32.24	0.24	113.58	0.383
201b	84.10	0.00	0.00	51.97	31.24	0.09	51.92	0.372

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.00	201.67	0 00:00

J2	JUNCTION	0.02	0.29	201.06	0	01:40
J3	JUNCTION	0.04	0.58	199.54	0	01:55
J6	JUNCTION	0.03	0.29	199.09	0	01:51
J10	JUNCTION	0.03	0.39	198.99	0	01:35
J4	JUNCTION	0.01	0.34	200.84	0	01:36
J7	JUNCTION	0.03	0.30	200.14	0	01:45
J11	JUNCTION	0.00	0.00	198.30	0	01:35
J9	JUNCTION	0.02	0.25	201.92	0	01:37
J5	JUNCTION	0.01	0.19	200.19	0	01:49
J8	JUNCTION	0.02	0.35	199.25	0	01:35
J18	JUNCTION	0.28	0.63	198.47	0	02:50
J12	JUNCTION	0.10	0.49	198.34	0	02:48
J13	JUNCTION	0.09	0.45	198.19	0	02:33
J14	JUNCTION	0.08	0.42	198.19	0	02:34
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.04	0.45	201.91	0	01:46
J22	JUNCTION	0.00	0.00	198.50	0	01:46
J19	JUNCTION	0.13	0.56	198.17	0	02:31
J21	JUNCTION	0.07	0.30	197.75	0	02:28
J16	JUNCTION	0.05	0.07	198.39	0	04:09
J23	JUNCTION	0.08	0.35	197.89	0	02:31
J24	JUNCTION	0.02	0.28	201.35	0	01:38
J25	JUNCTION	0.03	0.39	200.34	0	01:38
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.04	0.23	197.58	0	02:28
SWM_Pond	STORAGE	0.28	0.63	198.48	0	02:50

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
J2	JUNCTION	113.56	236.35	0 01:35	0.235	0.620
J3	JUNCTION	0.00	580.58	0 01:40	0.000	2.156
J6	JUNCTION	270.92	283.53	0 01:35	0.720	0.925
J10	JUNCTION	31.07	305.52	0 01:35	0.078	0.604
J4	JUNCTION	137.20	137.20	0 01:35	0.206	0.206
J7	JUNCTION	96.16	251.84	0 01:38	0.275	0.861
J11	JUNCTION	0.00	302.40	0 01:35	0.000	0.603
J9	JUNCTION	160.38	160.38	0 01:35	0.384	0.384
J5	JUNCTION	0.00	119.96	0 01:38	0.000	0.211

J8	JUNCTION	274.52	274.52	0	01:34	0.525	0.525
J18	JUNCTION	0.00	5.79	0	01:41	0.000	0.413
J12	JUNCTION	0.00	283.56	0	03:01	0.000	3.078
J13	JUNCTION	50.25	287.12	0	03:01	0.077	3.154
J14	JUNCTION	0.00	283.61	0	03:01	0.000	3.079
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	402.54	402.54	0	01:35	0.558	0.558
J22	JUNCTION	0.00	129.24	0	01:47	0.000	0.558
J19	JUNCTION	0.00	409.83	0	02:04	0.000	4.105
J21	JUNCTION	67.44	400.64	0	02:28	0.144	4.210
J16	JUNCTION	0.00	466.87	0	01:55	0.000	2.141
J23	JUNCTION	0.00	388.03	0	02:31	0.000	4.067
J24	JUNCTION	228.92	228.92	0	01:35	0.583	0.583
J25	JUNCTION	267.60	397.28	0	01:35	0.663	1.282
Out1	OUTFALL	235.22	235.22	0	01:35	0.570	0.570
Out2	OUTFALL	0.00	400.64	0	02:28	0.000	4.210
SWM_Pond	STORAGE	196.55	724.76	0	01:35	0.390	3.692

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	22.53	0.484	1.016

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS

SWM_Pond	0.861	13	0	2.067	32	0	02:50	283.56

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	14.82	44.55	235.22	0.570
Out2	95.94	50.80	400.64	4.210
System	55.38	95.34	459.60	4.779

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	302.40	0	01:35			
C3	CONDUIT	62.54	0	01:49	0.21	0.11	0.48
C1_1	CONDUIT	190.17	0	01:40	0.39	0.09	0.45
C5	CONDUIT	212.69	0	01:45	0.39	0.11	0.58
C7	CONDUIT	274.45	0	01:35	0.56	0.42	0.74
C10	CONDUIT	136.44	0	01:37	0.44	0.07	0.35
C6	CONDUIT	217.45	0	01:51	0.45	0.12	0.53
C8	CONDUIT	302.40	0	01:35	1.72	0.47	0.39
C15	CONDUIT	466.87	0	01:55	2.83	0.45	0.52
C2	CONDUIT	119.96	0	01:38	0.43	0.21	0.47
C12	CONDUIT	283.61	0	03:01	1.28	1.37	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.50
C14	CONDUIT	284.24	0	03:02	0.38	0.16	0.58
C17	CONDUIT	288.06	0	03:02	0.33	0.16	0.67
P1	CONDUIT	5.79	0	01:41	0.33	0.93	1.00
C18	CONDUIT	129.24	0	01:47	0.50	0.07	0.30
C21	DUMMY	129.24	0	01:47			
C19	CONDUIT	388.03	0	02:31	1.38	0.54	0.61
C20	CONDUIT	400.64	0	02:28	0.98	0.14	0.35
C16	DUMMY	466.87	0	01:55			
C22	CONDUIT	388.03	0	02:31	0.69	0.18	0.44

C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.19
C4_2	CONDUIT	182.02	0	01:39	0.50	0.09	0.38
C1_2	CONDUIT	399.66	0	01:39	0.61	0.20	0.61
C11	ORIFICE	5.78	0	01:41			1.00
2	ORIFICE	279.17	0	03:01			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted /Actual	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.05	0.00	0.00	0.94	0.00	0.00	0.00	0.08	0.0000
C1_1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
C7	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.0000
C6	1.00	0.01	0.04	0.00	0.95	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.93	0.06	0.00	0.00	0.22	0.0000
C15	1.00	0.01	0.00	0.00	0.84	0.15	0.00	0.00	0.34	0.0001
C2	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.03	0.0000
C12	1.00	0.03	0.00	0.00	0.96	0.01	0.00	0.00	0.49	0.0003
C13	1.00	0.03	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.02	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.22	0.0000
C19	1.00	0.01	0.00	0.00	0.98	0.01	0.00	0.00	0.67	0.0001
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.47	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.30	0.0000
C4_1	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.10	0.0000
C1_2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000

****
Conduit Surcharge Summary
****

	--- Hours Full ---			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited

C9	24.00	24.00	24.00	24.00	0.01
C12	1.60	1.60	1.60	3.02	1.60
P1	22.52	22.52	22.52	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:27:25 2013
Analysis ended on: Thu Jul 11 15:27:27 2013
Total elapsed time: 00:00:02

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

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Subcatchment Summary
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Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	100Yr	J9
210	0.43	500.00	100.00	10.0000	100Yr	SWM_Pond
201c	1.67	205.00	5.00	8.0000	100Yr	J24
202	0.90	105.00	7.00	7.0000	100Yr	J7
100	1.53	500.00	0.00	2.0000	100Yr	Out1
208	0.26	50.00	95.00	2.0000	100Yr	J8
207	0.38	63.00	95.00	2.0000	100Yr	J8
206	0.13	34.00	5.00	2.0000	100Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	100Yr	J10
205	1.85	450.00	0.00	50.0000	100Yr	J20
303	0.44	40.00	0.00	50.0000	100Yr	J21
304	0.15	95.00	20.00	3.0000	100Yr	J13
301	0.53	350.00	0.00	4.0000	100Yr	J4
302	1.95	770.00	0.00	1.0000	100Yr	J6
201a	0.46	76.00	5.00	13.0000	100Yr	J9
204c	1.74	198.00	8.00	7.0000	100Yr	J25
204b	0.37	119.00	8.00	13.0000	100Yr	J25
204a	0.73	119.00	8.00	13.0000	100Yr	J2
201b	0.28	76.00	5.00	13.0000	100Yr	J24

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.857	124.530
Evaporation Loss	0.000	0.000
Infiltration Loss	0.671	45.015
Surface Runoff	1.044	70.002
Final Surface Storage	0.145	9.751
Continuity Error (%)	-0.190	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.041	10.415
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.921	9.208
Internal Outflow	0.004	0.043
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.117	1.174
Continuity Error (%)	-0.106	

Highest Continuity Errors

Node J5 (2.13%)
Node J19 (1.04%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C16 (23)
Link C15 (13)
Link C19 (12)
Link C22 (9)
Link C12 (2)

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Routing Time Step Summary
****
Minimum Time Step   :   0.50 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.08

****
Subcatchment Runoff Summary
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Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	124.53	0.00	0.00	52.33	61.18	0.51	152.10	0.491
210	124.53	0.00	0.00	0.00	122.51	0.53	164.44	0.984
201c	124.53	0.00	0.00	50.87	62.42	1.04	290.25	0.501
202	124.53	0.00	0.00	49.80	63.57	0.57	153.64	0.511
100	124.53	0.00	0.00	43.78	71.99	1.10	322.50	0.578
208	124.53	0.00	0.00	0.25	121.99	0.32	99.40	0.980
207	124.53	0.00	0.00	0.25	121.97	0.46	145.26	0.979
206	124.53	0.00	0.00	52.33	60.81	0.08	20.51	0.488
209	124.53	0.00	0.00	52.33	61.23	0.17	49.99	0.492
205	124.53	0.00	0.00	51.99	62.14	1.15	474.64	0.499
303	124.53	0.00	0.00	51.99	65.21	0.29	91.01	0.524
304	124.53	0.00	0.00	27.88	87.91	0.13	49.26	0.706
301	124.53	0.00	0.00	43.78	73.12	0.39	147.69	0.587
302	124.53	0.00	0.00	43.78	71.78	1.40	385.62	0.576
201a	124.53	0.00	0.00	50.87	63.00	0.29	98.34	0.506
204c	124.53	0.00	0.00	49.26	64.19	1.12	299.13	0.515
204b	124.53	0.00	0.00	49.26	65.40	0.24	93.93	0.525
204a	124.53	0.00	0.00	49.26	64.89	0.47	160.82	0.521
201b	124.53	0.00	0.00	50.87	63.41	0.18	67.64	0.509

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Node Depth Summary
****

	Average	Maximum	Maximum	Time of Max

Node	Type	Depth Meters	Depth Meters	HGL Meters	Occurrence days	hr:min
J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.06	0.36	201.13	0	12:18
J3	JUNCTION	0.11	1.00	199.96	0	12:23
J6	JUNCTION	0.05	0.36	199.16	0	12:24
J10	JUNCTION	0.10	0.39	198.99	0	12:15
J4	JUNCTION	0.03	0.33	200.83	0	12:15
J7	JUNCTION	0.07	0.38	200.22	0	12:20
J11	JUNCTION	0.00	0.00	198.30	0	12:15
J9	JUNCTION	0.05	0.31	201.98	0	12:16
J5	JUNCTION	0.03	0.22	200.22	0	12:24
J8	JUNCTION	0.06	0.33	199.23	0	12:15
J18	JUNCTION	0.25	0.85	198.69	0	13:19
J12	JUNCTION	0.15	0.67	198.52	0	13:18
J13	JUNCTION	0.13	0.54	198.28	0	12:59
J14	JUNCTION	0.13	0.51	198.28	0	13:00
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.09	0.57	202.03	0	12:19
J22	JUNCTION	0.00	0.00	198.50	0	12:19
J19	JUNCTION	0.17	0.66	198.27	0	12:56
J21	JUNCTION	0.11	0.34	197.79	0	12:52
J16	JUNCTION	0.11	0.76	199.08	0	23:04
J23	JUNCTION	0.12	0.39	197.93	0	12:56
J24	JUNCTION	0.06	0.35	201.42	0	12:16
J25	JUNCTION	0.09	0.47	200.42	0	12:18
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.07	0.26	197.61	0	12:52
SWM_Pond	STORAGE	0.25	0.85	198.70	0	13:19

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Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J2	JUNCTION	160.78	383.09	0	12:15	0.473	1.274
J3	JUNCTION	0.00	1004.26	0	12:19	0.000	4.413
J6	JUNCTION	385.57	443.72	0	12:15	1.397	1.777
J10	JUNCTION	49.98	294.57	0	12:15	0.165	0.944
J4	JUNCTION	147.64	147.64	0	12:15	0.387	0.387

J7	JUNCTION	153.61	454.97	0	12:15	0.571	1.787
J11	JUNCTION	0.00	291.90	0	12:15	0.000	0.941
J9	JUNCTION	250.39	250.39	0	12:15	0.802	0.802
J5	JUNCTION	0.00	143.43	0	12:16	0.000	0.389
J8	JUNCTION	244.66	244.66	0	12:14	0.780	0.780
J18	JUNCTION	0.00	5.80	0	12:12	0.000	0.253
J12	JUNCTION	0.00	362.41	0	13:29	0.000	5.992
J13	JUNCTION	49.25	366.76	0	13:33	0.132	6.119
J14	JUNCTION	0.00	362.49	0	13:29	0.000	5.992
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	474.49	474.49	0	12:15	1.147	1.147
J22	JUNCTION	0.00	227.15	0	12:19	0.000	1.126
J19	JUNCTION	0.00	537.52	0	12:25	0.000	7.904
J21	JUNCTION	91.00	519.57	0	12:52	0.286	8.111
J16	JUNCTION	0.00	739.54	0	12:23	0.000	4.328
J23	JUNCTION	0.00	502.66	0	12:56	0.000	7.822
J24	JUNCTION	357.82	357.82	0	12:15	1.217	1.217
J25	JUNCTION	392.98	686.08	0	12:15	1.356	2.622
Out1	OUTFALL	322.45	322.45	0	12:15	1.099	1.099
Out2	OUTFALL	0.00	519.57	0	12:52	0.000	8.109
SWM_Pond	STORAGE	184.93	1099.77	0	12:23	0.605	7.004

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J3	JUNCTION	0.32	0.250	0.000
J18	JUNCTION	12.22	0.699	0.801
J16	JUNCTION	2.89	0.309	0.421

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Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters

J3	0.12	225.36	0	12:23	0.043	1.00

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.777	12	0	2.885	45	0 13:19	362.41

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	55.13	23.08	322.45	1.099
Out2	84.35	111.26	519.57	8.109
System	69.74	134.34	604.73	9.208

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	291.90	0 12:15			
C3	CONDUIT	90.99	0 12:24	0.23	0.16	0.58
C1_1	CONDUIT	332.26	0 12:18	0.45	0.17	0.56
C5	CONDUIT	382.37	0 12:20	0.41	0.19	0.76
C7	CONDUIT	244.59	0 12:15	0.52	0.38	0.72
C10	CONDUIT	229.45	0 12:16	0.48	0.11	0.45
C6	CONDUIT	327.68	0 12:24	0.48	0.19	0.64
C8	CONDUIT	291.90	0 12:15	1.70	0.45	0.39

C15	CONDUIT	739.54	0	12:23	3.86	0.72	0.64
C2	CONDUIT	143.43	0	12:16	0.43	0.25	0.52
C12	CONDUIT	362.49	0	13:29	1.64	1.75	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.50
C14	CONDUIT	363.90	0	13:33	0.38	0.21	0.70
C17	CONDUIT	369.14	0	13:33	0.30	0.20	0.80
P1	CONDUIT	5.80	0	12:12	0.33	0.93	1.00
C18	CONDUIT	227.15	0	12:19	0.58	0.12	0.38
C21	DUMMY	227.15	0	12:19			
C19	CONDUIT	502.66	0	12:56	1.52	0.69	0.70
C20	CONDUIT	519.57	0	12:52	1.05	0.18	0.40
C16	DUMMY	739.54	0	12:23			
C22	CONDUIT	502.66	0	12:56	0.75	0.24	0.49
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.24
C4_2	CONDUIT	313.05	0	12:16	0.57	0.16	0.49
C1_2	CONDUIT	630.91	0	12:18	0.66	0.31	0.80
C11	ORIFICE	5.79	0	12:12			1.00
2	ORIFICE	357.49	0	13:29			
3	WEIR	0.00	0	00:00			0.00

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Flow Classification Summary
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	Adjusted	--- Fraction of Time in Flow Class ----						Avg.	Avg.
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	0.45	0.01	0.00	0.54	0.00	0.00	0.00	0.07	0.0000
C1_1	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.19	0.0000
C5	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.22	0.0000
C7	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.15	0.0000
C10	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.22	0.0000
C6	1.00	0.07	0.38	0.00	0.55	0.00	0.00	0.00	0.05	0.0000
C8	1.00	0.07	0.00	0.00	0.88	0.05	0.00	0.00	0.38	0.0000
C15	1.00	0.07	0.00	0.00	0.30	0.63	0.00	0.00	1.43	0.0015
C2	1.00	0.45	0.00	0.00	0.55	0.00	0.00	0.00	0.13	0.0000
C12	1.00	0.12	0.00	0.00	0.88	0.00	0.00	0.00	0.46	0.0003
C13	1.00	0.12	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.07	0.05	0.00	0.88	0.00	0.00	0.00	0.20	0.0000
C17	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.18	0.0000
P1	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.12	0.0000
C18	1.00	0.49	0.00	0.00	0.51	0.00	0.00	0.00	0.18	0.0000
C19	1.00	0.07	0.00	0.00	0.86	0.06	0.00	0.00	0.69	0.0011
C20	1.00	0.10	0.00	0.00	0.90	0.00	0.00	0.00	0.47	0.0000
C22	1.00	0.08	0.00	0.00	0.92	0.00	0.00	0.00	0.30	0.0000

C4_1	1.00	0.07	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.24	0.0000
C1_2	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.27	0.0000

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
C15	0.01	0.01	0.01	0.59	0.01
C12	2.89	2.89	2.89	4.89	2.89
P1	12.16	12.16	12.16	0.01	0.01
C21	24.00	24.00	24.00	24.00	0.01
C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:28:17 2013
Analysis ended on: Thu Jul 11 15:28:20 2013
Total elapsed time: 00:00:03

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model was developed
July 8 2013 - Culvert on Brooks Road was corrected as single 750mm culvert

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NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
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Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-22-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

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Element Count
****
Number of rain gages 8
Number of subcatchments ... 19
Number of nodes 27
Number of links 27
Number of pollutants 0
Number of land uses 0

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Raingage Summary
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Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

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Subcatchment Summary
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Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.84	100.00	5.00	12.0000	25mm	J9
210	0.43	500.00	100.00	10.0000	25mm	SWM_Pond
201c	1.67	205.00	5.00	8.0000	25mm	J24
202	0.90	105.00	7.00	7.0000	25mm	J7
100	1.53	500.00	0.00	2.0000	25mm	Out1
208	0.26	50.00	95.00	2.0000	25mm	J8
207	0.38	63.00	95.00	2.0000	25mm	J8
206	0.13	34.00	5.00	2.0000	25mm	SWM_Pond
209	0.27	68.00	5.00	2.0000	25mm	J10
205	1.85	450.00	0.00	50.0000	25mm	J20
303	0.44	40.00	0.00	50.0000	25mm	J21
304	0.15	95.00	20.00	3.0000	25mm	J13
301	0.53	350.00	0.00	4.0000	25mm	J4
302	1.95	770.00	0.00	1.0000	25mm	J6
201a	0.46	76.00	5.00	13.0000	25mm	J9
204c	1.74	198.00	8.00	7.0000	25mm	J25
204b	0.37	119.00	8.00	13.0000	25mm	J25
204a	0.73	119.00	8.00	13.0000	25mm	J2
201b	0.28	76.00	5.00	13.0000	25mm	J24

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

J1	JUNCTION	201.67	1.00	0.0
J2	JUNCTION	200.77	1.00	0.0
J3	JUNCTION	198.96	1.00	0.0
J6	JUNCTION	198.80	1.20	0.0
J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.65	0.0
J12	JUNCTION	197.85	1.65	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.65	0.0
J20	JUNCTION	201.46	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
J24	JUNCTION	201.07	1.00	0.0
J25	JUNCTION	199.95	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.5000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C1_1	J2	J25	CONDUIT	167.9	0.4885	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.3478	0.0130
C13	J15	J14	CONDUIT	22.2	5.3180	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400

P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.4997	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C4_1	J1	J24	CONDUIT	116.1	0.5169	0.0400
C4_2	J24	J7	CONDUIT	253.7	0.4849	0.0400
C1_2	J25	J3	CONDUIT	202.1	0.4899	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C1_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2013.18
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	103.41
C13	TRAPEZOIDAL	0.40	1.28	0.28	4.40	1	3177.88
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1956.85
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96
C4_1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2070.90
C4_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2005.77
C1_2	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2016.13

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.373	24.990
Evaporation Loss	0.000	0.000
Infiltration Loss	0.317	21.246
Surface Runoff	0.036	2.415
Final Surface Storage	0.020	1.345
Continuity Error (%)	-0.065	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.036	0.360
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.019	0.191
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.017	0.169
Continuity Error (%)	-0.028	

Highest Continuity Errors

Node J19 (3.17%)
Node J25 (-2.23%)
Node J3 (1.70%)
Node J24 (-1.36%)
Node J2 (1.31%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (16)

****
Routing Time Step Summary
****
Minimum Time Step   :   1.00 sec
Average Time Step   :   1.00 sec
Maximum Time Step   :   1.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00

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Subcatchment Runoff Summary
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Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	24.99	0.00	0.00	22.54	1.15	0.01	7.18	0.046
210	24.99	0.00	0.00	0.00	23.07	0.10	73.53	0.923
201c	24.99	0.00	0.00	22.54	1.15	0.02	14.28	0.046
202	24.99	0.00	0.00	22.06	1.61	0.01	10.77	0.065
100	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
208	24.99	0.00	0.00	0.25	22.63	0.06	42.47	0.906
207	24.99	0.00	0.00	0.25	22.63	0.09	61.55	0.905
206	24.99	0.00	0.00	22.54	1.15	0.00	1.11	0.046
209	24.99	0.00	0.00	22.54	1.15	0.00	2.31	0.046
205	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
303	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
304	24.99	0.00	0.00	19.01	4.61	0.01	5.13	0.185
301	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
302	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
201a	24.99	0.00	0.00	22.54	1.15	0.01	3.93	0.046
204c	24.99	0.00	0.00	21.83	1.85	0.03	23.80	0.074
204b	24.99	0.00	0.00	21.83	1.85	0.01	5.06	0.074
204a	24.99	0.00	0.00	21.83	1.85	0.01	9.98	0.074
201b	24.99	0.00	0.00	22.54	1.16	0.00	2.39	0.046

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Node Depth Summary
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	Average Depth	Maximum Depth	Maximum HGL	Time of Max Occurrence

Node	Type	Meters	Meters	Meters	days	hr:min
J1	JUNCTION	0.00	0.00	201.67	0	00:00
J2	JUNCTION	0.00	0.08	200.85	0	01:54
J3	JUNCTION	0.01	0.11	199.07	0	02:00
J6	JUNCTION	0.00	0.00	198.80	0	00:00
J10	JUNCTION	0.02	0.33	198.93	0	01:48
J4	JUNCTION	0.00	0.00	200.50	0	00:00
J7	JUNCTION	0.01	0.08	199.92	0	01:55
J11	JUNCTION	0.00	0.00	198.30	0	01:48
J9	JUNCTION	0.00	0.07	201.74	0	01:51
J5	JUNCTION	0.00	0.00	200.00	0	00:00
J8	JUNCTION	0.01	0.23	199.13	0	01:50
J18	JUNCTION	0.09	0.12	197.96	0	04:28
J12	JUNCTION	0.03	0.04	197.89	0	04:29
J13	JUNCTION	0.02	0.05	197.79	0	01:50
J14	JUNCTION	0.02	0.03	197.80	0	04:32
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.00	0.00	201.46	0	00:00
J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.04	0.05	197.66	0	04:08
J21	JUNCTION	0.02	0.03	197.48	0	04:11
J16	JUNCTION	0.05	0.06	198.38	0	02:23
J23	JUNCTION	0.02	0.03	197.57	0	04:09
J24	JUNCTION	0.00	0.08	201.15	0	01:52
J25	JUNCTION	0.01	0.14	200.09	0	01:53
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.01	197.36	0	04:11
SWM_Pond	STORAGE	0.08	0.11	197.96	0	04:28

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J2	JUNCTION	9.98	19.11	0	01:49	0.013	0.029
J3	JUNCTION	0.00	39.68	0	01:56	0.000	0.106
J6	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J10	JUNCTION	2.31	103.87	0	01:50	0.003	0.148
J4	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J7	JUNCTION	10.77	20.41	0	01:50	0.015	0.037

J11	JUNCTION	0.00	178.22	0	01:48	0.000	0.148
J9	JUNCTION	11.11	11.11	0	01:49	0.015	0.015
J5	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J8	JUNCTION	104.00	104.00	0	01:49	0.145	0.145
J18	JUNCTION	0.00	3.09	0	04:27	0.000	0.192
J12	JUNCTION	0.00	3.09	0	04:28	0.000	0.192
J13	JUNCTION	5.13	5.13	0	01:45	0.007	0.198
J14	JUNCTION	0.00	3.09	0	04:29	0.000	0.192
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	4.05	0	01:52	0.000	0.198
J21	JUNCTION	0.00	3.14	0	04:09	0.000	0.191
J16	JUNCTION	0.00	42.86	0	02:00	0.000	0.105
J23	JUNCTION	0.00	3.14	0	04:08	0.000	0.191
J24	JUNCTION	16.67	16.67	0	01:45	0.023	0.023
J25	JUNCTION	28.86	37.83	0	01:49	0.039	0.067
Out1	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
Out2	OUTFALL	0.00	3.14	0	04:11	0.000	0.191
SWM_Pond	STORAGE	74.64	257.84	0	01:48	0.101	0.353

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Node Surcharge Summary
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No nodes were surcharged.

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.221	3	0	0.319	5	0 04:28	3.09

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Outfall Loading Summary
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Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	0.00	0.00	0.00	0.000
Out2	92.19	2.40	3.14	0.191
System	46.09	2.40	3.14	0.191

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.34	0	01:48			
C3	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C1_1	CONDUIT	11.35	0	01:54	0.15	0.01	0.15
C5	CONDUIT	12.49	0	01:55	0.25	0.01	0.13
C7	CONDUIT	101.63	0	01:50	0.38	0.16	0.55
C10	CONDUIT	9.39	0	01:51	0.23	0.00	0.10
C6	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C8	CONDUIT	178.22	0	01:48	1.42	0.27	0.33
C15	CONDUIT	42.86	0	02:00	1.91	0.04	0.19
C2	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C12	CONDUIT	3.09	0	04:29	0.28	0.01	0.10
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.04
C14	CONDUIT	3.09	0	04:32	0.13	0.00	0.04
C17	CONDUIT	4.05	0	01:52	0.15	0.00	0.05
P1	CONDUIT	3.09	0	04:27	0.29	0.50	0.78
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	3.14	0	04:08	0.41	0.00	0.05
C20	CONDUIT	3.14	0	04:11	0.18	0.00	0.03
C16	DUMMY	42.86	0	02:00			
C22	CONDUIT	3.14	0	04:09	0.13	0.00	0.04
C4_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C4_2	CONDUIT	10.69	0	01:52	0.24	0.01	0.11
C1_2	CONDUIT	27.22	0	01:56	0.31	0.01	0.16

C11	ORIFICE	3.09	0	04:28	1.00
2	ORIFICE	0.00	0	00:00	
3	WEIR	0.00	0	00:00	0.00

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C1_1	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.09	0.0000
C5	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.16	0.0000
C7	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.06	0.0000
C6	1.00	0.05	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C8	1.00	0.05	0.00	0.00	0.94	0.01	0.00	0.00	0.18	0.0000
C15	1.00	0.05	0.00	0.00	0.91	0.04	0.00	0.00	0.14	0.0001
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C12	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.07	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.05	0.03	0.00	0.93	0.00	0.00	0.00	0.22	0.0000
C17	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.25	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.05	0.00	0.00	0.94	0.01	0.00	0.00	0.71	0.0000
C20	1.00	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.37	0.0000
C22	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.24	0.0000
C4_1	1.00	0.05	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4_2	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.08	0.0000
C1_2	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.17	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	24.00	24.00	24.00	24.00	0.01
C21	24.00	24.00	24.00	24.00	0.01

C16	24.00	24.00	24.00	24.00	0.01

Analysis begun on: Thu Jul 11 15:29:56 2013
Analysis ended on: Thu Jul 11 15:29:58 2013
Total elapsed time: 00:00:02

APPENDIX D

PROPOSED VERTICAL EXPANSION CONDITION HYDROLOGIC MODEL INPUT AND OUTPUT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	2YR	J9
210	0.43	500.00	100.00	10.0000	2YR	SWM_Pond
204	2.64	319.00	8.00	25.0000	2YR	J2
202	0.85	96.00	7.00	25.0000	2YR	J7
201	2.62	307.00	5.00	25.0000	2YR	J1
100	1.53	500.00	0.00	2.0000	2YR	Out1
208	0.26	50.00	95.00	2.0000	2YR	J8
207	0.38	63.00	95.00	2.0000	2YR	J8
206	0.13	34.00	5.00	2.0000	2YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	2YR	J10
205	1.85	450.00	0.00	50.0000	2YR	J20
303	0.44	40.00	0.00	50.0000	2YR	J21
304	0.15	95.00	20.00	3.0000	2YR	J13
301	0.53	350.00	0.00	4.0000	2YR	J4
302	1.95	770.00	0.00	1.0000	2YR	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.510	34.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.428	28.708
Surface Runoff	0.063	4.230
Final Surface Storage	0.019	1.283
Continuity Error (%)	-0.064	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.063	0.631
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.057	0.573
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.006	0.058
Continuity Error (%)	0.010	

Highest Continuity Errors

Node J2 (-3.38%)
Node J3 (2.24%)
Node J5 (1.14%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (3)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	34.20	0.00	0.00	31.39	1.62	0.01	7.68	0.047
210	34.20	0.00	0.00	0.00	32.33	0.14	75.03	0.945
204	34.20	0.00	0.00	30.40	2.59	0.07	36.85	0.076
202	34.20	0.00	0.00	30.73	2.26	0.02	10.38	0.066
201	34.20	0.00	0.00	31.39	1.62	0.04	22.86	0.047
100	34.20	0.00	0.00	30.22	2.80	0.04	7.86	0.082
208	34.20	0.00	0.00	0.26	31.83	0.08	45.23	0.931
207	34.20	0.00	0.00	0.26	31.82	0.12	66.05	0.930
206	34.20	0.00	0.00	31.39	1.62	0.00	1.13	0.047
209	34.20	0.00	0.00	31.39	1.62	0.00	2.36	0.047
205	34.20	0.00	0.00	32.99	0.00	0.00	0.00	0.000
303	34.20	0.00	0.00	30.92	2.12	0.01	1.91	0.062
304	34.20	0.00	0.00	23.64	9.25	0.01	5.24	0.270
301	34.20	0.00	0.00	29.34	3.66	0.02	4.03	0.107
302	34.20	0.00	0.00	30.32	2.66	0.05	9.45	0.078

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.11	201.78	0 01:35
J2	JUNCTION	0.00	0.16	200.93	0 01:36
J3	JUNCTION	0.00	0.12	199.08	0 01:44
J6	JUNCTION	0.00	0.06	198.86	0 03:09
J10	JUNCTION	0.01	0.33	198.93	0 01:26
J4	JUNCTION	0.00	0.06	200.56	0 02:18
J7	JUNCTION	0.00	0.11	199.95	0 01:39
J11	JUNCTION	0.00	0.00	198.30	0 01:26
J9	JUNCTION	0.00	0.06	201.73	0 01:35
J5	JUNCTION	0.00	0.04	200.04	0 03:04
J8	JUNCTION	0.00	0.24	199.14	0 01:35
J18	JUNCTION	0.06	0.16	198.00	0 03:40
J12	JUNCTION	0.03	0.05	197.85	0 03:41
J13	JUNCTION	0.02	0.05	197.79	0 01:35

J14	JUNCTION	0.02	0.04	197.81	0	03:51
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.00	0.00	200.00	0	00:00
J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.03	0.11	197.72	0	03:23
J21	JUNCTION	0.02	0.07	197.52	0	03:17
J16	JUNCTION	0.06	0.06	198.38	0	02:14
J23	JUNCTION	0.02	0.07	197.61	0	03:24
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.03	197.38	0	03:17
SWM_Pond	STORAGE	0.06	0.16	198.01	0	03:40

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	22.86	22.86	0	01:30	0.043	0.042
J2	JUNCTION	36.85	43.72	0	01:34	0.068	0.083
J3	JUNCTION	0.00	55.55	0	01:38	0.000	0.148
J6	JUNCTION	9.45	12.65	0	03:00	0.052	0.071
J10	JUNCTION	2.36	113.35	0	01:35	0.004	0.208
J4	JUNCTION	4.03	4.03	0	02:19	0.019	0.019
J7	JUNCTION	10.38	30.35	0	01:34	0.019	0.063
J11	JUNCTION	0.00	178.13	0	01:26	0.000	0.208
J9	JUNCTION	7.68	7.68	0	01:34	0.014	0.014
J5	JUNCTION	0.00	4.41	0	02:31	0.000	0.020
J8	JUNCTION	111.28	111.28	0	01:34	0.204	0.204
J18	JUNCTION	0.00	4.19	0	03:40	0.000	0.438
J12	JUNCTION	0.00	4.19	0	03:40	0.000	0.438
J13	JUNCTION	5.24	6.45	0	01:34	0.014	0.452
J14	JUNCTION	0.00	4.19	0	03:41	0.000	0.438
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	16.19	0	03:06	0.000	0.523
J21	JUNCTION	1.91	15.54	0	03:16	0.009	0.530
J16	JUNCTION	0.00	49.22	0	01:44	0.000	0.145
J23	JUNCTION	0.00	14.70	0	03:23	0.000	0.521
Out1	OUTFALL	7.86	7.86	0	02:50	0.043	0.043
Out2	OUTFALL	0.00	15.54	0	03:17	0.000	0.530
SWM_Pond	STORAGE	76.17	260.12	0	01:26	0.141	0.493

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	4.31	0.011	1.499

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.174	3	0	0.451	7	0 03:40	4.19

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	3.95	4.27	7.86	0.043
Out2	98.07	2.10	15.54	0.530
System	51.01	6.37	22.65	0.573

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.24	0	01:26			
C3	CONDUIT	3.31	0	03:04	0.10	0.01	0.10
C4	CONDUIT	20.61	0	01:36	0.29	0.01	0.14
C5	CONDUIT	21.15	0	01:39	0.28	0.01	0.15
C7	CONDUIT	111.00	0	01:35	0.42	0.17	0.55
C10	CONDUIT	6.91	0	01:35	0.09	0.00	0.15
C6	CONDUIT	11.22	0	03:09	0.13	0.01	0.12
C8	CONDUIT	178.13	0	01:26	1.42	0.27	0.33
C1	CONDUIT	34.47	0	01:38	0.33	0.02	0.18
C15	CONDUIT	49.22	0	01:44	1.91	0.05	0.19
C2	CONDUIT	4.41	0	02:31	0.15	0.01	0.09
C12	CONDUIT	4.19	0	03:41	0.30	0.03	0.12
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C14	CONDUIT	4.19	0	03:51	0.14	0.00	0.05
C17	CONDUIT	6.29	0	01:36	0.17	0.00	0.10
P1	CONDUIT	4.19	0	03:40	0.32	0.67	1.00
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	14.70	0	03:23	0.50	0.02	0.12
C20	CONDUIT	15.54	0	03:17	0.33	0.01	0.07
C16	DUMMY	49.22	0	01:44			
C22	CONDUIT	14.70	0	03:24	0.23	0.01	0.09
C11	ORIFICE	4.19	0	03:40			1.00
2	ORIFICE	0.00	0	00:00			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.01	0.32	0.00	0.68	0.00	0.00	0.00	0.03	0.0000

C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.08	0.0000
C10	1.00	0.01	0.64	0.00	0.35	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.01	0.06	0.00	0.92	0.01	0.00	0.00	0.07	0.0000
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.23	0.00	0.74	0.02	0.00	0.00	0.06	0.0000
C2	1.00	0.02	0.57	0.00	0.41	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.49	0.0000
C13	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.22	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.14	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.38	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.01	0.00	0.00	0.87	0.12	0.00	0.00	0.79	0.0000
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.37	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.23	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
P1	2.54	2.54	2.54	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:32:34 2013
Analysis ended on: Thu Jul 11 15:32:41 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	5YR	J9
210	0.43	500.00	100.00	10.0000	5YR	SWM_Pond
204	2.64	319.00	8.00	25.0000	5YR	J2
202	0.85	96.00	7.00	25.0000	5YR	J7
201	2.62	307.00	5.00	25.0000	5YR	J1
100	1.53	500.00	0.00	2.0000	5YR	Out1
208	0.26	50.00	95.00	2.0000	5YR	J8
207	0.38	63.00	95.00	2.0000	5YR	J8
206	0.13	34.00	5.00	2.0000	5YR	SWM_Pond
209	0.27	68.00	5.00	2.0000	5YR	J10
205	1.85	450.00	0.00	50.0000	5YR	J20
303	0.44	40.00	0.00	50.0000	5YR	J21
304	0.15	95.00	20.00	3.0000	5YR	J13
301	0.53	350.00	0.00	4.0000	5YR	J4
302	1.95	770.00	0.00	1.0000	5YR	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.748	50.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.546	36.624
Surface Runoff	0.184	12.362
Final Surface Storage	0.019	1.299
Continuity Error (%)	-0.169	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.184	1.843
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.174	1.737
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.106
Continuity Error (%)	0.007	

Highest Continuity Errors

Node J5 (1.78%)
Node J2 (-1.18%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (5)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

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Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	50.20	0.00	0.00	41.62	7.46	0.07	12.27	0.149
210	50.20	0.00	0.00	0.00	48.38	0.21	110.14	0.964
204	50.20	0.00	0.00	39.74	9.32	0.25	60.16	0.186
202	50.20	0.00	0.00	40.17	8.82	0.07	17.06	0.176
201	50.20	0.00	0.00	41.04	7.98	0.21	39.39	0.159
100	50.20	0.00	0.00	36.79	12.23	0.19	39.52	0.244
208	50.20	0.00	0.00	0.26	47.91	0.12	66.52	0.954
207	50.20	0.00	0.00	0.26	47.91	0.18	97.19	0.954
206	50.20	0.00	0.00	42.23	6.71	0.01	1.74	0.134
209	50.20	0.00	0.00	41.92	7.13	0.02	3.68	0.142
205	50.20	0.00	0.00	41.79	7.28	0.13	32.86	0.145
303	50.20	0.00	0.00	38.82	10.27	0.05	10.79	0.205
304	50.20	0.00	0.00	27.41	21.72	0.03	17.97	0.433
301	50.20	0.00	0.00	35.60	13.56	0.07	34.92	0.270
302	50.20	0.00	0.00	37.03	11.98	0.23	45.69	0.239

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.13	201.80	0 01:36
J2	JUNCTION	0.01	0.19	200.96	0 01:37
J3	JUNCTION	0.01	0.15	199.11	0 01:51
J6	JUNCTION	0.01	0.14	198.94	0 02:18
J10	JUNCTION	0.01	0.32	198.92	0 01:22
J4	JUNCTION	0.00	0.17	200.67	0 01:43
J7	JUNCTION	0.01	0.14	199.98	0 02:26
J11	JUNCTION	0.00	0.00	198.30	0 01:22
J9	JUNCTION	0.00	0.08	201.75	0 01:35
J5	JUNCTION	0.00	0.09	200.09	0 02:07
J8	JUNCTION	0.00	0.28	199.18	0 01:35
J18	JUNCTION	0.15	0.34	198.18	0 03:29
J12	JUNCTION	0.05	0.17	197.97	0 03:29
J13	JUNCTION	0.03	0.14	197.88	0 03:31
J14	JUNCTION	0.03	0.15	197.92	0 03:30

J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.01	0.20	200.20	0	02:40
J22	JUNCTION	0.00	0.00	198.50	0	02:40
J19	JUNCTION	0.06	0.19	197.80	0	03:31
J21	JUNCTION	0.04	0.15	197.60	0	03:31
J16	JUNCTION	0.06	0.06	198.38	0	03:50
J23	JUNCTION	0.03	0.16	197.70	0	03:32
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.09	197.44	0	03:31
SWM_Pond	STORAGE	0.15	0.34	198.19	0	03:29

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	39.38	39.38	0	01:34	0.209	0.209
J2	JUNCTION	60.15	70.80	0	01:34	0.246	0.312
J3	JUNCTION	0.00	87.16	0	01:39	0.000	0.600
J6	JUNCTION	45.69	55.09	0	01:59	0.234	0.306
J10	JUNCTION	3.68	167.25	0	01:34	0.019	0.326
J4	JUNCTION	34.91	34.91	0	01:35	0.072	0.072
J7	JUNCTION	17.06	47.97	0	01:35	0.075	0.285
J11	JUNCTION	0.00	177.23	0	01:23	0.000	0.326
J9	JUNCTION	12.27	12.27	0	01:34	0.066	0.066
J5	JUNCTION	0.00	24.20	0	01:48	0.000	0.073
J8	JUNCTION	163.71	163.71	0	01:34	0.307	0.307
J18	JUNCTION	0.00	6.20	0	02:54	0.000	0.932
J12	JUNCTION	0.00	55.72	0	03:29	0.000	1.172
J13	JUNCTION	17.95	55.66	0	03:30	0.033	1.205
J14	JUNCTION	0.00	55.70	0	03:29	0.000	1.173
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	32.86	32.86	0	01:50	0.135	0.135
J22	JUNCTION	0.00	18.35	0	02:40	0.000	0.135
J19	JUNCTION	0.00	78.62	0	03:26	0.000	1.512
J21	JUNCTION	10.79	78.34	0	03:31	0.045	1.550
J16	JUNCTION	0.00	80.04	0	01:51	0.000	0.596
J23	JUNCTION	0.00	77.31	0	03:31	0.000	1.503
Out1	OUTFALL	39.52	39.52	0	01:35	0.187	0.187
Out2	OUTFALL	0.00	78.33	0	03:31	0.000	1.550
SWM_Pond	STORAGE	111.85	333.32	0	01:34	0.217	1.273

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	32.94	0.191	1.319

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.430	7	0	1.047	16	0 03:29	55.72

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.43	16.29	39.52	0.187
Out2	98.30	6.08	78.33	1.550
System	51.36	22.37	93.18	1.737

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	177.33	0	01:23			
C3	CONDUIT	14.64	0	02:07	0.16	0.03	0.23
C4	CONDUIT	33.07	0	01:37	0.33	0.02	0.18
C5	CONDUIT	39.36	0	02:26	0.32	0.02	0.20
C7	CONDUIT	163.57	0	01:35	0.47	0.25	0.59
C10	CONDUIT	10.79	0	01:35	0.13	0.01	0.18
C6	CONDUIT	48.65	0	02:18	0.24	0.03	0.22
C8	CONDUIT	177.23	0	01:23	1.42	0.27	0.33
C1	CONDUIT	53.22	0	01:39	0.37	0.03	0.22
C15	CONDUIT	80.04	0	01:51	2.11	0.08	0.19
C2	CONDUIT	24.20	0	01:48	0.27	0.04	0.22
C12	CONDUIT	55.70	0	03:29	0.64	0.44	0.42
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C14	CONDUIT	55.52	0	03:30	0.32	0.03	0.19
C17	CONDUIT	55.59	0	03:31	0.27	0.03	0.22
P1	CONDUIT	6.20	0	02:54	0.35	1.00	1.00
C18	CONDUIT	18.35	0	02:40	0.23	0.01	0.13
C21	DUMMY	18.35	0	02:40			
C19	CONDUIT	77.31	0	03:31	1.08	0.11	0.23
C20	CONDUIT	78.33	0	03:31	0.59	0.03	0.16
C16	DUMMY	80.04	0	01:51			
C22	CONDUIT	77.30	0	03:32	0.41	0.04	0.21
C11	ORIFICE	6.20	0	02:54			1.00
2	ORIFICE	50.18	0	03:29			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.01	0.30	0.00	0.69	0.00	0.00	0.00	0.04	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.14	0.0000

C7	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.01	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.01	0.06	0.00	0.92	0.01	0.00	0.00	0.07	0.0000
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.22	0.00	0.73	0.04	0.00	0.00	0.13	0.0000
C2	1.00	0.02	0.57	0.00	0.41	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.12	0.0000
C19	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0001
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.42	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.26	0.0000

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Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
P1	31.53	31.53	31.53	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:33:24 2013
Analysis ended on: Thu Jul 11 15:33:32 2013
Total elapsed time: 00:00:08

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	10Yr	J9
210	0.43	500.00	100.00	10.0000	10Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	10Yr	J2
202	0.85	96.00	7.00	25.0000	10Yr	J7
201	2.62	307.00	5.00	25.0000	10Yr	J1
100	1.53	500.00	0.00	2.0000	10Yr	Out1
208	0.26	50.00	95.00	2.0000	10Yr	J8
207	0.38	63.00	95.00	2.0000	10Yr	J8
206	0.13	34.00	5.00	2.0000	10Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	10Yr	J10
205	1.85	450.00	0.00	50.0000	10Yr	J20
303	0.44	40.00	0.00	50.0000	10Yr	J21
304	0.15	95.00	20.00	3.0000	10Yr	J13
301	0.53	350.00	0.00	4.0000	10Yr	J4
302	1.95	770.00	0.00	1.0000	10Yr	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.907	60.800
Evaporation Loss	0.000	0.000
Infiltration Loss	0.600	40.232
Surface Runoff	0.289	19.397
Final Surface Storage	0.020	1.311
Continuity Error (%)	-0.229	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.289	2.892
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.278	2.785
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.107
Continuity Error (%)	0.005	

Highest Continuity Errors

Node J5 (2.31%)
Node J6 (-1.82%)
Node J2 (-1.51%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	60.80	0.00	0.00	45.83	13.78	0.12	33.98	0.227
210	60.80	0.00	0.00	0.00	58.93	0.25	133.40	0.969
204	60.80	0.00	0.00	43.65	15.94	0.42	137.02	0.262
202	60.80	0.00	0.00	44.27	15.38	0.13	40.17	0.253
201	60.80	0.00	0.00	45.23	14.46	0.38	109.96	0.238
100	60.80	0.00	0.00	40.15	19.49	0.30	88.84	0.320
208	60.80	0.00	0.00	0.26	58.56	0.15	80.60	0.963
207	60.80	0.00	0.00	0.26	58.57	0.22	117.78	0.963
206	60.80	0.00	0.00	46.79	12.81	0.02	3.63	0.211
209	60.80	0.00	0.00	46.31	13.37	0.04	8.87	0.220
205	60.80	0.00	0.00	45.96	13.86	0.26	128.60	0.228
303	60.80	0.00	0.00	43.01	16.68	0.07	25.12	0.274
304	60.80	0.00	0.00	29.23	30.51	0.05	28.95	0.502
301	60.80	0.00	0.00	38.93	20.94	0.11	66.68	0.344
302	60.80	0.00	0.00	40.52	19.21	0.37	99.77	0.316

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.01	0.20	201.87	0 01:39
J2	JUNCTION	0.01	0.25	201.02	0 01:40
J3	JUNCTION	0.01	0.30	199.26	0 02:03
J6	JUNCTION	0.01	0.19	198.99	0 02:05
J10	JUNCTION	0.01	0.34	198.94	0 01:35
J4	JUNCTION	0.00	0.24	200.74	0 01:39
J7	JUNCTION	0.01	0.21	200.05	0 01:55
J11	JUNCTION	0.00	0.00	198.30	0 01:18
J9	JUNCTION	0.00	0.12	201.79	0 01:38
J5	JUNCTION	0.00	0.12	200.12	0 01:58
J8	JUNCTION	0.01	0.30	199.20	0 01:34
J18	JUNCTION	0.15	0.39	198.23	0 02:52
J12	JUNCTION	0.05	0.32	198.12	0 02:52
J13	JUNCTION	0.04	0.29	198.03	0 02:52

J14	JUNCTION	0.04	0.28	198.05	0	02:52
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.01	0.29	200.29	0	02:09
J22	JUNCTION	0.00	0.00	198.50	0	02:09
J19	JUNCTION	0.06	0.37	197.98	0	02:49
J21	JUNCTION	0.04	0.24	197.69	0	02:50
J16	JUNCTION	0.04	0.04	198.36	0	03:56
J23	JUNCTION	0.04	0.28	197.82	0	02:50
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.17	197.52	0	02:50
SWM_Pond	STORAGE	0.15	0.39	198.24	0	02:52

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Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	109.90	109.90	0	01:35	0.379	0.379
J2	JUNCTION	136.93	157.20	0	01:35	0.421	0.542
J3	JUNCTION	0.00	217.33	0	01:46	0.000	1.061
J6	JUNCTION	99.76	104.16	0	01:50	0.375	0.485
J10	JUNCTION	8.86	207.13	0	01:35	0.036	0.411
J4	JUNCTION	66.64	66.64	0	01:35	0.111	0.111
J7	JUNCTION	40.15	107.50	0	01:44	0.131	0.512
J11	JUNCTION	0.00	205.80	0	01:35	0.000	0.411
J9	JUNCTION	33.97	33.97	0	01:35	0.121	0.121
J5	JUNCTION	0.00	47.75	0	01:42	0.000	0.113
J8	JUNCTION	198.37	198.37	0	01:34	0.375	0.375
J18	JUNCTION	0.00	6.22	0	02:08	0.000	0.931
J12	JUNCTION	0.00	172.06	0	02:52	0.000	1.888
J13	JUNCTION	28.94	174.22	0	02:52	0.046	1.934
J14	JUNCTION	0.00	172.06	0	02:52	0.000	1.889
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	128.54	128.54	0	01:35	0.257	0.257
J22	JUNCTION	0.00	38.00	0	02:09	0.000	0.256
J19	JUNCTION	0.00	229.26	0	02:49	0.000	2.427
J21	JUNCTION	25.11	236.10	0	02:49	0.073	2.487
J16	JUNCTION	0.00	187.49	0	02:03	0.000	1.052
J23	JUNCTION	0.00	237.40	0	02:49	0.000	2.412
Out1	OUTFALL	88.83	88.83	0	01:35	0.298	0.298
Out2	OUTFALL	0.00	235.62	0	02:50	0.000	2.487
SWM_Pond	STORAGE	137.02	415.80	0	01:34	0.270	1.989

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	33.26	0.242	1.268

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.441	7	0	1.208	19	0 02:52	172.06

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.67	24.62	88.83	0.298
Out2	98.43	9.74	235.62	2.487
System	51.55	34.36	262.05	2.785

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	205.80	0	01:35			
C3	CONDUIT	26.69	0	01:58	0.18	0.05	0.31
C4	CONDUIT	82.74	0	01:44	0.41	0.04	0.27
C5	CONDUIT	96.36	0	01:55	0.39	0.05	0.34
C7	CONDUIT	198.27	0	01:35	0.51	0.31	0.64
C10	CONDUIT	25.38	0	01:38	0.15	0.01	0.25
C6	CONDUIT	88.03	0	02:05	0.33	0.05	0.35
C8	CONDUIT	205.80	0	01:35	1.49	0.32	0.34
C1	CONDUIT	130.27	0	01:46	0.46	0.06	0.35
C15	CONDUIT	187.49	0	02:03	2.19	0.18	0.34
C2	CONDUIT	47.75	0	01:42	0.33	0.08	0.31
C12	CONDUIT	172.06	0	02:52	0.92	1.36	0.79
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.25
C14	CONDUIT	172.05	0	02:53	0.40	0.10	0.38
C17	CONDUIT	174.24	0	02:53	0.32	0.10	0.44
P1	CONDUIT	6.22	0	02:08	0.35	1.00	1.00
C18	CONDUIT	38.00	0	02:09	0.28	0.03	0.19
C21	DUMMY	38.00	0	02:09			
C19	CONDUIT	237.40	0	02:49	1.34	0.33	0.43
C20	CONDUIT	235.62	0	02:50	0.84	0.08	0.27
C16	DUMMY	187.49	0	02:03			
C22	CONDUIT	229.75	0	02:50	0.58	0.11	0.34
C11	ORIFICE	6.22	0	02:08			1.00
2	ORIFICE	168.00	0	02:52			
3	WEIR	0.00	0	00:00			0.00

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Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.00	0.30	0.00	0.69	0.00	0.00	0.00	0.04	0.0000

C5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.00	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.00	0.06	0.00	0.92	0.01	0.00	0.00	0.08	0.0000
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.22	0.00	0.73	0.04	0.00	0.00	0.12	0.0000
C2	1.00	0.02	0.57	0.00	0.41	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.53	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0001
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.42	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.27	0.0000

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Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C12	0.01	0.01	0.01	1.76	0.01
P1	31.87	31.87	31.87	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:36:24 2013
Analysis ended on: Thu Jul 11 15:36:31 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

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NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	25Yr	J9
210	0.43	500.00	100.00	10.0000	25Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	25Yr	J2
202	0.85	96.00	7.00	25.0000	25Yr	J7
201	2.62	307.00	5.00	25.0000	25Yr	J1
100	1.53	500.00	0.00	2.0000	25Yr	Out1
208	0.26	50.00	95.00	2.0000	25Yr	J8
207	0.38	63.00	95.00	2.0000	25Yr	J8
206	0.13	34.00	5.00	2.0000	25Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	25Yr	J10
205	1.85	450.00	0.00	50.0000	25Yr	J20
303	0.44	40.00	0.00	50.0000	25Yr	J21
304	0.15	95.00	20.00	3.0000	25Yr	J13
301	0.53	350.00	0.00	4.0000	25Yr	J4
302	1.95	770.00	0.00	1.0000	25Yr	J6

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Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

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Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.106	74.200
Evaporation Loss	0.000	0.000
Infiltration Loss	0.658	44.107
Surface Runoff	0.433	29.066
Final Surface Storage	0.019	1.289
Continuity Error (%)	-0.353	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.433	4.334
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.423	4.226
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.108
Continuity Error (%)	0.003	

Highest Continuity Errors

Node J5 (2.66%)
Node J6 (-2.66%)
Node J2 (-2.11%)
Node J3 (1.30%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	74.20	0.00	0.00	50.56	22.63	0.20	80.26	0.305
210	74.20	0.00	0.00	0.00	72.39	0.31	162.80	0.976
204	74.20	0.00	0.00	48.00	25.12	0.66	286.96	0.339
202	74.20	0.00	0.00	48.68	24.50	0.21	86.12	0.330
201	74.20	0.00	0.00	49.73	23.49	0.62	252.17	0.317
100	74.20	0.00	0.00	43.76	29.47	0.45	168.10	0.397
208	74.20	0.00	0.00	0.26	72.04	0.19	98.39	0.971
207	74.20	0.00	0.00	0.26	72.05	0.27	143.78	0.971
206	74.20	0.00	0.00	51.56	21.48	0.03	7.91	0.289
209	74.20	0.00	0.00	51.06	22.14	0.06	20.36	0.298
205	74.20	0.00	0.00	50.44	23.05	0.43	289.79	0.311
303	74.20	0.00	0.00	47.56	25.66	0.11	48.09	0.346
304	74.20	0.00	0.00	31.13	42.27	0.06	41.57	0.570
301	74.20	0.00	0.00	42.30	31.11	0.16	107.42	0.419
302	74.20	0.00	0.00	44.01	29.17	0.57	191.69	0.393

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Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.01	0.30	201.97	0 01:39
J2	JUNCTION	0.01	0.35	201.12	0 01:39
J3	JUNCTION	0.01	0.46	199.42	0 01:58
J6	JUNCTION	0.01	0.25	199.05	0 01:55
J10	JUNCTION	0.01	0.37	198.97	0 01:35
J4	JUNCTION	0.00	0.30	200.80	0 01:37
J7	JUNCTION	0.01	0.30	200.14	0 01:48
J11	JUNCTION	0.00	0.00	198.30	0 01:35
J9	JUNCTION	0.00	0.18	201.85	0 01:38
J5	JUNCTION	0.00	0.16	200.16	0 01:52
J8	JUNCTION	0.01	0.33	199.23	0 01:35
J18	JUNCTION	0.16	0.51	198.35	0 02:52
J12	JUNCTION	0.06	0.44	198.24	0 02:50

J13	JUNCTION	0.04	0.39	198.13	0	02:38
J14	JUNCTION	0.04	0.37	198.14	0	02:40
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.02	0.40	200.40	0	01:54
J22	JUNCTION	0.00	0.00	198.50	0	01:54
J19	JUNCTION	0.07	0.50	198.11	0	02:35
J21	JUNCTION	0.04	0.28	197.73	0	02:33
J16	JUNCTION	0.03	0.04	198.36	0	04:00
J23	JUNCTION	0.04	0.32	197.86	0	02:35
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.21	197.56	0	02:33
SWM_Pond	STORAGE	0.15	0.51	198.36	0	02:52

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Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	252.12	252.12	0	01:35	0.616	0.616
J2	JUNCTION	286.91	336.87	0	01:35	0.663	0.862
J3	JUNCTION	0.00	486.09	0	01:43	0.000	1.708
J6	JUNCTION	191.66	197.55	0	01:35	0.569	0.733
J10	JUNCTION	20.35	262.44	0	01:35	0.060	0.522
J4	JUNCTION	107.41	107.41	0	01:35	0.165	0.165
J7	JUNCTION	86.10	249.46	0	01:41	0.208	0.830
J11	JUNCTION	0.00	259.98	0	01:35	0.000	0.521
J9	JUNCTION	80.24	80.24	0	01:35	0.199	0.199
J5	JUNCTION	0.00	87.14	0	01:39	0.000	0.169
J8	JUNCTION	242.17	242.17	0	01:35	0.461	0.461
J18	JUNCTION	0.00	6.24	0	01:50	0.000	0.929
J12	JUNCTION	0.00	240.33	0	03:07	0.000	2.871
J13	JUNCTION	41.56	243.27	0	03:05	0.063	2.935
J14	JUNCTION	0.00	240.39	0	03:07	0.000	2.872
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	289.73	289.73	0	01:35	0.427	0.427
J22	JUNCTION	0.00	76.22	0	01:54	0.000	0.426
J19	JUNCTION	0.00	346.12	0	02:05	0.000	3.686
J21	JUNCTION	48.08	333.13	0	02:33	0.113	3.775
J16	JUNCTION	0.00	361.11	0	01:58	0.000	1.686
J23	JUNCTION	0.00	322.99	0	02:35	0.000	3.662
Out1	OUTFALL	168.07	168.07	0	01:35	0.451	0.451
Out2	OUTFALL	0.00	333.12	0	02:33	0.000	3.775

SWM_Pond	STORAGE	170.71	546.59	0	01:34	0.339	2.973

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	33.56	0.364	1.146

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.457	7	0	1.630	26	0 02:52	240.33

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.80	36.20	168.07	0.451
Out2	98.57	14.76	333.12	3.775
System	51.69	50.96	377.85	4.226

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Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	259.98	0	01:35			
C3	CONDUIT	46.11	0	01:52	0.20	0.08	0.41
C4	CONDUIT	196.72	0	01:42	0.52	0.10	0.39
C5	CONDUIT	210.53	0	01:48	0.48	0.10	0.50
C7	CONDUIT	242.09	0	01:35	0.54	0.37	0.70
C10	CONDUIT	62.65	0	01:38	0.20	0.03	0.35
C6	CONDUIT	156.15	0	01:55	0.41	0.09	0.47
C8	CONDUIT	259.98	0	01:35	1.63	0.40	0.37
C1	CONDUIT	292.93	0	01:43	0.57	0.15	0.50
C15	CONDUIT	361.11	0	01:58	2.20	0.35	0.51
C2	CONDUIT	87.14	0	01:39	0.39	0.15	0.40
C12	CONDUIT	240.39	0	03:07	1.09	1.90	0.99
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.34
C14	CONDUIT	240.97	0	03:08	0.41	0.14	0.51
C17	CONDUIT	243.86	0	03:05	0.32	0.13	0.59
P1	CONDUIT	6.24	0	01:50	0.35	1.00	1.00
C18	CONDUIT	76.22	0	01:54	0.35	0.05	0.27
C21	DUMMY	76.22	0	01:54			
C19	CONDUIT	322.99	0	02:35	1.35	0.45	0.55
C20	CONDUIT	333.12	0	02:33	0.93	0.11	0.32
C16	DUMMY	361.11	0	01:58			
C22	CONDUIT	322.99	0	02:35	0.65	0.15	0.40
C11	ORIFICE	6.24	0	01:50			1.00
2	ORIFICE	236.31	0	03:07			
3	WEIR	0.00	0	00:00			0.00

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000

C4	1.00	0.00	0.30	0.00	0.69	0.00	0.00	0.00	0.04	0.0000
C5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.00	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.00	0.06	0.00	0.92	0.02	0.00	0.00	0.08	0.0000
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.01	0.22	0.00	0.73	0.05	0.00	0.00	0.12	0.0000
C2	1.00	0.02	0.57	0.00	0.42	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.52	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0000
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.43	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.27	0.0000

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Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C12	0.01	0.01	0.01	2.61	0.01
P1	32.18	32.18	32.18	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:37:01 2013
Analysis ended on: Thu Jul 11 15:37:08 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

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NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	50Yr	J9
210	0.43	500.00	100.00	10.0000	50Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	50Yr	J2
202	0.85	96.00	7.00	25.0000	50Yr	J7
201	2.62	307.00	5.00	25.0000	50Yr	J1
100	1.53	500.00	0.00	2.0000	50Yr	Out1
208	0.26	50.00	95.00	2.0000	50Yr	J8
207	0.38	63.00	95.00	2.0000	50Yr	J8
206	0.13	34.00	5.00	2.0000	50Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	50Yr	J10
205	1.85	450.00	0.00	50.0000	50Yr	J20
303	0.44	40.00	0.00	50.0000	50Yr	J21
304	0.15	95.00	20.00	3.0000	50Yr	J13
301	0.53	350.00	0.00	4.0000	50Yr	J4
302	1.95	770.00	0.00	1.0000	50Yr	J6

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Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.254	84.100
Evaporation Loss	0.000	0.000
Infiltration Loss	0.694	46.557
Surface Runoff	0.545	36.556
Final Surface Storage	0.019	1.283
Continuity Error (%)	-0.352	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.545	5.451
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.534	5.342
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.109
Continuity Error (%)	0.002	

Highest Continuity Errors

Node J6 (-3.02%)
Node J5 (2.85%)
Node J2 (-2.60%)
Node J3 (1.64%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	84.10	0.00	0.00	53.61	29.56	0.26	121.41	0.351
210	84.10	0.00	0.00	0.00	82.21	0.35	184.52	0.978
204	84.10	0.00	0.00	50.80	32.28	0.85	416.37	0.384
202	84.10	0.00	0.00	51.51	31.63	0.27	126.39	0.376
201	84.10	0.00	0.00	52.62	30.57	0.80	376.97	0.363
100	84.10	0.00	0.00	45.90	37.24	0.57	235.24	0.443
208	84.10	0.00	0.00	0.26	82.00	0.21	111.53	0.975
207	84.10	0.00	0.00	0.26	82.01	0.31	162.99	0.975
206	84.10	0.00	0.00	54.62	28.35	0.04	12.06	0.337
209	84.10	0.00	0.00	53.95	29.04	0.08	31.07	0.345
205	84.10	0.00	0.00	53.30	30.17	0.56	402.60	0.359
303	84.10	0.00	0.00	50.39	32.72	0.14	67.44	0.389
304	84.10	0.00	0.00	32.30	51.11	0.08	50.26	0.608
301	84.10	0.00	0.00	44.45	38.90	0.21	137.22	0.463
302	84.10	0.00	0.00	46.14	36.93	0.72	270.94	0.439

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.01	0.37	202.04	0 01:38
J2	JUNCTION	0.01	0.42	201.19	0 01:39
J3	JUNCTION	0.01	0.59	199.55	0 01:58
J6	JUNCTION	0.01	0.29	199.09	0 01:51
J10	JUNCTION	0.01	0.39	198.99	0 01:35
J4	JUNCTION	0.00	0.34	200.84	0 01:36
J7	JUNCTION	0.01	0.36	200.20	0 01:45
J11	JUNCTION	0.00	0.00	198.30	0 01:35
J9	JUNCTION	0.00	0.21	201.88	0 01:37
J5	JUNCTION	0.00	0.19	200.19	0 01:49
J8	JUNCTION	0.01	0.35	199.25	0 01:35
J18	JUNCTION	0.16	0.64	198.48	0 02:52
J12	JUNCTION	0.06	0.54	198.34	0 02:50

J13	JUNCTION	0.05	0.45	198.19	0	02:37
J14	JUNCTION	0.05	0.42	198.19	0	02:38
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.02	0.47	200.47	0	01:50
J22	JUNCTION	0.00	0.00	198.50	0	01:50
J19	JUNCTION	0.07	0.56	198.17	0	02:35
J21	JUNCTION	0.04	0.30	197.75	0	02:32
J16	JUNCTION	0.03	0.03	198.35	0	04:03
J23	JUNCTION	0.04	0.35	197.89	0	02:35
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.02	0.23	197.58	0	02:32
SWM_Pond	STORAGE	0.16	0.64	198.49	0	02:52

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	376.87	376.87	0	01:35	0.801	0.801
J2	JUNCTION	416.27	498.71	0	01:35	0.852	1.113
J3	JUNCTION	0.00	736.71	0	01:41	0.000	2.219
J6	JUNCTION	270.88	283.46	0	01:35	0.720	0.926
J10	JUNCTION	31.07	305.52	0	01:35	0.078	0.604
J4	JUNCTION	137.20	137.20	0	01:35	0.206	0.206
J7	JUNCTION	126.36	386.84	0	01:38	0.269	1.079
J11	JUNCTION	0.00	302.40	0	01:35	0.000	0.603
J9	JUNCTION	121.38	121.38	0	01:35	0.260	0.260
J5	JUNCTION	0.00	119.95	0	01:38	0.000	0.211
J8	JUNCTION	274.52	274.52	0	01:35	0.525	0.525
J18	JUNCTION	0.00	6.23	0	01:43	0.000	0.933
J12	JUNCTION	0.00	286.82	0	03:01	0.000	3.631
J13	JUNCTION	50.26	290.48	0	03:01	0.077	3.709
J14	JUNCTION	0.00	286.87	0	03:01	0.000	3.633
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	402.51	402.51	0	01:35	0.558	0.558
J22	JUNCTION	0.00	111.18	0	01:50	0.000	0.558
J19	JUNCTION	0.00	412.35	0	01:55	0.000	4.660
J21	JUNCTION	67.43	398.36	0	02:32	0.144	4.772
J16	JUNCTION	0.00	482.28	0	01:58	0.000	2.182
J23	JUNCTION	0.00	386.46	0	02:35	0.000	4.628
Out1	OUTFALL	235.19	235.19	0	01:35	0.570	0.570
Out2	OUTFALL	0.00	398.36	0	02:32	0.000	4.772

SWM_Pond	STORAGE	196.56	681.78	0	01:35	0.390	3.734

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J18	JUNCTION	33.87	0.491	1.019

****
Node Flooding Summary
****

No nodes were flooded.

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Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.476	7	0	2.091	33	0 02:52	286.82

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	4.93	44.53	235.19	0.570
Out2	98.65	18.65	398.36	4.772
System	51.79	63.18	455.12	5.342

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	302.40	0	01:35			
C3	CONDUIT	62.52	0	01:49	0.21	0.11	0.48
C4	CONDUIT	303.74	0	01:40	0.58	0.15	0.46
C5	CONDUIT	317.77	0	01:45	0.53	0.16	0.62
C7	CONDUIT	274.45	0	01:35	0.56	0.42	0.74
C10	CONDUIT	97.78	0	01:37	0.23	0.05	0.42
C6	CONDUIT	218.58	0	01:51	0.45	0.12	0.53
C8	CONDUIT	302.40	0	01:35	1.72	0.47	0.39
C1	CONDUIT	445.41	0	01:41	0.63	0.22	0.61
C15	CONDUIT	482.28	0	01:58	2.91	0.47	0.52
C2	CONDUIT	119.95	0	01:38	0.43	0.21	0.47
C12	CONDUIT	286.87	0	03:01	1.30	2.27	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.39
C14	CONDUIT	287.61	0	03:02	0.40	0.17	0.58
C17	CONDUIT	291.36	0	03:02	0.33	0.16	0.67
P1	CONDUIT	6.23	0	01:43	0.35	1.00	1.00
C18	CONDUIT	111.18	0	01:50	0.39	0.08	0.31
C21	DUMMY	111.18	0	01:50			
C19	CONDUIT	386.46	0	02:35	1.38	0.53	0.61
C20	CONDUIT	398.36	0	02:32	0.98	0.14	0.35
C16	DUMMY	482.28	0	01:58			
C22	CONDUIT	386.46	0	02:35	0.69	0.18	0.43
C11	ORIFICE	6.23	0	01:43			1.00
2	ORIFICE	282.41	0	03:01			
3	WEIR	0.00	0	00:00			0.00

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class --- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.0000

C4	1.00	0.00	0.30	0.00	0.70	0.00	0.00	0.00	0.04	0.0000
C5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.00	0.63	0.00	0.37	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.00	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.0000
C8	1.00	0.00	0.06	0.00	0.92	0.02	0.00	0.00	0.08	0.0000
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.00	0.22	0.00	0.72	0.05	0.00	0.00	0.13	0.0000
C2	1.00	0.02	0.57	0.00	0.42	0.00	0.00	0.00	0.01	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.51	0.0000
C13	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.15	0.0000
P1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.17	0.0000
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.71	0.0000
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.43	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.27	0.0000

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C9	72.00	72.00	72.00	72.00	0.01
C12	1.63	1.63	1.63	3.18	1.63
P1	32.49	32.49	32.49	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:37:53 2013
Analysis ended on: Thu Jul 11 15:38:00 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

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NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
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****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	100Yr	J9
210	0.43	500.00	100.00	10.0000	100Yr	SWM_Pond
204	2.64	319.00	8.00	25.0000	100Yr	J2
202	0.85	96.00	7.00	25.0000	100Yr	J7
201	2.62	307.00	5.00	25.0000	100Yr	J1
100	1.53	500.00	0.00	2.0000	100Yr	Out1
208	0.26	50.00	95.00	2.0000	100Yr	J8
207	0.38	63.00	95.00	2.0000	100Yr	J8
206	0.13	34.00	5.00	2.0000	100Yr	SWM_Pond
209	0.27	68.00	5.00	2.0000	100Yr	J10
205	1.85	450.00	0.00	50.0000	100Yr	J20
303	0.44	40.00	0.00	50.0000	100Yr	J21
304	0.15	95.00	20.00	3.0000	100Yr	J13
301	0.53	350.00	0.00	4.0000	100Yr	J4
302	1.95	770.00	0.00	1.0000	100Yr	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.859	124.697
Evaporation Loss	0.000	0.000
Infiltration Loss	0.775	52.010
Surface Runoff	1.060	71.071
Final Surface Storage	0.027	1.823
Continuity Error (%)	-0.166	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.060	10.597
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.032	10.317
Internal Outflow	0.005	0.053
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.023	0.235
Continuity Error (%)	-0.076	

Highest Continuity Errors

Node J2 (-2.02%)
Node J6 (-1.64%)
Node J3 (1.30%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C16 (7)
Link C19 (7)
Link C15 (4)
Link C22 (4)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.04

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	124.70	0.00	0.00	61.22	62.37	0.55	182.74	0.500
210	124.70	0.00	0.00	0.00	122.71	0.53	164.44	0.984
204	124.70	0.00	0.00	57.40	65.73	1.74	586.20	0.527
202	124.70	0.00	0.00	58.03	65.07	0.55	182.94	0.522
201	124.70	0.00	0.00	59.28	63.84	1.67	557.21	0.512
100	124.70	0.00	0.00	49.69	73.37	1.12	322.50	0.588
208	124.70	0.00	0.00	0.25	122.47	0.32	99.40	0.982
207	124.70	0.00	0.00	0.25	122.49	0.47	145.26	0.982
206	124.70	0.00	0.00	61.22	62.02	0.08	20.51	0.497
209	124.70	0.00	0.00	61.22	62.22	0.17	49.99	0.499
205	124.70	0.00	0.00	60.33	62.68	1.16	474.64	0.503
303	124.70	0.00	0.00	57.39	66.20	0.29	91.01	0.531
304	124.70	0.00	0.00	30.87	88.50	0.13	49.26	0.710
301	124.70	0.00	0.00	49.69	73.83	0.39	147.69	0.592
302	124.70	0.00	0.00	49.69	73.29	1.43	385.62	0.588

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.02	0.44	202.11	0 12:16
J2	JUNCTION	0.03	0.49	201.26	0 12:16
J3	JUNCTION	0.04	1.00	199.96	0 12:25
J6	JUNCTION	0.02	0.36	199.16	0 12:24
J10	JUNCTION	0.04	0.39	198.99	0 12:15
J4	JUNCTION	0.01	0.33	200.83	0 12:15
J7	JUNCTION	0.03	0.45	200.29	0 12:20
J11	JUNCTION	0.00	0.00	198.30	0 12:15
J9	JUNCTION	0.01	0.27	201.94	0 12:16
J5	JUNCTION	0.01	0.22	200.22	0 12:24
J8	JUNCTION	0.02	0.33	199.23	0 12:15

J18	JUNCTION	0.21	0.85	198.69	0	13:23
J12	JUNCTION	0.09	0.72	198.52	0	13:22
J13	JUNCTION	0.07	0.53	198.27	0	13:05
J14	JUNCTION	0.07	0.51	198.28	0	13:06
J15	JUNCTION	0.00	0.00	198.95	0	00:00
J20	JUNCTION	0.04	0.60	200.60	0	12:21
J22	JUNCTION	0.00	0.00	198.50	0	12:21
J19	JUNCTION	0.10	0.65	198.26	0	12:59
J21	JUNCTION	0.06	0.34	197.79	0	12:58
J16	JUNCTION	0.38	0.76	199.08	0	21:42
J23	JUNCTION	0.06	0.39	197.93	0	12:58
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.04	0.26	197.61	0	12:58
SWM_Pond	STORAGE	0.21	0.85	198.70	0	13:23

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	557.02	557.02	0	12:15	1.673	1.673
J2	JUNCTION	586.01	743.55	0	12:15	1.735	2.285
J3	JUNCTION	0.00	1200.79	0	12:18	0.000	4.571
J6	JUNCTION	385.48	443.65	0	12:15	1.429	1.821
J10	JUNCTION	49.97	294.56	0	12:15	0.168	0.952
J4	JUNCTION	147.66	147.66	0	12:15	0.391	0.391
J7	JUNCTION	182.88	671.92	0	12:16	0.553	2.239
J11	JUNCTION	0.00	291.90	0	12:15	0.000	0.952
J9	JUNCTION	182.67	182.67	0	12:15	0.549	0.549
J5	JUNCTION	0.00	143.43	0	12:16	0.000	0.395
J8	JUNCTION	244.66	244.66	0	12:15	0.784	0.784
J18	JUNCTION	0.00	6.19	1	02:47	0.000	1.062
J12	JUNCTION	0.00	365.26	0	13:31	0.000	6.960
J13	JUNCTION	49.25	369.97	0	13:34	0.133	7.092
J14	JUNCTION	0.00	365.36	0	13:35	0.000	6.960
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	474.54	474.54	0	12:15	1.160	1.160
J22	JUNCTION	0.00	196.00	0	12:21	0.000	1.160
J19	JUNCTION	0.00	525.44	0	12:23	0.000	8.943
J21	JUNCTION	90.98	509.53	0	12:57	0.291	9.195
J16	JUNCTION	0.00	739.54	0	12:25	0.000	4.459
J23	JUNCTION	0.00	497.14	0	12:58	0.000	8.898

Out1	OUTFALL	322.39	322.39	0	12:15	1.123	1.123
Out2	OUTFALL	0.00	509.39	0	12:58	0.000	9.194
SWM_Pond	STORAGE	184.93	1054.80	0	12:25	0.608	7.182

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J3	JUNCTION	0.32	0.250	0.000
J18	JUNCTION	44.05	0.701	0.809
J16	JUNCTION	51.46	0.310	0.420

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J3	0.12	302.47	0 12:25	0.053	1.00

****
Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.631	10	0	2.894	45	0 13:23	365.26

****
Outfall Loading Summary

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Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	25.34	17.07	322.39	1.123
Out2	94.79	37.38	509.39	9.194
System	60.06	54.45	594.56	10.317

****
Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	291.90	0	12:15			
C3	CONDUIT	90.98	0	12:24	0.23	0.16	0.58
C4	CONDUIT	520.36	0	12:17	0.66	0.26	0.58
C5	CONDUIT	550.38	0	12:20	0.58	0.27	0.79
C7	CONDUIT	244.59	0	12:15	0.52	0.38	0.72
C10	CONDUIT	163.51	0	12:16	0.27	0.08	0.51
C6	CONDUIT	328.40	0	12:24	0.49	0.19	0.63
C8	CONDUIT	291.90	0	12:15	1.70	0.45	0.39
C1	CONDUIT	692.68	0	12:16	0.70	0.34	0.79
C15	CONDUIT	739.54	0	12:25	4.11	0.72	0.63
C2	CONDUIT	143.43	0	12:16	0.43	0.25	0.52
C12	CONDUIT	365.36	0	13:35	1.65	2.88	1.00
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.46
C14	CONDUIT	367.16	0	13:34	0.39	0.21	0.69
C17	CONDUIT	372.16	0	13:34	0.30	0.20	0.79
P1	CONDUIT	6.19	1	02:47	0.35	1.00	1.00
C18	CONDUIT	196.00	0	12:21	0.46	0.14	0.40
C21	DUMMY	196.00	0	12:21			
C19	CONDUIT	497.14	0	12:58	1.52	0.69	0.69
C20	CONDUIT	509.39	0	12:58	1.05	0.18	0.40
C16	DUMMY	739.54	0	12:25			
C22	CONDUIT	493.76	0	12:58	0.74	0.23	0.48
C11	ORIFICE	6.19	1	02:47			1.00
2	ORIFICE	360.33	0	13:35			
3	WEIR	0.00	0	00:00			0.00

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.15	0.00	0.00	0.85	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.12	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000
C7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.02	0.32	0.00	0.66	0.00	0.00	0.00	0.05	0.0000
C6	1.00	0.02	0.13	0.00	0.85	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.18	0.0000
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.18	0.0000
C15	1.00	0.03	0.07	0.00	0.69	0.21	0.00	0.00	0.51	0.0005
C2	1.00	0.15	0.26	0.00	0.59	0.00	0.00	0.00	0.05	0.0000
C12	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.49	0.0001
C13	1.00	0.04	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.01	0.00	0.96	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C18	1.00	0.16	0.00	0.00	0.84	0.00	0.00	0.00	0.13	0.0000
C19	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.69	0.0004
C20	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.45	0.0000
C22	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.28	0.0000

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Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C15	0.01	0.01	0.01	0.62	0.01
C12	2.92	2.92	2.92	6.09	2.92
P1	42.62	42.62	42.62	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:38:42 2013
Analysis ended on: Thu Jul 11 15:38:49 2013
Total elapsed time: 00:00:07

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

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NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

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Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary

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Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	25mm	J9
210	0.43	500.00	100.00	10.0000	25mm	SWM_Pond
204	2.64	319.00	8.00	25.0000	25mm	J2
202	0.85	96.00	7.00	25.0000	25mm	J7
201	2.62	307.00	5.00	25.0000	25mm	J1
100	1.53	500.00	0.00	2.0000	25mm	Out1
208	0.26	50.00	95.00	2.0000	25mm	J8
207	0.38	63.00	95.00	2.0000	25mm	J8
206	0.13	34.00	5.00	2.0000	25mm	SWM_Pond
209	0.27	68.00	5.00	2.0000	25mm	J10
205	1.85	450.00	0.00	50.0000	25mm	J20
303	0.44	40.00	0.00	50.0000	25mm	J21
304	0.15	95.00	20.00	3.0000	25mm	J13
301	0.53	350.00	0.00	4.0000	25mm	J4
302	1.95	770.00	0.00	1.0000	25mm	J6

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Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	
J10	JUNCTION	198.60	1.00	0.0	
J4	JUNCTION	200.50	1.20	0.0	

J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

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Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400
C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400

C11	J18	J12	ORIFICE
2	SWM_Pond	J12	ORIFICE
3	SWM_Pond	J15	WEIR

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

********** Runoff Quantity Continuity **********	Volume hectare-m	Depth mm
Total Precipitation	0.373	24.990
Evaporation Loss	0.000	0.000
Infiltration Loss	0.317	21.258
Surface Runoff	0.036	2.404
Final Surface Storage	0.020	1.345
Continuity Error (%)	-0.066	

**********	Volume	Volume

Flow Routing Continuity	hectare-m	10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.036	0.358
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.031	0.308
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.005	0.051
Continuity Error (%)	-0.061	

Highest Continuity Errors

Node J2 (-4.22%)
Node J3 (3.05%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)

Routing Time Step Summary

Minimum Time Step	:	1.00 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
203	24.99	0.00	0.00	22.54	1.16	0.01	7.52	0.046
210	24.99	0.00	0.00	0.00	23.07	0.10	73.53	0.923
204	24.99	0.00	0.00	21.83	1.85	0.05	36.11	0.074
202	24.99	0.00	0.00	22.06	1.62	0.01	10.17	0.065
201	24.99	0.00	0.00	22.54	1.15	0.03	22.40	0.046
100	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
208	24.99	0.00	0.00	0.26	22.63	0.06	42.47	0.906
207	24.99	0.00	0.00	0.26	22.63	0.09	61.55	0.905
206	24.99	0.00	0.00	22.54	1.15	0.00	1.11	0.046
209	24.99	0.00	0.00	22.54	1.15	0.00	2.31	0.046
205	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
303	24.99	0.00	0.00	23.76	0.00	0.00	0.00	0.000
304	24.99	0.00	0.00	19.01	4.61	0.01	5.13	0.185
301	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000
302	24.99	0.00	0.00	23.75	0.00	0.00	0.00	0.000

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.00	0.10	201.77	0 01:52
J2	JUNCTION	0.00	0.14	200.91	0 01:54
J3	JUNCTION	0.00	0.10	199.06	0 02:04
J6	JUNCTION	0.00	0.00	198.80	0 00:00
J10	JUNCTION	0.01	0.33	198.93	0 01:48
J4	JUNCTION	0.00	0.00	200.50	0 00:00
J7	JUNCTION	0.00	0.09	199.93	0 02:00
J11	JUNCTION	0.00	0.00	198.30	0 01:48
J9	JUNCTION	0.00	0.06	201.73	0 01:51
J5	JUNCTION	0.00	0.00	200.00	0 00:00
J8	JUNCTION	0.00	0.23	199.13	0 01:50
J18	JUNCTION	0.05	0.12	197.96	0 04:28
J12	JUNCTION	0.03	0.05	197.85	0 04:10
J13	JUNCTION	0.01	0.05	197.79	0 01:50
J14	JUNCTION	0.02	0.03	197.80	0 04:33
J15	JUNCTION	0.00	0.00	198.95	0 00:00
J20	JUNCTION	0.00	0.00	200.00	0 00:00

J22	JUNCTION	0.00	0.00	198.50	0	00:00
J19	JUNCTION	0.03	0.05	197.66	0	04:09
J21	JUNCTION	0.02	0.03	197.48	0	04:12
J16	JUNCTION	0.05	0.05	198.37	0	02:21
J23	JUNCTION	0.01	0.03	197.57	0	04:10
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.01	0.01	197.36	0	04:12
SWM_Pond	STORAGE	0.05	0.11	197.96	0	04:28

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	22.40	22.40	0	01:49	0.030	0.030
J2	JUNCTION	36.11	41.37	0	01:49	0.049	0.059
J3	JUNCTION	0.00	36.92	0	02:03	0.000	0.106
J6	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J10	JUNCTION	2.31	103.87	0	01:50	0.003	0.148
J4	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J7	JUNCTION	10.17	21.94	0	01:50	0.014	0.045
J11	JUNCTION	0.00	178.22	0	01:48	0.000	0.148
J9	JUNCTION	7.52	7.52	0	01:49	0.010	0.010
J5	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J8	JUNCTION	104.00	104.00	0	01:49	0.145	0.145
J18	JUNCTION	0.00	3.38	0	04:27	0.000	0.303
J12	JUNCTION	0.00	3.38	0	04:28	0.000	0.303
J13	JUNCTION	5.13	5.13	0	01:45	0.007	0.310
J14	JUNCTION	0.00	3.38	0	04:29	0.000	0.303
J15	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J20	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J22	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
J19	JUNCTION	0.00	3.83	0	01:53	0.000	0.309
J21	JUNCTION	0.00	3.41	0	04:10	0.000	0.308
J16	JUNCTION	0.00	36.38	0	02:04	0.000	0.103
J23	JUNCTION	0.00	3.41	0	04:09	0.000	0.308
Out1	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
Out2	OUTFALL	0.00	3.41	0	04:12	0.000	0.308
SWM_Pond	STORAGE	74.64	254.99	0	01:48	0.101	0.352

****

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.124	2	0	0.313	5	0 04:28	3.38

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Out1	0.00	0.00	0.00	0.000
Out2	97.39	1.22	3.41	0.308
System	48.70	1.22	3.41	0.308

Link Flow Summary

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth

C9	DUMMY	178.34	0	01:48			
C3	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C4	CONDUIT	14.59	0	01:54	0.26	0.01	0.12
C5	CONDUIT	14.41	0	02:01	0.26	0.01	0.13
C7	CONDUIT	101.63	0	01:50	0.38	0.16	0.55
C10	CONDUIT	5.56	0	01:51	0.10	0.00	0.13
C6	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C8	CONDUIT	178.22	0	01:48	1.42	0.27	0.33
C1	CONDUIT	22.92	0	02:04	0.30	0.01	0.15
C15	CONDUIT	36.38	0	02:04	1.84	0.04	0.17
C2	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C12	CONDUIT	3.38	0	04:29	0.28	0.03	0.10
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C14	CONDUIT	3.38	0	04:33	0.13	0.00	0.04
C17	CONDUIT	3.83	0	01:53	0.15	0.00	0.05
P1	CONDUIT	3.38	0	04:27	0.32	0.54	0.76
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C21	DUMMY	0.00	0	00:00			
C19	CONDUIT	3.41	0	04:09	0.41	0.00	0.05
C20	CONDUIT	3.41	0	04:12	0.19	0.00	0.03
C16	DUMMY	36.38	0	02:04			
C22	CONDUIT	3.41	0	04:10	0.14	0.00	0.04
C11	ORIFICE	3.38	0	04:28			1.00
2	ORIFICE	0.00	0	00:00			
3	WEIR	0.00	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted /Actual	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Conduit	Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
C3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C4	1.00	0.02	0.31	0.00	0.68	0.00	0.00	0.00	0.03	0.0000
C5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.14	0.0000
C7	1.00	0.02	0.02	0.00	0.97	0.00	0.00	0.00	0.09	0.0000
C10	1.00	0.02	0.63	0.00	0.36	0.00	0.00	0.00	0.01	0.0000
C6	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C8	1.00	0.02	0.06	0.00	0.92	0.00	0.00	0.00	0.07	0.0000
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
C15	1.00	0.02	0.22	0.00	0.74	0.01	0.00	0.00	0.05	0.0000
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C12	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.47	0.0000

C13	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.02	0.01	0.00	0.98	0.00	0.00	0.00	0.21	0.0000
C17	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.0000
P1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.43	0.0000
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
C19	1.00	0.02	0.00	0.00	0.86	0.12	0.00	0.00	0.82	0.0000
C20	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.35	0.0000
C22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.22	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C21	72.00	72.00	72.00	72.00	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Mon Jul 08 14:08:53 2013
Analysis ended on: Mon Jul 08 14:09:02 2013
Total elapsed time: 00:00:09

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

April 2013 - Original Model developed
July 8 2013 - Culvert crossing on Brooks Road corrected as a single 750mm culvert

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date NOV-21-2012 00:00:00
Ending Date NOV-24-2012 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 1.00 sec

WARNING 02: maximum depth increased for Node J15

****
Element Count
****
Number of rain gages 8
Number of subcatchments ... 15
Number of nodes 25
Number of links 25
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
2YR	Timeseries_2yr	INTENSITY	5 min.
5YR	Timeseries1_5Yr	INTENSITY	5 min.
10Yr	Timeseries_10Yr_Storm	INTENSITY	5 min.
25Yr	Timeseries_25Yr_Storm	INTENSITY	5 min.
50Yr	Timeseries_50Yr_Storm	INTENSITY	5 min.
100Yr	Timeseries_100Yr_Storm	INTENSITY	15 min.
Huricane_Hazel	Huricane_Hazel	INTENSITY	15 min.
25mm	25mm_storm	VOLUME	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
203	0.88	105.00	5.00	25.0000	Huricane_Hazel	J9
210	0.43	500.00	100.00	10.0000	Huricane_Hazel	SWM_Pond
204	2.64	319.00	8.00	25.0000	Huricane_Hazel	J2
202	0.85	96.00	7.00	25.0000	Huricane_Hazel	J7
201	2.62	307.00	5.00	25.0000	Huricane_Hazel	J1
100	1.53	500.00	0.00	2.0000	Huricane_Hazel	Out1
208	0.26	50.00	95.00	2.0000	Huricane_Hazel	J8
207	0.38	63.00	95.00	2.0000	Huricane_Hazel	J8
206	0.13	34.00	5.00	2.0000	Huricane_Hazel	SWM_Pond
209	0.27	68.00	5.00	2.0000	Huricane_Hazel	J10
205	1.85	450.00	0.00	50.0000	Huricane_Hazel	J20
303	0.44	40.00	0.00	50.0000	Huricane_Hazel	J21
304	0.15	95.00	20.00	3.0000	Huricane_Hazel	J13
301	0.53	350.00	0.00	4.0000	Huricane_Hazel	J4
302	1.95	770.00	0.00	1.0000	Huricane_Hazel	J6

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	201.67	1.00	0.0	
J2	JUNCTION	200.77	1.00	0.0	
J3	JUNCTION	198.96	1.00	0.0	
J6	JUNCTION	198.80	1.20	0.0	

J10	JUNCTION	198.60	1.00	0.0
J4	JUNCTION	200.50	1.20	0.0
J7	JUNCTION	199.84	1.00	0.0
J11	JUNCTION	198.30	1.00	0.0
J9	JUNCTION	201.67	1.00	0.0
J5	JUNCTION	200.00	1.20	0.0
J8	JUNCTION	198.90	1.00	0.0
J18	JUNCTION	197.84	1.66	0.0
J12	JUNCTION	197.80	1.40	0.0
J13	JUNCTION	197.74	1.20	0.0
J14	JUNCTION	197.77	1.20	0.0
J15	JUNCTION	198.95	1.50	0.0
J20	JUNCTION	200.00	1.00	0.0
J22	JUNCTION	198.50	1.00	0.0
J19	JUNCTION	197.61	1.20	0.0
J21	JUNCTION	197.45	1.20	0.0
J16	JUNCTION	198.32	1.18	0.0
J23	JUNCTION	197.54	1.00	0.0
Out1	OUTFALL	0.00	0.00	0.0
Out2	OUTFALL	197.35	0.75	0.0
SWM_Pond	STORAGE	197.85	1.65	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C9	J11	SWM_Pond	CONDUIT	10.0	0.3000	0.0400
C3	J5	J6	CONDUIT	436.8	0.2747	0.0400
C4	J1	J7	CONDUIT	369.8	0.4949	0.0400
C5	J7	J3	CONDUIT	181.2	0.4856	0.0400
C7	J8	J10	CONDUIT	59.9	0.5010	0.0400
C10	J9	J2	CONDUIT	180.5	0.4987	0.0400
C6	J6	J19	CONDUIT	374.3	0.3179	0.0400
C8	J10	J11	CONDUIT	60.0	0.5003	0.0400
C1	J2	J3	CONDUIT	369.9	0.4893	0.0400
C15	J3	J16	CONDUIT	19.6	3.2587	0.0130
C2	J4	J5	CONDUIT	170.6	0.2931	0.0400
C12	J12	J14	CONDUIT	23.0	0.1304	0.0130
C13	J15	J14	CONDUIT	30.1	3.9285	0.0400
C14	J14	J13	CONDUIT	9.6	0.3125	0.0400
C17	J13	J19	CONDUIT	37.5	0.3467	0.0400
P1	SWM_Pond	J18	CONDUIT	6.0	0.1667	0.0130
C18	J20	J22	CONDUIT	592.4	0.2532	0.0400
C21	J22	SWM_Pond	CONDUIT	10.0	0.1000	0.0400
C19	J19	J23	CONDUIT	16.6	0.4227	0.0130
C20	J21	Out2	CONDUIT	11.4	0.8780	0.0400

C16	J16	SWM_Pond	CONDUIT	15.0	3.1349	0.0360
C22	J23	J21	CONDUIT	19.6	0.4599	0.0400
C11	J18	J12	ORIFICE			
2	SWM_Pond	J12	ORIFICE			
3	SWM_Pond	J15	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C3	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	551.55
C4	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2026.44
C5	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2007.25
C7	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.71
C10	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2034.20
C6	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1749.29
C8	TRAPEZOIDAL	0.50	0.90	0.26	3.30	1	648.22
C1	TRAPEZOIDAL	0.75	2.19	0.38	5.55	1	2014.79
C15	CIRCULAR	0.45	0.16	0.11	0.45	2	514.70
C2	TRAPEZOIDAL	0.50	1.00	0.27	3.50	1	569.68
C12	CIRCULAR	0.38	0.11	0.09	0.38	2	63.33
C13	TRAPEZOIDAL	0.55	2.01	0.37	5.30	1	5094.07
C14	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1734.34
C17	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	1826.69
P1	CIRCULAR	0.15	0.02	0.04	0.15	1	6.22
C18	TRAPEZOIDAL	0.75	2.06	0.39	5.00	1	1393.06
C21	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C19	CIRCULAR	0.75	0.44	0.19	0.75	1	723.85
C20	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2907.07
C16	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C22	TRAPEZOIDAL	0.75	2.25	0.41	5.25	1	2103.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	3.161	212.000
Evaporation Loss	0.000	0.000
Infiltration Loss	0.937	62.810
Surface Runoff	2.206	147.947
Final Surface Storage	0.020	1.316
Continuity Error (%)	-0.035	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	2.206	22.059
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.171	21.713
Internal Outflow	0.019	0.192
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.016	0.156
Continuity Error (%)	-0.011	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C19 (4)
Link C16 (2)
Link C15 (1)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00

Subcatchment Runoff Summary

	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff

Subcatchment	mm	mm	mm	mm	mm	10^6 ltr	LPS	
203	212.00	0.00	0.00	74.29	136.52	1.20	110.08	0.644
210	212.00	0.00	0.00	0.00	210.08	0.90	63.30	0.991
204	212.00	0.00	0.00	69.74	141.05	3.72	335.67	0.665
202	212.00	0.00	0.00	70.59	140.20	1.19	107.75	0.661
201	212.00	0.00	0.00	72.11	138.72	3.63	331.07	0.654
100	212.00	0.00	0.00	59.16	151.68	2.32	200.84	0.715
208	212.00	0.00	0.00	0.26	209.55	0.54	38.28	0.988
207	212.00	0.00	0.00	0.26	209.55	0.80	55.94	0.988
206	212.00	0.00	0.00	75.33	135.51	0.18	15.88	0.639
209	212.00	0.00	0.00	74.70	136.09	0.37	33.52	0.642
205	212.00	0.00	0.00	72.68	138.23	2.56	236.15	0.652
303	212.00	0.00	0.00	69.73	141.13	0.62	55.53	0.666
304	212.00	0.00	0.00	38.70	171.65	0.26	21.09	0.810
301	212.00	0.00	0.00	58.03	152.83	0.81	70.82	0.721
302	212.00	0.00	0.00	59.35	151.46	2.95	254.11	0.714

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.03	0.36	202.03	0 10:15
J2	JUNCTION	0.03	0.41	201.18	0 10:15
J3	JUNCTION	0.06	1.00	199.96	0 10:01
J6	JUNCTION	0.03	0.35	199.15	0 10:18
J10	JUNCTION	0.04	0.33	198.93	0 09:22
J4	JUNCTION	0.01	0.22	200.72	0 09:39
J7	JUNCTION	0.03	0.40	200.24	0 10:16
J11	JUNCTION	0.00	0.00	198.30	0 09:22
J9	JUNCTION	0.02	0.23	201.90	0 10:15
J5	JUNCTION	0.01	0.20	200.20	0 10:17
J8	JUNCTION	0.02	0.22	199.12	0 10:15
J18	JUNCTION	0.26	1.49	199.33	0 11:27
J12	JUNCTION	0.14	1.33	199.13	0 11:27
J13	JUNCTION	0.10	1.10	198.84	0 11:27
J14	JUNCTION	0.10	1.07	198.84	0 11:27
J15	JUNCTION	0.00	0.14	199.09	0 11:28
J20	JUNCTION	0.05	0.63	200.63	0 10:17
J22	JUNCTION	0.00	0.00	198.50	0 10:17
J19	JUNCTION	0.14	1.20	198.81	0 11:14
J21	JUNCTION	0.08	0.46	197.91	0 11:15

J16	JUNCTION	0.03	0.04	198.36	0	13:31
J23	JUNCTION	0.08	0.53	198.07	0	11:15
Out1	OUTFALL	0.00	0.00	0.00	0	00:00
Out2	OUTFALL	0.05	0.37	197.72	0	11:15
SWM_Pond	STORAGE	0.25	1.49	199.34	0	11:27

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	331.07	331.07	0	10:15	3.634	3.634
J2	JUNCTION	335.67	445.20	0	10:15	3.724	4.926
J3	JUNCTION	0.00	871.61	0	10:15	0.000	9.779
J6	JUNCTION	254.11	323.17	0	10:15	2.953	3.765
J10	JUNCTION	33.52	127.73	0	10:15	0.367	1.709
J4	JUNCTION	70.82	70.82	0	10:15	0.810	0.810
J7	JUNCTION	107.75	436.50	0	10:15	1.192	4.831
J11	JUNCTION	0.00	178.05	0	09:22	0.000	1.709
J9	JUNCTION	110.08	110.08	0	10:15	1.201	1.201
J5	JUNCTION	0.00	71.42	0	09:54	0.000	0.812
J8	JUNCTION	94.22	94.22	0	10:15	1.341	1.341
J18	JUNCTION	0.00	6.21	0	05:50	0.000	1.042
J12	JUNCTION	0.00	512.00	0	12:44	0.000	12.875
J13	JUNCTION	21.09	821.61	0	11:35	0.257	15.032
J14	JUNCTION	0.00	815.74	0	11:36	0.000	14.775
J15	JUNCTION	0.00	423.91	0	11:27	0.000	1.900
J20	JUNCTION	236.15	236.15	0	10:15	2.557	2.557
J22	JUNCTION	0.00	214.68	0	10:17	0.000	2.557
J19	JUNCTION	0.00	1048.49	0	11:22	0.000	18.824
J21	JUNCTION	55.53	1064.04	0	11:15	0.621	19.393
J16	JUNCTION	0.00	739.54	0	10:01	0.000	9.576
J23	JUNCTION	0.00	1022.22	0	11:14	0.000	18.771
Out1	OUTFALL	200.84	200.84	0	10:15	2.321	2.321
Out2	OUTFALL	0.00	1063.89	0	11:15	0.000	19.392
SWM_Pond	STORAGE	79.18	1159.42	0	10:15	1.080	14.923

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J3	JUNCTION	1.49	0.250	0.000
J18	JUNCTION	41.45	1.344	0.166
J12	JUNCTION	3.16	0.428	0.072
J13	JUNCTION	1.95	0.346	0.104
J14	JUNCTION	1.72	0.323	0.127
J19	JUNCTION	2.65	0.450	0.000

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J3	0.53	132.07	0 10:15	0.175	1.00
J19	0.27	26.27	0 11:22	0.017	1.20

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SWM_Pond	0.805	13	0	5.630	88	0 11:27	815.31

****
Outfall Loading Summary
****

	Flow Freq.	Avg. Flow	Max. Flow	Total Volume

Outfall Node	Pcnt.	LPS	LPS	10^6 ltr
Out1	15.30	58.42	200.84	2.321
Out2	97.99	76.23	1063.89	19.392
System	56.65	134.66	1215.10	21.713

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C9	DUMMY	178.17	0	09:22			
C3	CONDUIT	69.29	0	10:17	0.20	0.13	0.54
C4	CONDUIT	328.84	0	10:15	0.53	0.16	0.51
C5	CONDUIT	431.51	0	10:16	0.39	0.21	0.77
C7	CONDUIT	94.22	0	10:15	0.37	0.15	0.53
C10	CONDUIT	109.55	0	10:15	0.25	0.05	0.42
C6	CONDUIT	309.81	0	10:18	0.28	0.18	0.73
C8	CONDUIT	178.05	0	09:22	1.42	0.27	0.33
C1	CONDUIT	440.32	0	10:15	0.44	0.22	0.77
C15	CONDUIT	739.54	0	10:01	4.41	0.72	0.52
C2	CONDUIT	71.42	0	09:54	0.34	0.13	0.39
C12	CONDUIT	512.23	0	12:44	2.32	4.04	1.00
C13	CONDUIT	423.90	0	11:28	0.40	0.08	0.63
C14	CONDUIT	815.86	0	11:36	0.41	0.47	1.00
C17	CONDUIT	821.72	0	11:35	0.37	0.45	1.00
P1	CONDUIT	6.21	0	05:50	0.35	1.00	1.00
C18	CONDUIT	214.68	0	10:17	0.47	0.15	0.42
C21	DUMMY	214.68	0	10:17			
C19	CONDUIT	1022.22	0	11:14	2.55	1.41	0.85
C20	CONDUIT	1063.89	0	11:15	1.28	0.37	0.55
C16	DUMMY	739.54	0	10:01			
C22	CONDUIT	1022.26	0	11:20	0.94	0.49	0.66
C11	ORIFICE	6.21	0	05:50			1.00
2	ORIFICE	506.28	0	12:44			
3	WEIR	423.91	0	11:27			0.96

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
C3	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.07	0.0000
C4	1.00	0.01	0.17	0.00	0.82	0.00	0.00	0.00	0.08	0.0000
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
C7	1.00	0.01	0.02	0.00	0.98	0.00	0.00	0.00	0.11	0.0000
C10	1.00	0.01	0.49	0.00	0.50	0.00	0.00	0.00	0.03	0.0000
C6	1.00	0.01	0.05	0.00	0.94	0.00	0.00	0.00	0.02	0.0000
C8	1.00	0.01	0.00	0.00	0.95	0.04	0.00	0.00	0.15	0.0000
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.15	0.0000
C15	1.00	0.01	0.16	0.00	0.66	0.17	0.00	0.00	0.43	0.0001
C2	1.00	0.05	0.43	0.00	0.51	0.00	0.00	0.00	0.04	0.0000
C12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.47	0.0001
C13	1.00	0.01	0.93	0.00	0.06	0.00	0.00	0.00	0.00	0.0000
C14	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.24	0.0000
C17	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
P1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.12	0.0000
C18	1.00	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.14	0.0000
C19	1.00	0.01	0.00	0.00	0.98	0.01	0.00	0.00	0.70	0.0001
C20	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.47	0.0000
C22	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.30	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	72.00	72.00	72.00	72.00	0.01
C15	0.01	0.01	0.01	1.92	0.01
C12	7.64	7.64	7.64	10.03	7.64
C14	1.72	1.72	1.72	0.01	0.01
C17	1.95	1.95	1.95	0.01	0.01
P1	39.99	39.99	39.99	0.01	0.01
C21	72.00	72.00	72.00	72.00	0.01
C19	0.01	0.01	0.01	2.05	0.01
C16	72.00	72.00	72.00	72.00	0.01

Analysis begun on: Thu Jul 11 15:39:24 2013
Analysis ended on: Thu Jul 11 15:39:32 2013

Total elapsed time: 00:00:08

APPENDIX E

SUPPORTING DESIGN CALCULATIONS

APPENDIX E1

FOREBAY DESIGN
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Brooks Road Landfill Proposed SWM Pond

Design forebay For The Outlet From Outlet

Forebay Length (L)

$$L = \sqrt{\frac{r\ Q}{Vs}}$$

L = 29 m

Length to width ratio (r) =	1	:1
25mm Storm Peak flowrate (Q) =	0.258	m^3/s
Particle size settling velocity (V_s) =	0.0003	m/s

Dispersion Length (D)

$$D = \frac{8\ Q}{d\ V\ f}$$

D = 11 m

Permanent Pool Depth (d) =	0.65	m
Desired Velocity in the Forebay (V_f) =	0.5	m/s
10 year Storm Peak flow rate (Q) =	0.429	m^3/s

Minimum Forebay Bottom Width (W)

$$W = \frac{L}{8}$$

W = 4 m

Velocity Within Forebay (V)

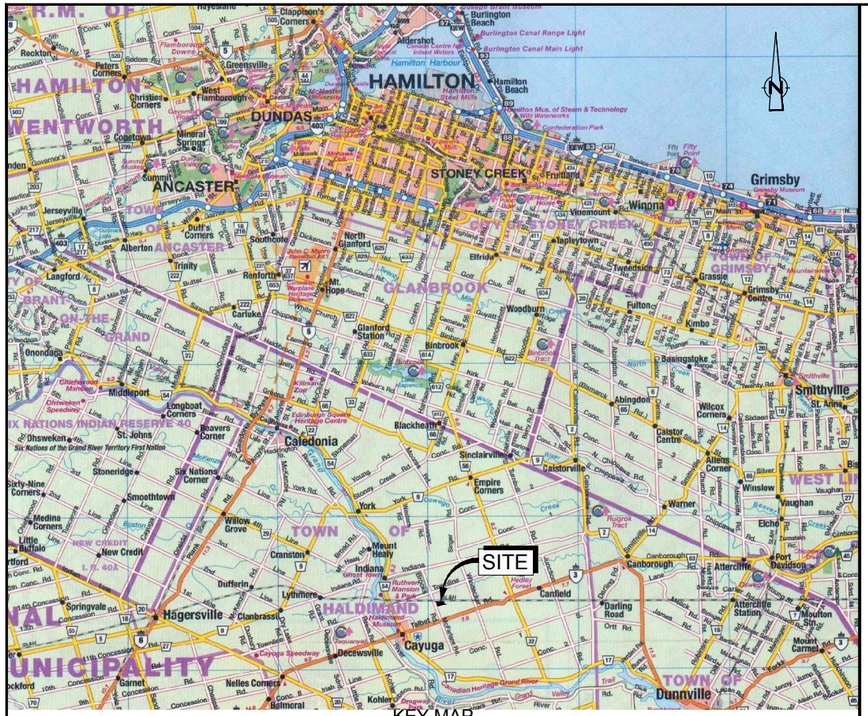
$$V = \frac{Q}{A}$$

V = 0.056 m/s

Actual Upstream Width	4	m
Actual Downstream Width	15	m
Permanent Pool Depth =	0.65	m
Channel Side Slopes =	4	:1
Cross Sectional Area (A) =	8	m^2

Notes: 1. Design Equations are from the "*Stormwater Management Planning and Design Manual*" (MOE, 2003)

DRAWINGS



KEY MAP

BROOKS ROAD LANDFILL SITE

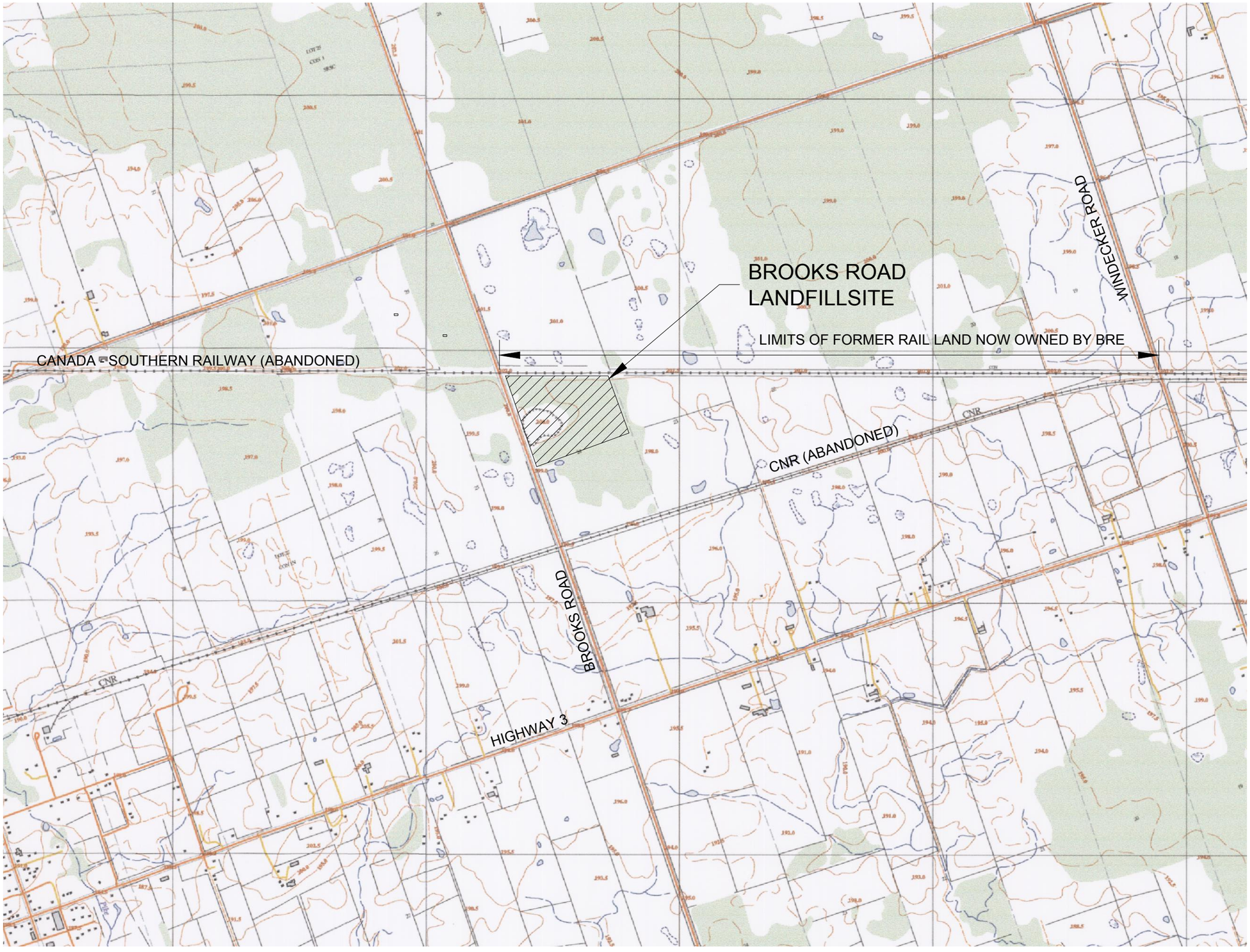
BROOKS ROAD ENVIRONMENTAL C/O 2270386 ONTARIO LIMITED

DESIGN AND OPERATIONS PLANS

DRAWING INDEX

DWG. Nº	REV. Nº	DATE	TITLE
1	1	SEPTEMBER 2013	SURROUNDING PROPERTY PLAN
2	1	SEPTEMBER 2013	EXISTING CONDITIONS
3	0	SEPTEMBER 2013	INTERIM STORMWATER MANAGEMENT SITE DRAINAGE PLAN
4	0	SEPTEMBER 2013	INTERIM STORMWATER MANAGEMENT SITE DRAINAGE PLAN DETAILS
5	2	SEPTEMBER 2013	APPROVED FINAL CONTOURS
6	1	NOVEMBER 2003	BASE CONTOURS FOR WASTE DISPOSAL
7	1	NOVEMBER 2003	TOP OF WASTE CONTOURS
8	2	SEPTEMBER 2013	TYPICAL SECTIONS
9	2	SEPTEMBER 2013	SITE SEQUENCING AND MONITORING PLAN
10	1	NOVEMBER 2003	LEACHATE COLLECTION SYSTEM
11	1	NOVEMBER 2003	LEACHATE COLLECTION SYSTEM DETAILS
12	2	SEPTEMBER 2013	STORMWATER DRAINAGE PLAN DETAILS 1 OF 2
13	0	SEPTEMBER 2013	STORMWATER DRAINAGE PLAN DETAILS 2 OF 2
14	0	OCTOBER 2002	SITE LAYOUT FOR DECOMMISSIONING ACTIVITIES

CONESTOGA-ROVERS & ASSOCIATES



No	Revision	Date	Initial

0 100 200 300m

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

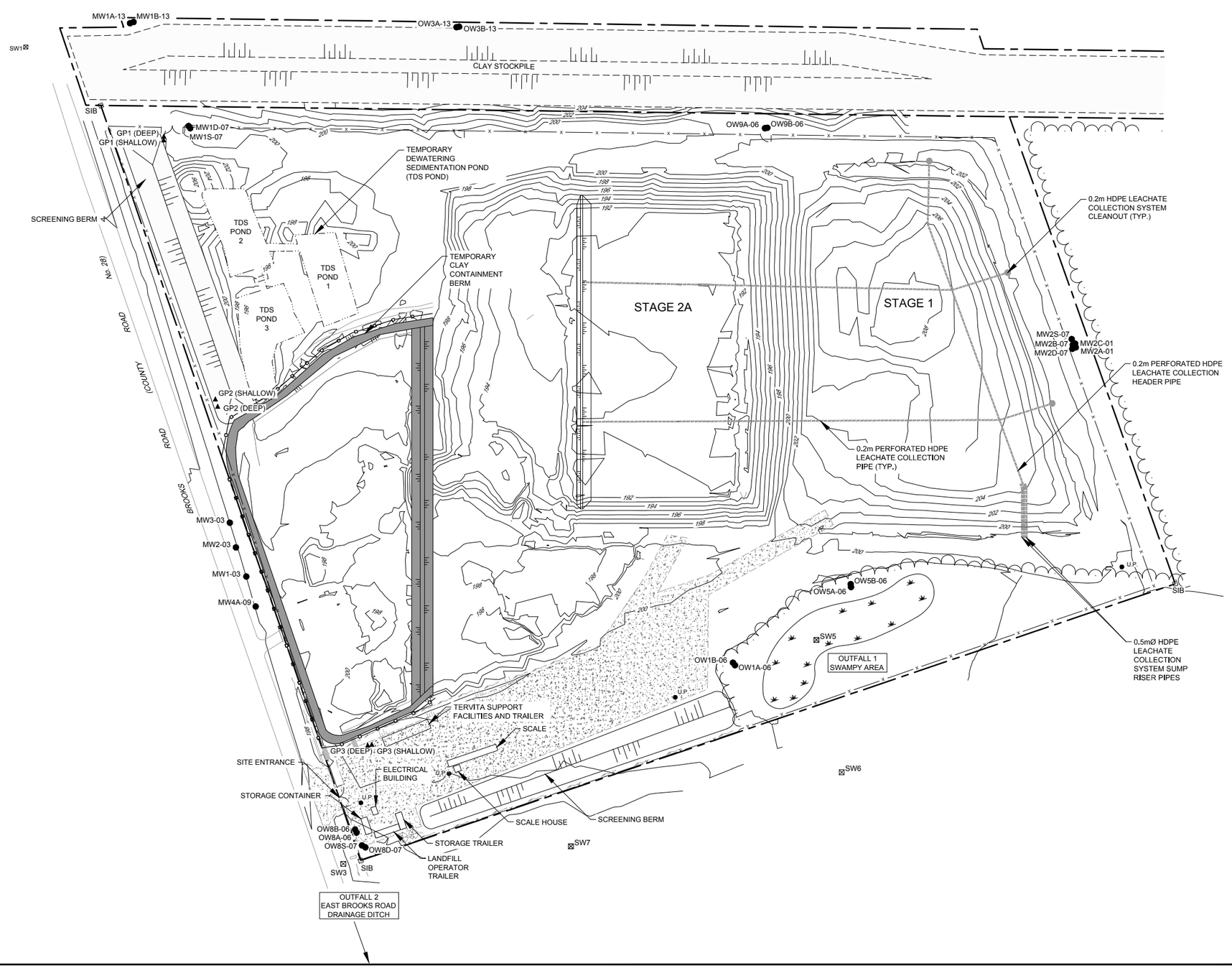
SURROUNDING PROPERTY PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
MINISTRY OF NATURAL RESOURCES, AIR PHOTOGRAPHY 1983
MAP No. 10 17 5900 47550 & 10 17 5950 47550

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P.KEMP	SEPTEMBER 2013	
Scale: 1:10,000	Project No: 18235-00	Report No: 007	Drawing No: 1

18235-00(007)GN-WA007 SEP 10/2013



Nº	Revision	Date	Initial

0 10 20 30m

LEGEND:

- PROPERTY LINE
- FENCELINE
- EDGE OF PONDED WATER
- TREELINE
- GROUND CONTOUR AT 0.5m INTERVAL
- GROUND CONTOUR AT 1.0m INTERVAL
- SWAMPY AREA
- OW1B-06 OBSERVATION WELL
- MW2A-01 MONITORING WELL
- SW6 SURFACE WATER MONITORING
- SILT FENCE
- GP3 GAS PROBE
- CLAY STOCKPILE AREA
- TEMPORARY CLAY CONTAINMENT BERM

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

EXISTING CONDITIONS

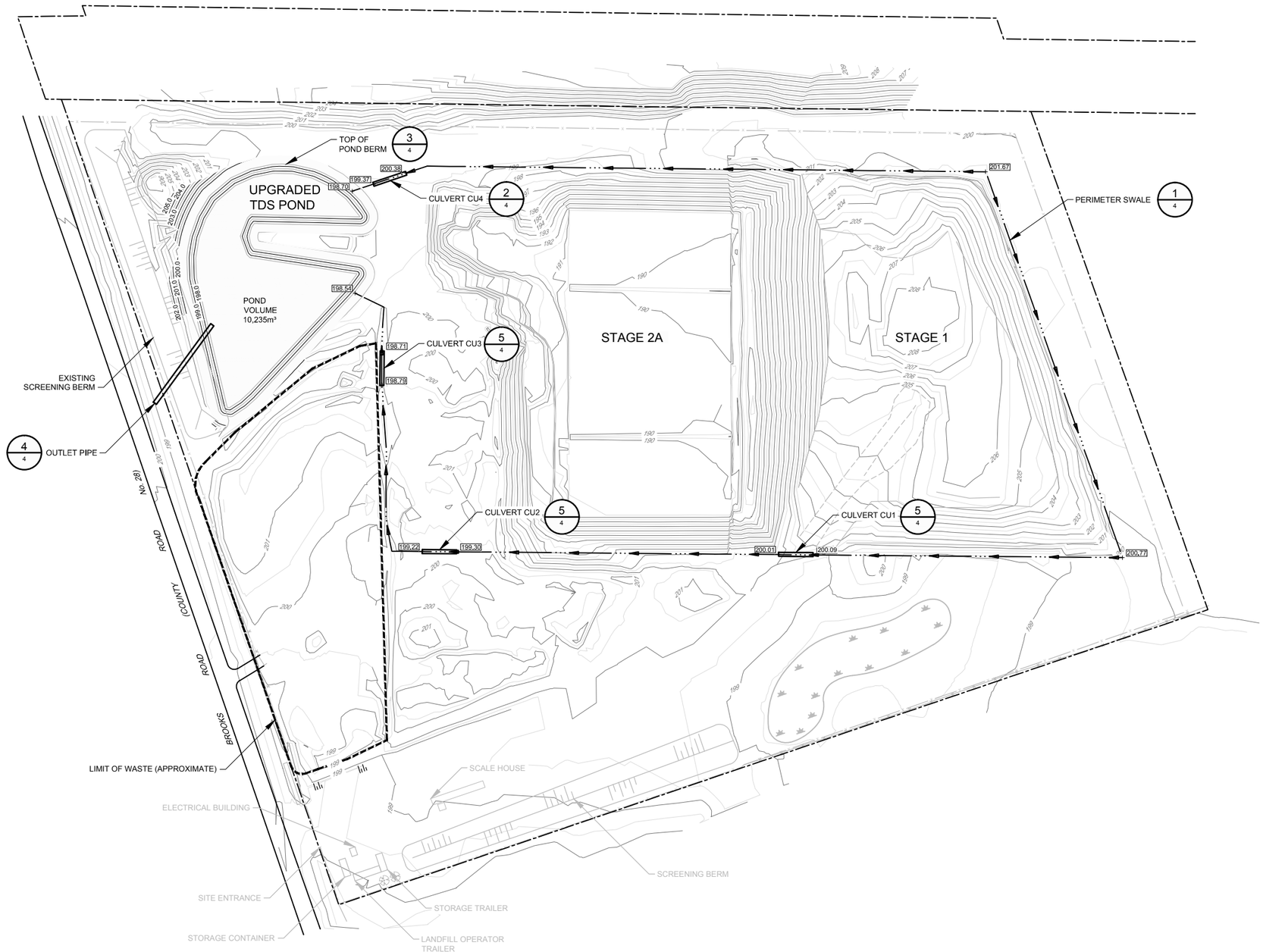
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P.KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 2

18235-00(007)GN-WA008 SEP 10/2013



Nº	Revision	Date	Initial

N

0 10 20 30m

LEGEND

- DRAINAGE SWALE
- PROPOSED CULVERT
- POND CONTOUR - 0.5m INTERVAL
- 200.0 POND CONTOUR - 1.0m INTERVAL
- PROPERTY LINE
- LIMIT OF WASTE (APPROXIMATE)
- EXISTING POST AND WIRE FENCE
- GROUND CONTOUR - 0.5m INTERVAL
- 200.0 GROUND CONTOUR - 1.0m INTERVAL
- CHAINLINK FENCE
- GRAVEL ROADWAY
- CULVERT
- LOW AREA

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH UPDATED ISWMP APPLICATION	JAN 2013	PK

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

INTERIM STORMWATER MANAGEMENT SITE DRAINAGE PLAN

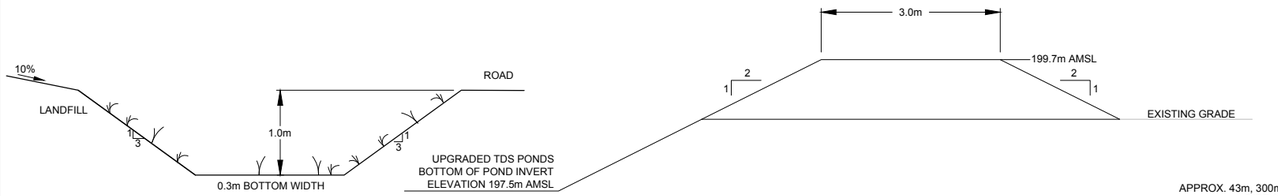
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

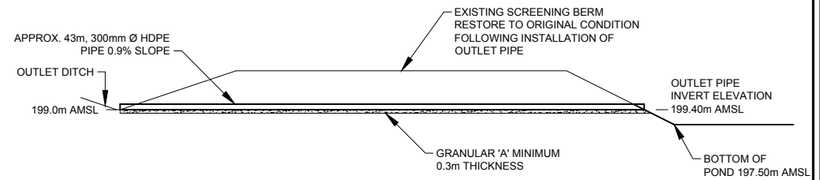
Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 3

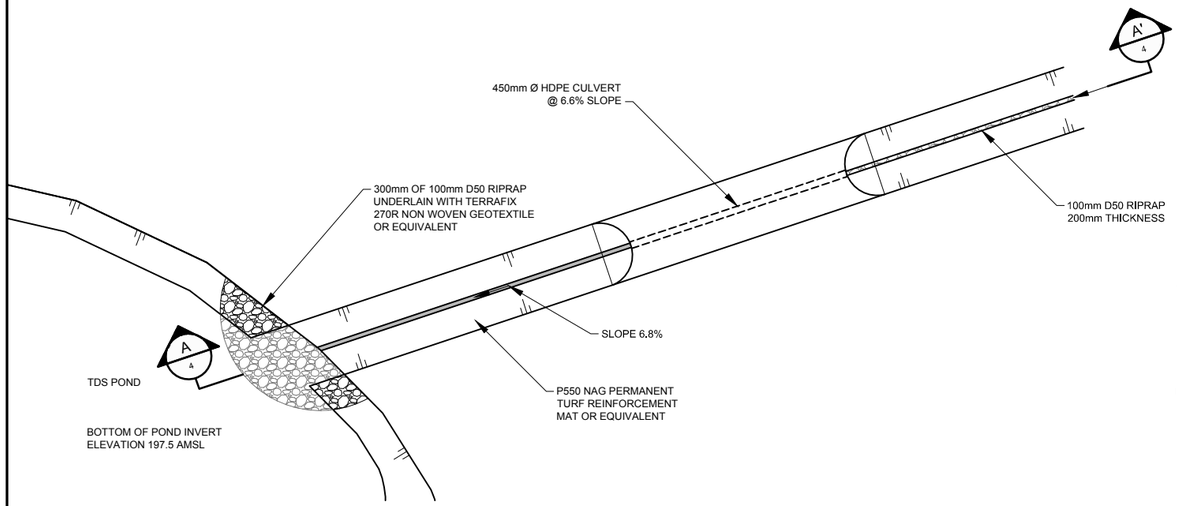
18235-00(007)GN-WA025 SEP 6/2013



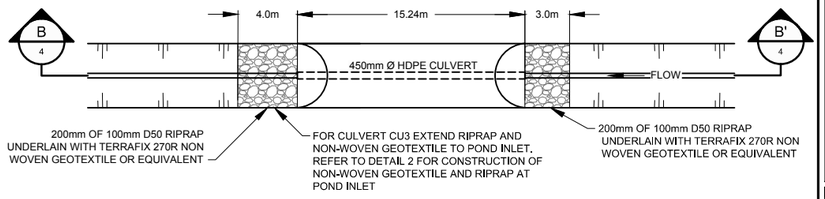
DETAIL 1/3 TYPICAL PERIMETER SWALE SECTION
NTS

DETAIL 3/3 TOP OF POND BERM
NTS

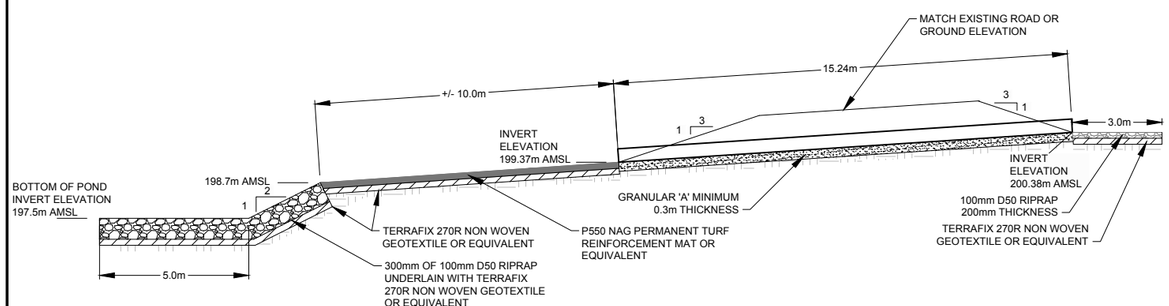




DETAIL 4/3 OUTLET PIPE
NTS

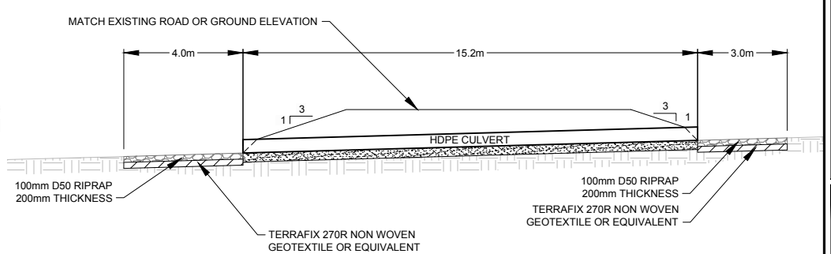


DETAIL 2/3 CULVERT 4 AND POND INLET
NTS



SECTION A-A' CULVERT 4 AND POND INLET

DETAIL 5/3 CULVERTS CU1, CU2, & CU3
NTS



SECTION B-B' CULVERTS CU1, CU2, & CU3

NO	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH UPDATED ISWMP APPLICATION	JAN 2013	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

INTERIM STORMWATER MANAGEMENT
SITE DRAINAGE PLAN DETAILS

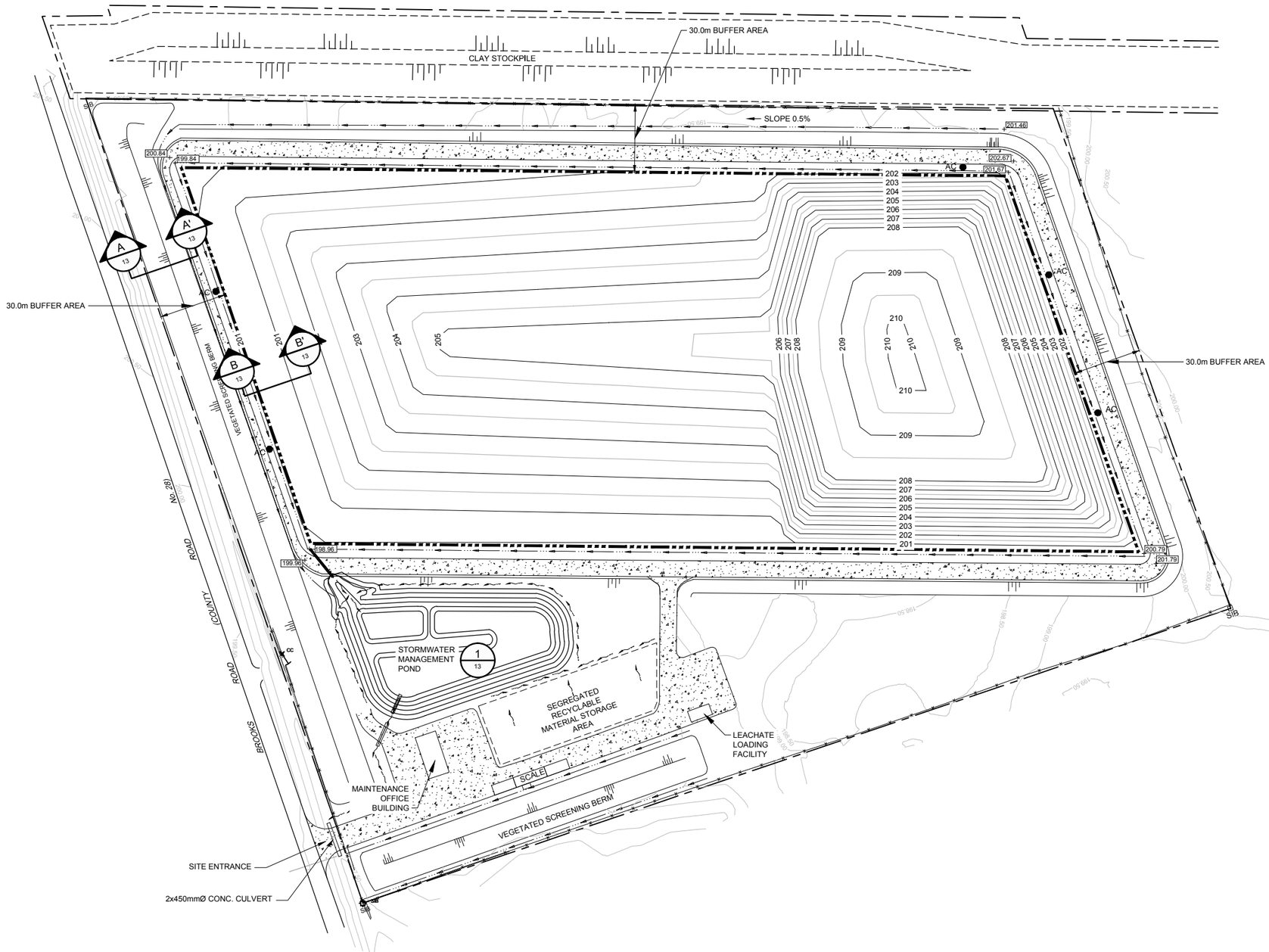
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project No: 18235-00	Report No: 007	Drawing No: 4

18235-00(007)GN-WA027 SEP 6/2013



NO.	Revision	Date	Initial
1	MATERIAL STORAGE AREA DRAINAGE ADDED	SEP 2003	DCC

0 10 20 30m

LEGEND

- PROPERTY LINE
- LANDFILL AREA FOOTPRINT
- EXISTING FENCELINE
- EXISTING GROUND CONTOUR AT 0.5m INTERVAL
- EXISTING GROUND CONTOUR AT 1.0m INTERVAL
- GRANULAR SURFACE ACCESS ROAD
- DRAINAGE SWALE
- TOP OF FINAL COVER CONTOUR (m AMSL)
- SPOT ELEVATION (m AMSL)
- ACCESS CHAMBER
- CLAY STOCKPILE AREA

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

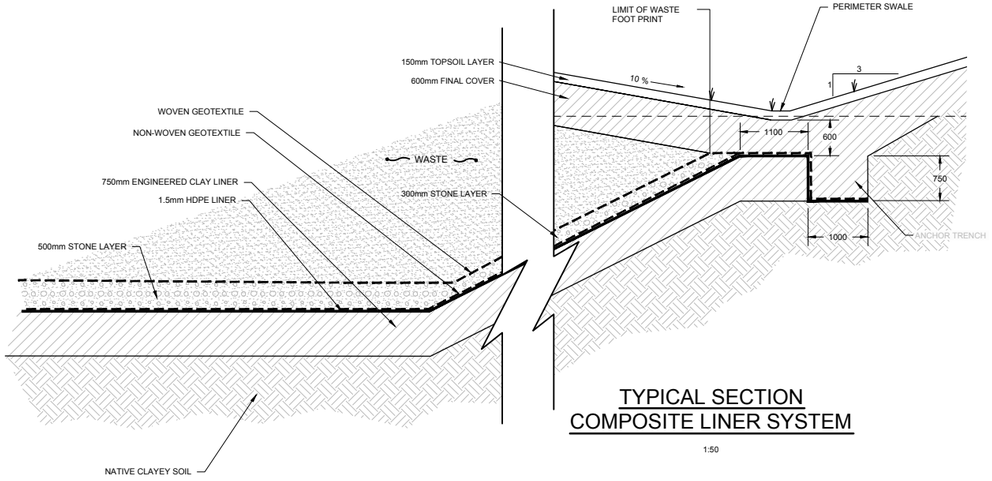
APPROVED FINAL CONTOURS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project No.: 18235-00	Report No.: 007	Drawing No.: 5

18235-00(007)GN-WA009 SEP 6/2013



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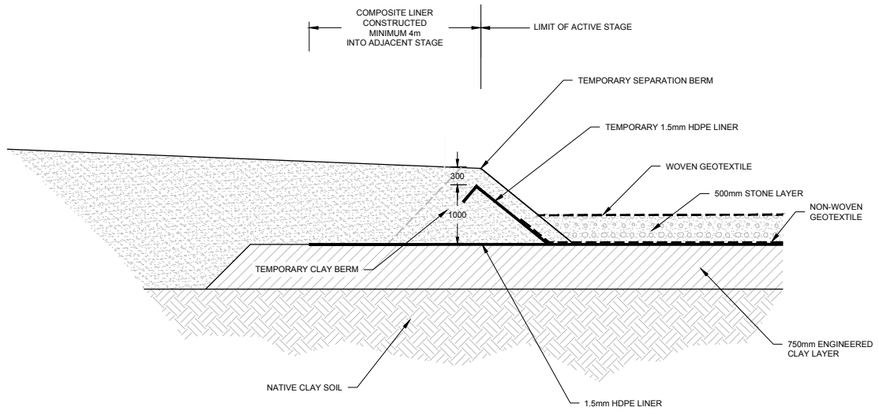
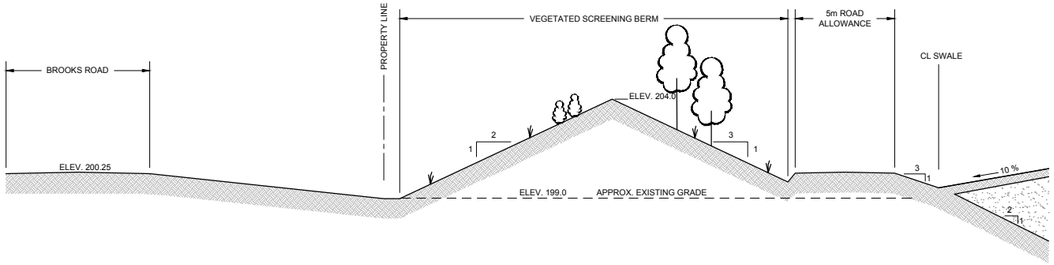
COMPOSITE LINER SYSTEM

1:50



TYPICAL SECTION
TEMPORARY SEPARATION BERM
AT LIMIT OF ACTIVE STAGE

NTS



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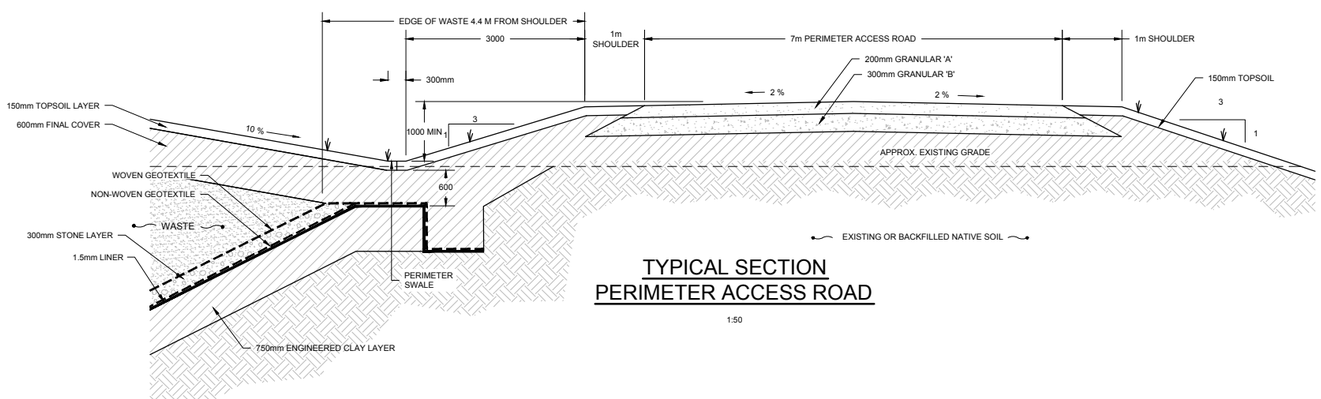
BERM ALONG BROOKS ROAD

1:150



TYPICAL SECTION
PERIMETER ACCESS ROAD

1:50

Nº	Revision	Date	Initial
1	TEMPORARY SEPARATION BERM SECTION ADDED	SEP 2003	DCC

NOTE:

1. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

TYPICAL SECTIONS

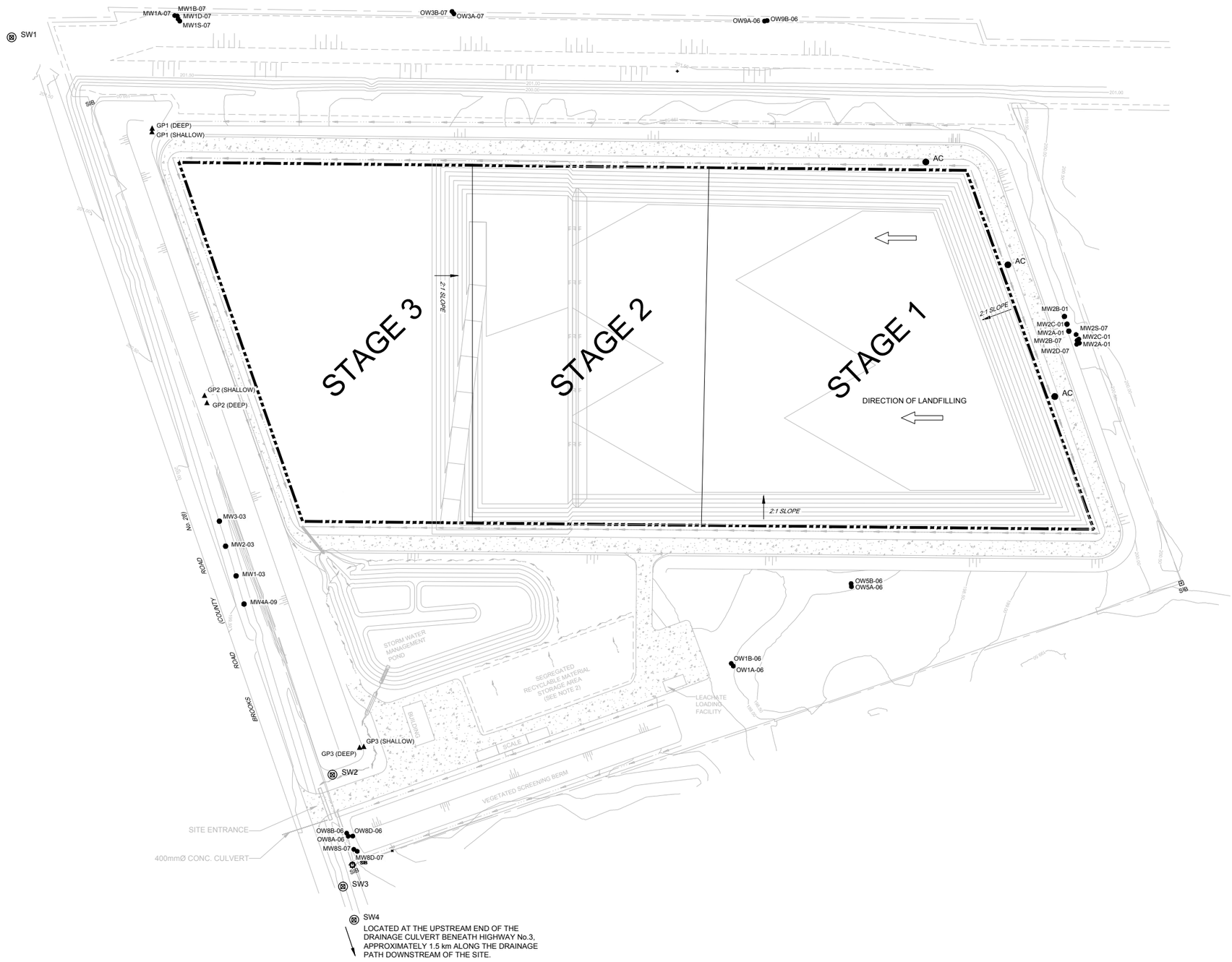
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 8

18235-00(007)GN-WA014 SEP 6/2013



Nº	Revision	Date	Initial
1	STAGE 1 CONSTRUCTION DETAILS ADDED	SEP 2003	DCC
	GAS PROBE LOCATIONS ADDED		
	MATERIAL STORAGE AREA DRAINAGE ADDED		

N

0 10 20 30m

LEGEND

- PROPERTY LINE
- PROPOSED LANDFILL AREA FOOTPRINT
- EXISTING FENCELINE
- EXISTING TREELINE
- EXISTING GROUND CONTOUR AT 0.25m INTERVAL
- EXISTING GROUND CONTOUR AT 1.0m INTERVAL
- EXISTING SWAMPY AREA
- ACCESS ROAD
- OW6B-92 EXISTING OBSERVATION WELL
- MW2-01 GROUNDWATER MONITORING WELL LOCATION
- SW1 SURFACE WATER MONITORING LOCATION
- GP1 GAS PROBE LOCATION
- AC ACCESS CHAMBER

SCALE VERIFICATION

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Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

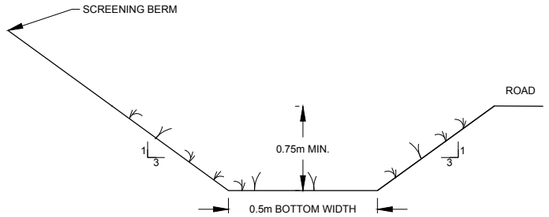
SITE SEQUENCING AND MONITORING PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
FIELD SURVEY DATA COMPLETED MARCH 7, 2013 AND MARCH 13, 2013 BY TERVITA.

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P.KEMP	SEPTEMBER 2013	
Scale: 1:1000	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 9

18235-00(007)GN-WA012 SEP 6/2013



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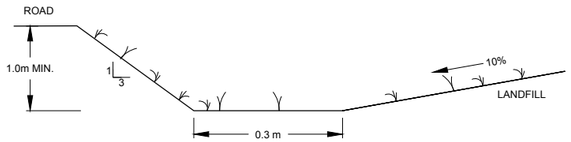

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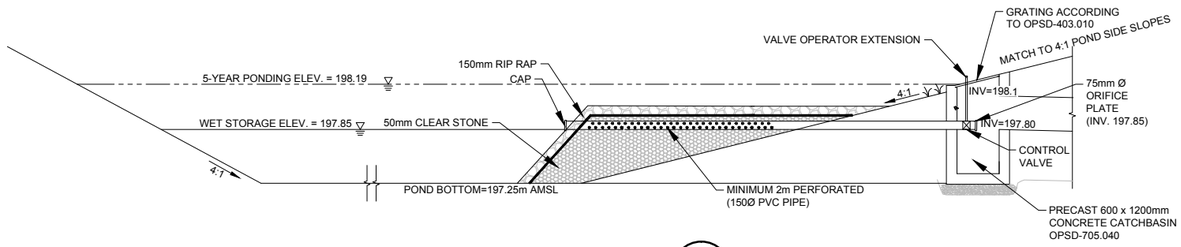

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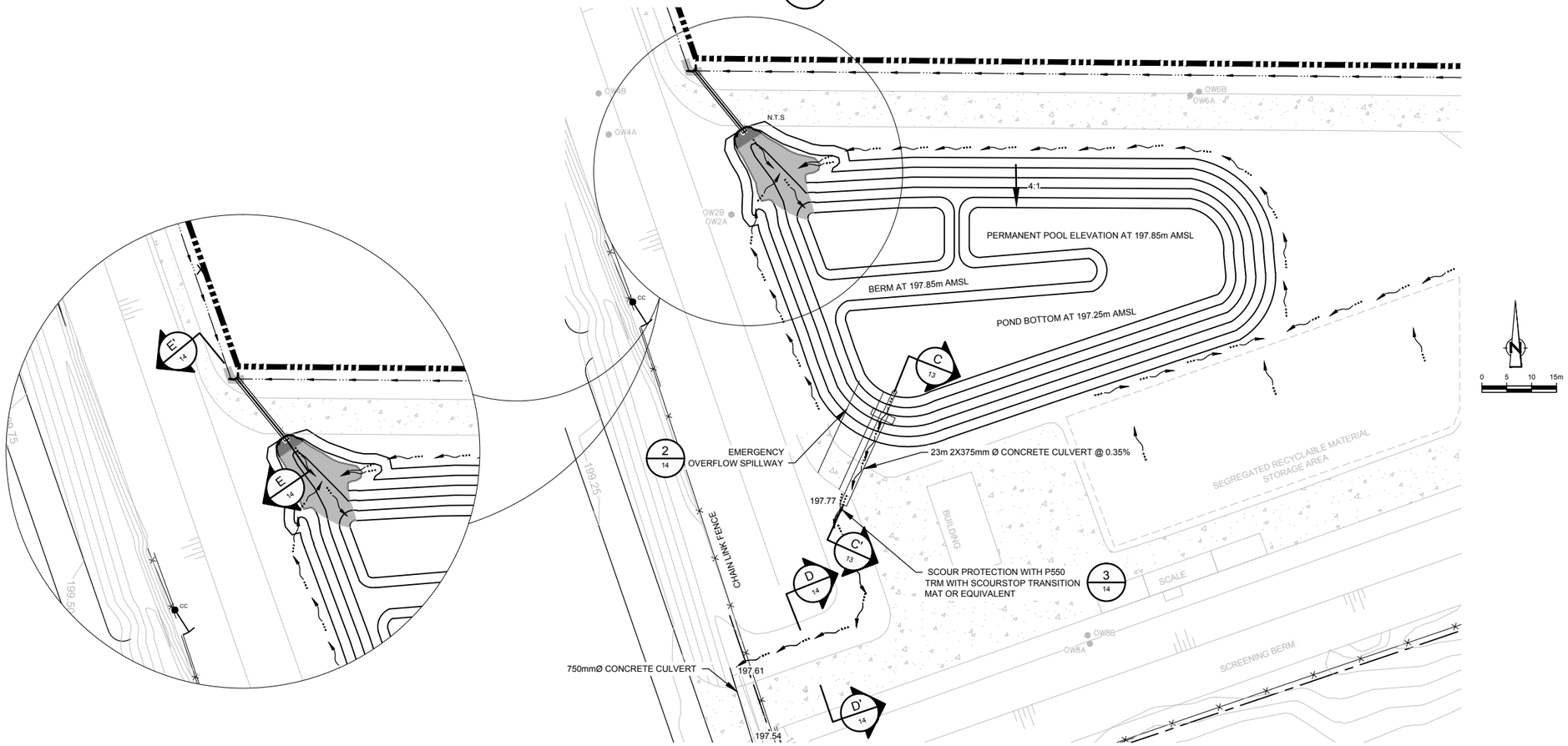

DETAIL 1 (5) STORM WATER MANAGEMENT POND
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No	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
ISSUED WITH AMENDED D&O REPORT	NOV 2003	DCC
ISSUED WITH AMENDMENT APPLICATION	OCT 2002	DCC
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

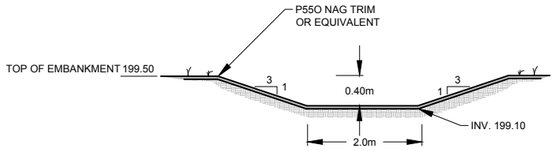
DESIGN AND OPERATIONS REPORT

STORMWATER DRAINAGE PLAN DETAILS 1 OF 2

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: AS SHOWN	Project No: 18235-00	Report No: 007	Drawing No: 12



DETAIL 2 EMERGENCY OVERFLOW SPILLWAY
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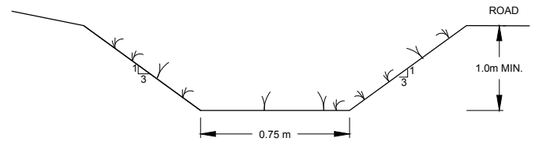

SECTION D-D' GRASSED LINED SWALE SECTION
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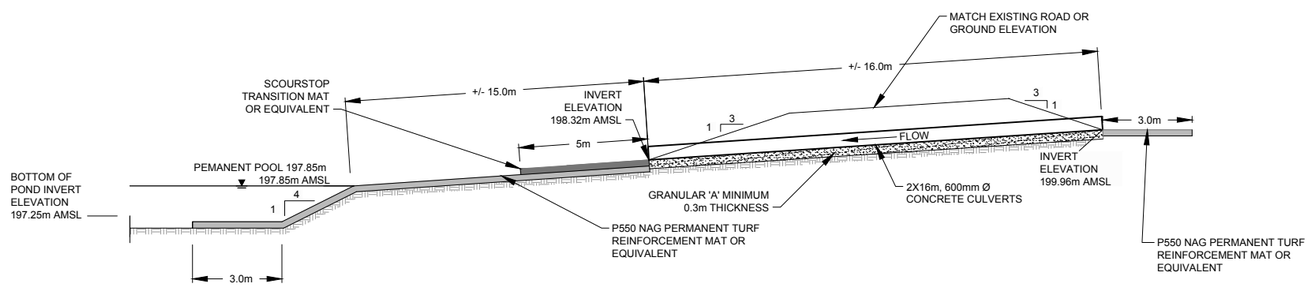

SECTION E-E' CULVERT AND POND INLET
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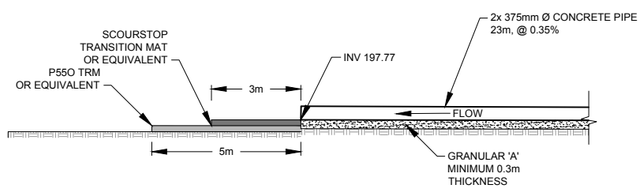

DETAIL 3
NTS 13

Nº	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED WITH AMENDMENT APPLICATION	SEP 2013	PK
Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

DESIGN AND OPERATIONS REPORT

STORMWATER DRAINAGE PLAN DETAILS 2 OF 2

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G. FERRARO	P. KEMP	SEPTEMBER 2013	
Scale: AS SHOWN	Project Nº: 18235-00	Report Nº: 007	Drawing Nº: 13

Table 1

City of Hamilton Design Storm Parameters
Brooks Road Landfill Site
Haldimand County, Ontario

Design Storm	Depth (mm)	Duration (hours)	Timestep (min)
25 mm	25	4	5
2-Year	34.2	3	5
5-Year	50.2	3	5
10-Year	60.8	3	5
25-Year	74.2	3	5
50-Year	84.1	3	5
100-Year	124.7	24	15
Regional (Hurricane Hazel)	212	12	15

Notes:

1. Storms based on Hamilton Airport data - Environment Canada Atmospheric Environment Service.
2. Hyetographs created based on SCS Type II distribution

Appendix E

2021 O&M Report

2021 Operations and Monitoring Report

Brooks Road Landfill Site

2270386 Ontario Limited

31 March 2022

→ The Power of Commitment

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Waterloo, Ontario N2L 3X2, Canada
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Printed date	2022-03-31 12:50:00 PM
Last saved date	March 31, 2022
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Author	Brian Packer
Project manager	Ryan Loveday
Client name	2270386 Ontario Limited
Project name	Brooks Road Landfill
Document title	2021 Operations and Monitoring Report | Brooks Road Landfill Site
Revision version	Rev 2
Project number	018235--RPT-113

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	1	Brian Packer	Ryan Loveday		Victoria Shortreed		March 16, 2022
S4	2	Brian Packer	Ryan Loveday		Victoria Shortreed		March 31, 2022
[Status code]							
[Status code]							
[Status code]							

Contents

Figure index

Table index

Table index

Appendices

1. Introduction

1.1 General

GHD, has prepared the following 2021 Operations and Monitoring Report (2021 O&M Report), on behalf of Brooks Road Environmental c/o 2270386 Ontario Limited (BRE), the owner of the Brooks Road Landfill Site (Landfill/Site). The Site and Site operations are authorized under ECA (Landfill) A110302, ECA (Industrial Sewage Works) 1122-BKUPSM, and ECA (Air) 8922-9ZHR29. In 2021, the Landfill ECA was amended on October 2, 2021 with an approved fill rate of 1,000 tonnes per day (250,000 tonnes per year) and the approved capacity is 1,045,065 cubic metre (m^3) (including waste and daily cover).

As required by the Landfill ECA, this report provides an annual summary of the development, operations, and monitoring of the Site, based upon Section 7.7 of the Design and Operations Report (D&O), dated June 2021, and referenced under Condition 12(6) and 12(7) of the Landfill ECA.

This report provides a summary of the environmental monitoring program results and Site operations conducted in 2021 in accordance with the ECAs in effect during the reporting period. This report also provides an annual performance report as required under Condition 12(4) of the Industrial Sewage Works ECA.

1.2 Site Location

The Site is located at 160 Brooks Road in Haldimand, Ontario, approximately 1 kilometre (km) north of Kings Highway No. 3 (Talbot Road). The Site is legally described as Part of Lot 24, Concession I-N.T.R., Haldimand County.

The total Site area is approximately 14.3 hectares (ha) (35.3 acres) of which 6 ha (15 acres) is approved for landfilling. The regional Site location is presented on Figure 1.1. The local Site setting is presented on Figure 1.2. Copies of the legal surveys for the Site are provided in Appendix A.

The Site is bounded to the north by a rural property consisting of undeveloped fields (i.e., long-term inactive agricultural crop production lands) and forested areas. To the south and east of the Site is undeveloped rural property consisting of a combination of fields and forested areas. The Site is bounded to the west by Brooks Road. On the west side of Brooks Road is an undeveloped rural property which is characterized primarily by undeveloped fields with occasional bush lots.

1.3 Regulatory Approvals

The following lists the ECAs, including the ECA amendments issued for the Site.

– Landfill ECA A110302 was issued on October 7, 1980 and was most recently amended on October 1, 2021.
– Industrial Sewage Works ECA 1122-BKUPSM was issued on February 3, 2020
– Air ECA 7323-C6EJUM was issued on September 24, 2021

Copies of the ECAs, and associated amendments, are included in Appendix B.

An Environmental Assessment (EA) for a 400,000 m^3 vertical expansion was submitted on February 10, 2017. The EA was subject to a seven-week public and agency comment period, followed by a Ministry review and a public inspection of the Ministry Review, which concluded in August 2017. The Notice of Approval to Proceed with the Undertaking - EA Reference Number 13004 and EA File Number 03-08-02 (Notice of Approval) was signed by the Minister of the Environment, Conservation and Parks on January 15, 2019, was approved by cabinet on February 14, 2019, and received by BRE on March 13, 2019.

In April 2019, an ECA amendment application was submitted to the MECP for Landfill ECA A110302 to implement the vertical expansion. On March 27, 2020 the Landfill ECA was amended, resulting in Landfill ECA A110302. The environmental monitoring program for landfill gas (LFG), groundwater, surface water, and leachate were also updated in the amended Landfill ECA.

In September 2019, an ECA amendment application was submitted to the MECP to amend the Industrial Sewage Works ECA to increase the on-Site treatment rate, increase the treated effluent discharge rate and to operate the treatment system on a continual discharge basis. On February 3, 2020, the Industrial Sewage Works ECA was amended, resulting in Industrial Sewage ECA 1122-BKUPSM.

In June 2021, an ECA amendment application was submitted to the MECP to amend the Waste ECA to increase the annual waste fill rate to 250,000 tonnes per year. On October 1, 2021, the Waste ECA was amended. The Air ECA was also amended based on this submission, resulting in the new Air ECA 7323-C6EJUM.

Future Site development, operation and environmental monitoring activities will be carried out in accordance with the amended Landfill ECA and amended Industrial Sewage ECA.

1.4 Purpose and Organization of Report

The 2021 O&M Report has been prepared to satisfy the requirements of Condition 12(6) and 12(7) of the Landfill ECA and Condition 12(4) of the Industrial Sewage Works ECA. The purpose of the 2021 O&M Report is to present, interpret, and evaluate the development, operation, and monitoring of the Site during the 2021 reporting period. This report covers the monitoring period from January 1, 2021 to December 31, 2021.

The O&M Report is organized into the following sections:

– Section 1 Introduction
– Section 2 Background
– Section 3 Site Setting
– Section 4 Environmental Monitoring Program
– Section 5 2021 Monitoring Program Results
– Section 6 Groundwater and Surface Water Compliance Assessment
– Section 7 Site Operations and Development
– Section 8 Financial Assurance
– Section 9 ECA Compliance Status
– Section 10 Annual Monitoring Report Completion Checklist
– Section 11 Conclusions
– Section 12 Recommendations
– Section 13 References

2. Background

2.1 Site History

Based on the information provided in the original 1971 application, the Site was approved under a Provisional Certificate of Approval (now called ECA) as a 15-acre (6.07 ha) landfill site with a daily fill rate of 10 tons (9.07 tonnes). The approved waste composition was 95 percent domestic (solid); 2 percent industrial (solid); 2.75 percent agricultural (solid); and 0.25 percent sewage sludge from the Caledonia Sewage Treatment Plant. The service area for the Site included the Province of Ontario.

Waste from various municipalities in the vicinity of the Site continued to be disposed at the Site on an ongoing basis from 1959 until 1977. After 1977, waste disposal activities were carried out on an intermittent basis. During the above period, waste disposed at the Site was placed in unlined trenches excavated into the native silty soils within the Site. After filling the trenches, waste was disposed directly on the ground surface and covered with a layer of the native soil. The waste stream included metal drums containing resin which have also been disposed at the Site. The area where historic waste was disposed at the Site is referred to as the original landfill area (OLA).

Redevelopment of the landfill commenced with the construction of the Stage 1 engineered landfill cell and decommissioning and cleanup of the OLA. Decommissioning of the OLA commenced on September 4, 2012 and was completed on August 21, 2013 and satisfied Condition 30 of the Landfill ECA No. A110302 Notice 2. A total of 60,204 m^3 of non-hazardous solid waste and impacted soil was excavated from the OLA and transported to the newly constructed Stage 1 landfill cell for disposal. A total of 146.2 metric tons of non-hazardous solid waste, and 47.17 metric tons of suspect hazardous solid waste was excavated and transported off Site for disposal. A total of five over-packed drums of solid non-hazardous waste were transported off Site for disposal. A total of 27,680 litres of liquid hazardous waste was pumped from the OLA and transported off Site for disposal.

The redevelopment of the Site included the construction of new lined landfill cells as follows:

– Stage 1 was completed in 2007
– Stage 2A was completed in 2013
– Stage 2B/3A was completed in 2013
– Stage 3B was completed in 2015

A storm water management system and on-Site leachate treatment system (LTS) have been established on Site. Clean storm water and treated effluent discharge to the Brooks Road roadside ditch and are regulated by ECA No. 1122-BKUPSM.

3. Site Setting

The geographic, geologic, and hydrogeologic framework for the Site and surrounding area have been previously described in a report entitled “Hydrogeologic Performance Assessment” dated October 2002, prepared by GHD. The previously reported information regarding the Site setting is summarized in the following sections.

3.1 Site Topography and Drainage

The Site is located within the Haldimand Clay Plain, which is characterized by level topography and relatively poor drainage. The stormwater management facility currently consists of the surface water management system (SWMS) Pond. The function of the stormwater management system is to capture stormwater runoff from capped portions of the landfill and direct the stormwater to the SWMS Pond by way of perimeter ditching. Stormwater that has contact with waste (i.e., non-capped areas of the landfill) is directed to the leachate collection system within the landfill cell. The SWMS Pond operates as a continuously open pond with an outlet control structure. The SWMS Pond is presented on Figure 2.1, 2022 Existing Conditions.

The roadside ditch along the east side of Brooks Road adjacent to the Site drains south through a culvert under the abandoned railway corridor and empties into a small, natural stream channel which is part of the head waters of Norton Creek. Other drainage from adjacent lands to the west of Brooks Road also flows in culverts under Brooks Road to provide surface runoff to Norton Creek. Other surface runoff contributions include ephemeral streams on lands south of the Site that enter Norton Creek via culverts under the abandoned railway corridor.

3.2 Site Geology

The overburden geology is relatively uniform beneath the Site. In general, the Site is characterized by a thick (14 to 18 m) glaciolacustrine layer of stratified silty clay, silty clay till and varved clays, underlain by a thin (1 to 3 m) discontinuous layer of silty sand till with varying concentrations of gravel and clay. The bedrock is encountered at depths varying from 15.2 to 20.2 m BGS. A thin surficial deposit of topsoil is generally observed at the surface of the Site, except for the southwestern portion, where refuse associated with historical waste disposal activities was observed.

The silty clay deposits are described as being locally fractured (weathered) from the surface down to depths varying from 3 to 5 m BGS, and are characterized as a very stiff to hard unit with low plasticity. At depths more than 5 m, the silty clay deposits have little to no fracturing and the consistency of the units decrease from stiff to very stiff.

Underlying the silty clay deposits, a thin discontinuous silty sand till with varying concentration of clay and gravel is encountered across the Site. The silty sand till ranges in thickness from 1 to 3 m and often contains cobbles and/or broken angular bedrock fragments. This deposit is usually well graded with fine to medium grained sand, minor silt and trace clay, and is described as dense to compact, grey, and saturated. The silty sand till is referred to as a basal till and exists directly over the bedrock.

Bedrock underlying the Site has been described as a fractured shale, dolostone and gypsum of the Salina Formation. The top of bedrock elevation ranges from 180.80 to 185.73 m above mean sea level (AMSL) and forms a small bedrock valley from northwest to southeast across the Site. The small depression is characterized by the thicker silty sand basal till deposit. Regionally, the bedrock topography dips to the south.

3.3 Site Hydrogeology

In general, the geologic units identified at the Site may be grouped into two main flow zones, as follows:

i) An unconfined water table (shallow overburden) unit within shallow fractured silty clay (weathered) unit

ii) A confined basal overburden/shallow bedrock aquifer

These two flow zones are separated by a thick (between 9 and 12 m) layer of stratified silty clay, silty clay till, and varved clays which form an aquitard of very low hydraulic conductivity. Groundwater level data historically gathered from the shallow overburden unit and basal overburden/shallow bedrock aquifer indicate that the presence of the clay aquitard results in hydraulic separation of the two units. A hydraulic head difference varying from 9.5 to 15 m has been historically measured at the location of nested wells.

Based on the groundwater data historically obtained, the unconfined water table unit is generally encountered at depths varying from 0.5 to 4.0 m BGS across the Site. The groundwater flow within the unconfined water table unit is essentially a perched water table resting on the impermeable un-weathered clay units. Based on the shallow overburden monitoring wells monitored in 2021, the groundwater flow in this unit is generally towards the south.

Underlying the silty clay aquitard, a confined basal overburden/shallow bedrock aquifer was observed within the lower portion of the silty sand till unit and the upper fractured bedrock. Groundwater quality and water level data historically gathered from monitoring wells screened within the lower silty sand till unit exhibited similar hydrochemical characteristics which are not substantially different from samples obtained from well nests screened solely within the bedrock. Therefore, these two geological units have been generally considered to form one aquifer.

Based on the groundwater data obtained to date, the basal overburden/shallow bedrock aquifer is generally encountered at depths varying from 14 to 17 m BGS. The groundwater flow pattern of this aquifer is generally characterized by a weak horizontal gradient and a southerly flow direction.

4. Environmental Monitoring Program

4.1 General

The environmental monitoring program developed for the Site is comprised of leachate, groundwater, surface water, and LFG monitoring, in accordance with the Landfill ECA. The surface water management system (SWMS) and leachate treatment system (LTS) monitoring are undertaken in accordance with the Industrial Sewage Works ECA. The various components of the Site monitoring program are summarized in the following sections. The analytical portion of the monitoring program for the current monitoring period was completed by ALS Canada Ltd. (ALS) of Waterloo, Ontario. ALS is registered with the Canadian Association for Environmental Analytical Laboratories (CAEAL).

4.1.1 Leachate Monitoring

The leachate monitoring program includes leachate level monitoring and leachate quality monitoring.

Leachate level monitoring is required to monitor leachate mounding in the landfill and leachate levels in the leachate collection system (LCS). Schedule B of the Landfill ECA requires monthly leachate level monitoring to be completed at leachate well LW1-17 and the inclined leachate collection sump riser pipe located on the southeast side of the landfill. LW1-17 was installed on October 10, 2017. A copy of the stratigraphy and well instrumentation log for LW1-17 is provided in Appendix C. Leachate level monitoring from the inclined leachate collection sump riser pipe is also required for determining compliance with the Leachate Removal Plan (LRP) and Condition 5 of the Landfill ECA.

Leachate quality monitoring as required by the Landfill ECA involved the collection of a leachate sample from the LCS on an annual basis (May). The leachate sample was analyzed for inorganic chemistry parameters, metals, PAH, and VOC parameters. Results from leachate sampling conducted as part of the Landfill ECA are presented in Table 5.3 and discussed in Section 5.2.

Leachate quality monitoring as required by the Industrial Sewage Works ECA involves collection of influent and effluent samples from the LTS. The LTS is operated by Clearford Waterworks Incorporated (CWI). Results from leachate sampling conducted as part of the Industrial Sewage ECA are discussed in Section 5.8.

4.1.2 Groundwater Monitoring

The groundwater monitoring program currently consists of both hydraulic monitoring and water quality monitoring at a network of 34 monitoring wells (26 on-Site and 8 off-Site wells), as listed in Table 4.1a. Groundwater quality parameters analyzed in during the current monitoring period are summarized in Table 5.2, and monitoring well stratigraphic and instrumentation logs, including monitoring well abandonment logs, are provided in Appendix C.

The locations of the on-Site and off-Site monitoring wells forming the current monitoring network are presented on Figure 2.1.

Hydraulic and groundwater quality monitoring are scheduled to take place in May and November, as indicated by the schedule set out in Table 4.1a.

The list of specific parameters analyzed for during the groundwater sampling events is provided in Table 5.2. Results of the groundwater monitoring are presented in Tables 5.4 through 5.6 and discussed in Section 5.4.

4.1.3 Surface Water Monitoring

As specified in the Landfill ECA, the current surface water monitoring program includes water quality monitoring and surface water flow measurements. The surface water monitoring network for the current monitoring period consisted of nine surface water monitoring stations (two on-Site and seven off-Site) as indicated on Figure 4.1. Surface sample collection is ideally only performed when flowing conditions are observed at each monitoring station; however, some

samples have been identified as being collected from stagnant (non-flowing) conditions. Furthermore, an attempt is made to collect surface water samples during precipitation events or shortly thereafter. The approximate locations of the surface water monitoring stations are presented in Figure 4.1. The following provides a brief description of each surface water monitoring station:

– SW1 is located at the culvert on the west-side of Brooks Road approximately 265 m north of the intersection of Brooks Road and the former railway crossing (north of the site).
– SW2 is located on Site and downstream of the outlet from the SWMS Pond.
– SW3 is located downstream of the southwest corner of the Site in the drainage ditch located on the east side of Brooks Road.
– SW4 is located at the upstream end at the double culvert beneath Highway No. 3, approximately 200 m east of the intersection of Brooks Road and Highway No. 3.
– SW5 is located in an existing pond located in the southeastern portion of the Site. This portion of the Site including the pond will be maintained “as is”, i.e., it will be excluded from the Site development activities.
– SW6 is located in an off-Site pond located approximately 30 m south of the Site. During heavy storm events and/or during spring snow melt, this pond may be hydraulically connected to the on-Site pond monitored at SW5.
– SW7 is located in an off-Site pond approximately 24 m south of the Site and approximately 130 m west of SW6 monitoring location. This pond does not appear to receive surface water run-off from the Site.
– SW8 is located in an off-Site pond approximately 230 m south of the Site and approximately 310 m east of Brooks Road. This pond is not hydraulically connected to the Site and, due to its distance from the Site and Brooks Road, water quality in this pond is considered as a background for assessing surface water quality on and around the Site.
– SW9 is located approximately 30 m north of the Site, and north of OW3A/B-13 in a low-lying wetland area.

Water quality monitoring and surface water flow measurements at all surface water stations is scheduled to take place on a quarterly basis in March, May, August, and November. An attempt is made to correlate the surface water monitoring with rainfall events. As such, the John C. Munro Hamilton International Airport in Mount Hope, ON (Hamilton Airport), located approximately 24 kilometres to the north, is often used to schedule surface water monitoring events. A chart of the surface water monitoring dates and daily precipitation, as recorded at the Hamilton Airport and accessed through Environment Canada for the current monitoring period, is presented on Figure 1.3.

The list of specific surface water parameters analyzed for during the current monitoring period is provided in Table 5.7. Results of the surface water monitoring are presented in Tables 5.8 and 5.9 and discussed in Section 5.5.

4.1.4 Landfill Gas Monitoring

LFG generation and subsequent subsurface migration can be the most significant potential risk associated with closed landfills. This risk is mitigated through LFG monitoring. LFG monitoring results provide important information on soil gas quality, subsurface gas movement, and can be used to characterize potential hazards. LFG is produced during the anaerobic digestion of organic matter in municipal solid waste and largely consists of carbon dioxide and methane gas. Methane is explosive within the range of 5 to 15 percent volume by volume (% v/v) at oxygen concentrations as low as approximately 12% v/v (Coward and Jones, 1950[1]). LFG is under positive pressure and has the ability to migrate in the subsurface from a landfill and accumulate in enclosed structures if sufficient barriers to prevent migration are not in place.

The LFG monitoring program includes monitoring gas probes for gas composition (methane, carbon dioxide, oxygen and balance gases), gas pressure, and water levels. The monitoring network currently consists of 12 gas probes installed in five on-Site locations. A brief description of the current LFG monitoring locations is provided below. A copy of the LFG probe construction details is provided in Appendix C.

[1] Coward, H.F. and Jones, G.W., *Limits of Flammability of Gases and Vapours,* 1950.

– GP-1A/B and GP-5 are located in the northwest corner of the Site. These locations are the closest to the nearest off-Site dwelling/structure, which is located approximately 300 m to the northwest of the gas probes.
– GP-2A/B are located between the west limit of waste and Brooks Road
– GP-3A/B and GP-6 are located in the vicinity of the on-Site office/maintenance building
– GP-4A/B and GP-7 are located adjacent to the SWMS pond and the leachate treatment facility effluent holding tanks
– GP-8 is located adjacent to the leachate treatment system

The LFG monitoring activities are to be conducted at the gas probes above on a monthly basis from December 1 through April 30 (i.e., during frozen ground conditions) and on a quarterly basis from May through November. LFG monitoring is a requirement as per Schedule B of ECA No. A110302, as amended.

Monitoring is completed using a uses a Landtec portable gas analyzer to measure the soil gas composition. The current Landtec model used is the Landtec GEM-5000, which has a ±0.3% v/v accuracy for measuring combustible gas (calibrated to a methane standard) for concentrations of 0 to 5% v/v [2]. As such, combustible gas measurements of 0.3% v/v or less are considered not detected in this assessment. Results of the LFG monitoring is presented in Table 5.9 and discussed in Section 5.7.

4.1.5 Industrial Sewage Works Monitoring and Reporting

During 2021, the industrial sewage works operated under the Industrial Sewage Works ECA No. 1122-BKUPSM, issued on February 3, 2020 for the SWMS and leachate collection, treatment, and disposal systems. The LTS was in operation during the current monitoring period. Leachate collected from the LCS was pumped to above-ground storage tanks for treatment in the LTS.

Leachate sampling was conducted in accordance with the Industrial Sewage Works ECA as described in Section 4.1.1.

Surface water samples are collected from the SWMS Pond on a quarterly frequency (spring, summer, fall, and winter) and analyzed for a selected list of inorganic, metals, PAH, and VOC parameters, as indicated in the amended Industrial Sewage Works ECA.

4.1.6 Groundwater and Surface Water Sampling Protocols

The collection of groundwater and surface water samples are to follow standard sample collection protocols, which are designed to ensure that representative water quality samples are obtained. During monitoring events, field data information encompassing water levels, purging information, and field-measured parameters are recorded. A summary of the groundwater and surface water sampling protocols, which are to be followed during Site monitoring activities, is provided in Appendix D, along with the current monitoring program specifications.

4.1.7 Quality Assurance/Quality Control Program

A Quality Assurance/Quality Control (QA/QC) Program involving the collection and analysis of field duplicates and field blanks, as well as the evaluation of standard laboratory quality control samples and procedures, was conducted for all leachate, groundwater, and surface water samples collected by GHD during the current monitoring period. An analytical data assessment and validation report for the current reporting period is provided in Appendix E. All data generated from the current monitoring period are acceptable when used with the qualifications presented in Appendix E.

Groundwater and surface water quality samples collected by GHD personnel followed standard sample collection protocols. All groundwater wells were purged a total of three well volumes and then sampled, unless the well was purged dry, in which case the groundwater sample was collected the same day after allowing the well to recover for

[2] Landtec GEM5000 Operating Manual, Landtec North America Inc.

several hours or occasionally the following morning. All groundwater samples collected for metals parameters were field filtered using a disposable 0.45 micrometre (µm) in-line filter. The sampling protocols were designed to ensure that representative water quality samples were obtained. During the monitoring events, field notes including water level measurements, purging information, and field-measured parameters were collected.

Field QA/QC Program

As part of the field QA/QC program, field duplicate and field blank samples were collected and included for analysis.

Field duplicates were collected at a frequency of one per every ten samples collected. The QA/QC objective of these samples is to evaluate sampling variability and/or the precision of the analytical methods and procedures employed. Duplicate samples were obtained by simultaneously filling two sample containers in order to ensure the homogeneity of the samples. Duplicate samples are submitted as “blind” samples for analyses. In the event that duplicate samples had a high differential between results, a qualification of “J” - estimated concentration is applied to all detections, and “UJ” – estimated detection limit is applied to all non-detections.

One field blank per sampling event was also included as part of the field QA/QC program. The QA/QC objective of the field blank is to determine the existence and magnitude of contamination, if any, occurring in the field during sample handling and/or from ambient air conditions. Field blanks were prepared by filling a sample container with laboratory de-ionized water while in the field. The field blank was also submitted as a blind sample. According to United States Environmental Protection Agency (USEPA) guidelines, when target analytes are detected within the field blank, only analytical results that are greater than five times the level reported in the field blank are considered to be true positive detections. Affected results are qualified as “U” – not detected above sample quantitation limit (SQL). In essence, these guidelines correct for contributory influences not reflected in the limitations of the analytical method, and the SQL is the true confidence threshold. Analytes detected at levels below the SQL are not regarded as being true positive detections, and thus are qualified.

Laboratory QA/QC Program

As part of the laboratory QA/QC program, laboratory duplicates, laboratory blanks, and a laboratory check sample were included for analysis. Laboratory sample holding times were also reviewed.

The allowable holding time of a sample is the maximum time, at sample collection, which can be allowed to elapse before extracting and/or analyzing a sample. By comparing the collection dates of all samples with the reported date of extraction and analysis, the actual holding time is determined and compared to the allowable holding time for each analyte. If samples are not extracted or analyzed within the allowable holding time, a qualification of “J” – estimated concentration is applied to all detections, and “UJ” – estimated detection limit is applied to all non-detections.

Laboratory duplicates consist of laboratory prepared duplicates of field samples. The duplicates are prepared by subdividing a homogeneous field sample into two individual samples for analysis. The QA/QC objective of laboratory duplicates is to check the precision of the laboratory analytical methods employed. Laboratory duplicate qualifications are similar to field duplicate qualifications.

A laboratory blank was prepared by the analytical laboratory on the day of investigative sample analyses and consists of de-ionized water. The QA/QC objective of the laboratory blank is to determine the existence and magnitude of contamination, if any, occurring within the laboratory. Laboratory blank qualifications are similar to field blank qualifications.

Laboratory check samples are prepared by the analytical laboratory by adding a known concentration of a compound to the investigative sample and analyzing the sample for that known compound. The results are compared to established control limits. The QA/QC objective of laboratory check samples is to check the precision of the laboratory analytical methods employed. Laboratory check sample qualifications are similar to holding time qualifications.

5. 2021 Monitoring Program Results

5.1 General

Monitoring of leachate, groundwater, surface water, and LFG was completed during the current monitoring period in accordance with the requirements of the Landfill ECA and Industrial Sewage Works ECA.

The leachate monitoring activities consisted of measuring leachate levels monthly and collecting a leachate sample in May.

The groundwater monitoring activities consisted of measuring water levels and collecting samples from on-Site and off-Site monitoring wells in June and November.

The surface water monitoring consisted of collecting flow measurements and samples from on-Site and off-Site locations in March, June, August, and November.

During the current monitoring period, several water samples were not collected from the following groundwater monitoring wells and surface water monitoring locations for the stated reasons:

Monitoring Location	2021 Monitoring Event	Comment
MW1S-07	November	Blocked
MW4A-09	November	Dry
MW5A-09	November	Not monitored
MW5B-09	November	Not monitored
SW1	June	Dry
SW2	June	Dry
SW3	August and November	Dry
SW4	June	Dry
SW5	June	Dry
SW8	June, August, and November	Dry
SW9	June	Dry

The SWMS Pond was sampled four times in 2021 (March, June, August, and November).

LFG monitoring consisted of collecting gas readings from the LFG probes in January, February, March, April, July, September, and December.

It is noted select sample results for the groundwater, surface water, and leachate sampling for June 2021 sampling event (June 1 through 3, 2021) had to be “qualified” due to the loss of a portion of the field collection records. In the absence of the field documentation, the laboratory results for the June groundwater, surface water, and leachate sampling event were evaluated and assigned to their most likely sampling location (when sample location could not be determined by the sample identification) based on the typical sampling location collection sequence conducted by the Technician, and on a comparison with historical results at each location. The results from these events are noted as being “qualified” on the referenced summary tables by modify with the addition of “**” at the end and of, and underlining, the select sample identification. Additionally, groundwater elevations could not be calculated for the select monitoring wells (MW1A-13, MW1D/S-07, MW5A/B-09, MW6A/B-07, OW3A/B-13, OW8A/B-06, OW8D/S-07, MW10A/B-18. MW11A/B-19, and MW12A/B-19) and were designated with data not available “DNA” where field records were missing.

5.2 Leachate Monitoring

Leachate generated from within the waste cell is conveyed into the LCS and flows by gravity to a sump located in the southeast corner of the landfill base. The leachate is pumped from the sump to an above-ground storage tank for on-Site treatment and/or off-Site disposal.

5.2.1 Leachate Level

Leachate level monitoring at LW1-17 and the transducer installed in the leachate collection system sump was completed by GHD on a monthly basis as summarized below.

Monitoring Date	Leachate Elevation Recorded at LW1-17 (m AMSL)	Leachate Elevation Recorded in the Sump (m AMSL)
January	197.64	196.06
February	197.53	195.19
March	197.53	194.39
April	197.43	194.77
May	197.25	194.35
June	197.35	193.79
July	197.24	196.18
August	197.31	195.55
September	197.25	197.07
October	197.44	197.32
November	198.19	197.39
December	198.22	196.94

The leachate level measurements from the transducer in the leachate collection system sump show reduction in leachate elevation until July 2021 as a result of leachate removal activities. Leachate levels continued to increase from July to December 2021. The leachate elevation measured in leachate well LW1-17 also shows some reduction as a result of leachate removal activities in September 2021, but increased from October to December 2021. The elevation reduction observed in LW1-17 is muted and delayed compared to the elevation reduction observed in the leachate collection sump. This is due to the complicated material properties of the waste mound and the effect of pore pressures which is expected when comparing a monitoring location within the waste mound to a monitoring location within the leachate collection system. The results of leachate monitoring activities indicate that the leachate collection system continues to function as designed.

Leachate levels are further discussed in Section 7.1.7.

5.2.2 Leachate Quality

Leachate quality is monitored to characterize leachate source contaminants and concentrations. Understanding the characteristics of leachate is important for identifying potential leachate impacts to groundwater outside the waste footprint, as well as to surface water. Leachate samples are analyzed for general chemistry, metals, PAH, and VOCs on an annual basis. The 2021 leachate sample results are presented below.

Leachate samples collected from the LCS in accordance with the Landfill ECA were collected on June 3, 2021. Sample results are provided in Table 5.3. The following table summarizes select leachate parameters in comparison to historical concentration ranges and the ODWS where applicable:

Parameters	Units	2021 Results	Historical (2011-2021) Concentration Range	Comparative ODWS
Alkalinity	mg/L	820	820 – 3,700	30 – 500 (OG)
Chloride	mg/L	1,130	555 – 1,440	250 (AO)
DOC	mg/L	188	15.6 – 767	5 (AO)
Hardness	mg/L	1,640	1,560 – 2,310	80 – 100 (OG)
Sulphate	mg/L	287	26 – 1,490	500 (AO)
TDS	mg/L	4,120	2,980 – 5,800	500 (AO)
Aluminum	mg/L	<0.50	0.063 – 1.69	0.1 (OG)
Arsenic	mg/L	0.030	0.030 – 69	0.010 (MAC)
Boron	mg/L	10.0	4.97 – 16.1	5.0 (IMAC)
Chromium	mg/L	<0.050	0.016 – 0.058	0.050 (MAC)
Iron	mg/L	<1.0	<0.10 – 7.51	0.30 (AO)
Lead	mg/L	<0.0050	<0.00050 – 0.0088	0.01 (MAC)
Manganese	mg/L	--	0.249 – 3.04	0.05 (AO)
Sodium	mg/L	716	255 – 843	200 (AO)
Benzene	µg/L	3.40	<0.8 – 4.3	1 (MAC)
Ethylbenzene	µg/L	8.31	<1.00 – 11.5	2.4 (AO) / 140 (MAC)
Toluene	µg/L	1.06	1.06 – 41	60 (AO)
Benzo(a)pyrene	µg/L	<0.010	<0.010 – 0.085	0.01 (MAC)
Naphthalene	µg/L	8.12	2.1 – 11	--
Phenanthrene	µg/L	0.411	0.217 – 4	--
Notes: '--' indicates that no information available				

In general, the landfill leachate is characterized by elevated conductivity, alkalinity, chloride, DOC, hardness, phenolics, phosphorus, TDS, arsenic, boron, and iron. For the purposes of the Site groundwater assessment, alkalinity, boron, chloride, DOC, hardness, sodium and TDS have been selected as appropriate leachate indicator parameters. The concentration patterns of these parameters as they compare to leachate and background groundwater quality will be used as the principal means of identifying the presence and magnitude of leachate impacts within groundwater.

The following VOC parameters were detected in the landfill leachate during 2021: benzene, cis-1,2-dichloroethene, ethylbenzene, xylenes (m&p, o), and toluene. The following PAH parameters were detected in the landfill leachate during 2021: 1-Methylnaphthalene/2-Methylnaphthalene, acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene. The presence of these parameters in leachate quality may be used in identifying potential leachate impacts to groundwater in conjunction with the leachate indicator parameters identified above.

5.3 Groundwater Elevations

The groundwater elevation monitoring was conducted in accordance with the current monitoring program discussed in Section 4.1.1. A summary of groundwater elevations (2017 – present) is provided in Table 5.1. Hydrographs covering the period 2004 - 2021 are presented in Appendix F.

The results of the hydraulic monitoring program were utilized to interpret the groundwater flow patterns within the shallow overburden, basal overburden/shallow bedrock, and the bedrock hydrogeologic units at the Site. The results of the hydraulic monitoring and groundwater flow assessment are presented below.

5.3.1 Shallow Overburden Unit

Based upon the groundwater elevation data obtained for the current monitoring period, and consistent with historical levels, the shallow overburden unit is generally encountered at depths varying from approximately 0.4 to 5.8 m below ground surface (BGS). During the current monitoring period, the flow direction of the groundwater in the shallow overburden unit was interpreted to flow to the south in November 2021.

Due to the limited data set in June 2021, groundwater elevations contours were not generated. Groundwater elevations for June 2021 were within the historical seasonal range and have historically been interpreted to flow to the south.

The current results are generally consistent with historical results where the shallow overburden unit has been interpreted to flow generally in a southerly direction. Consistent with historical results, the average horizontal gradient was 0.003 m/m during the current monitoring period.

It is noted that the following deviations to the shallow overburden unit groundwater flow contour patterns were observed for November 2021:

– Monitoring wells MW1-03, MW2-03, and MW3-03 are all installed at a similar depth (5.8 m BGS) in close proximity to one another. However, the groundwater elevations between each of these monitoring wells generally vary slightly (up to 0.26 m in June and 0.24 m in November). MW1-03 is more consistent with general shallow overburden flow patterns and as such was selected for generating groundwater contours in November 2021 while MW2-03 and MW3-03 have not been used. There have been no deficiencies observed at either MW2-03 or MW3-03 and so the variation in groundwater elevation at MW2-03 and MW3-03 is likely influenced by local recharge to the shallow water table.
– Groundwater elevations for monitoring wells OW9B-06, MW2B-07, MW10B-18, and MW12-19 were identified at elevations lower than the surrounding wells. MW2B-07 and MW12-19 are typically dry or generally lower than the surrounding monitoring wells. Historical groundwater elevations at MW10B-18 have historically been lower then surrounding monitoring wells but are generally increasing with each monitoring event. The lower groundwater elevation at MW10B-19 is likely contributed to very slow groundwater recharge. OW9B-06 was approximately 1.0 m lower then typically observed and is likely anomalous.

The shallow overburden groundwater elevations and/or flow directions for the current monitoring period are presented in Figures 5.1 and 5.2 with the noted qualifications outlined above.

Hydrographs of shallow overburden groundwater elevations versus time are provided in Appendix F.

5.3.2 Basal Overburden/Shallow Bedrock Unit

Based upon groundwater level data obtained for the current monitoring period, the groundwater level in the basal overburden/shallow bedrock unit is encountered at depths varying from 14.44 to 18.85 m BGS. An average horizontal gradient of 0.0017 m/m was calculated for the on-Site basal overburden/shallow bedrock unit. Due to the flat horizontal gradient, groundwater flow pattern contours were not generated. Historical interpretations have indicated that groundwater generally flows towards the south.

The basal overburden/shallow bedrock groundwater elevations for the current monitoring period are presented on Figures 5.3 and 5.4.

Vertical groundwater hydraulic gradients have been downward during the current and historical monitoring periods as interpreted between the nested shallow overburden and basal overburden/shallow bedrock monitoring wells. The 2021 vertical hydraulic gradient averaged +1.05 m/m, which is consistent with historical gradients.

Hydrographs of basal overburden/shallow bedrock groundwater elevations versus time are provided in Appendix F.

5.3.3 Bedrock Unit

The bedrock monitoring is comprised of intermediate and deep bedrock monitoring wells screened in the same bedrock formation as the basal overburden/shallow bedrock monitoring wells. The intermediate bedrock monitoring wells at the Site are screened between 3.6 to 7.9 m below the top of bedrock, while the deeper bedrock monitoring wells are screened between 9.4 to 14.4 m below the top of bedrock. Discounting OW8D-07, during the current monitoring period, the intermediate and deep bedrock groundwater elevations ranged from 183.98 to 184.13 m AMSL with a very flat horizontal gradient, which is consistent with historical measurements.

The bedrock groundwater elevations for the current monitoring period are presented on Figures 5.5 and 5.6, respectively. Hydrographs of bedrock groundwater elevations versus time are provided in Appendix F.

Detailed information regarding the Bedrock Unit is referenced in the Gypsum Mine Investigation Report, prepared by GHD, and dated May 2016.

5.4 Groundwater Quality

The groundwater quality monitoring program for the current monitoring period was performed by GHD. A sample key for the groundwater samples collected and analyzed during the current monitoring period is presented in Table 5.2 and the groundwater quality results for the reporting period are provided in Tables 5.4, 5.5 and 5.6 for the shallow overburden, basal overburden/shallow bedrock, and bedrock wells respectively.

Although not a requirement for Site compliance, the discussion of water quality includes an evaluation of analytical results against the criteria listed in the Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, published by the MECP in June 2003, and revised in June 2006 (ODWS). The ODWS includes operational guidelines (OG), aesthetic objectives (AO), maximum acceptable concentrations (MAC), and interim maximum acceptable concentrations (IMAC) are used. Where an ODWS criterion was not available, criteria has been used from Table 2 of the *Soil, Ground Water and Sediment Standards for Use Under part XV.1 of the Environmental Protection Act*, dated April 15, 2011. This evaluation is provided for information and comparative purposes only.

Groundwater quality at the Site is assessed in terms of the presence and magnitude of potential effects from landfilling on groundwater quality primarily through examining the spatial and temporal patterns in leachate indicator parameter concentrations. For the purposes of the Site groundwater, alkalinity, boron, chloride, DOC, hardness, sodium and TDS have been selected as appropriate leachate indicator parameters (identified in Section 5.2.2.). To aid in the assessment, concentration versus time plots of these parameters for each groundwater monitoring well are provided in Appendix G-2.

It is noted that a portion of the sample results for the June 2022 sampling event (June 1 through 3, 2021) had to be “qualified” due to the loss of the field collection records. In the absence of the field documentation, the laboratory results for the June groundwater sampling event was evaluated and assigned to their “most likely” sampling location (when sample location could not be determined by the sample ID) based on the typical sampling location collection sequence conducted by the Technician, and on a comparison with historical results at each location. The results from these events are noted as being “qualified” on the referenced summary tables utilizing underlining and the addition of “**” at the end of the sample ID.

An assessment of the groundwater quality relative to the Reasonable Use Criteria (RUC) at boundary monitoring wells is discussed in Section 6.1 and presented in Tables 6.1 to 6.4.

5.4.1 Shallow Overburden Unit

The shallow overburden unit is assessed using groundwater quality data collected from ten on-Site (MW1B-13, MW2B-07, OW1B-06, OW3B-13, OW5B-06, OW8B-06, OW9B-06, MW10B-18, MW11B-19, MW12B-19) and two off-Site (MW5B-09, MW6B-07) shallow overburden wells. As previously indicated monitoring well MW2B-07 was noted

as dry during the May and November monitoring events, and MW5B-09 and MW12B-19 were noted as dry during the November monitoring event.

Monitoring wells MW1B-13, OW3B-13 and OW9B-06 are located upgradient relative to the landfill. Accordingly, water quality from these locations is interpreted to represent water quality flowing on-Site from upgradient. As OW3B-13 is located further from the landfill footprint than OW9B-06 and further from Brooks Road than MW1B-13, OW3B-13 represents the most conservative upgradient location. As such, the water quality data from this well has been included on the concentration versus time plots in Appendix G-2 so that comparison of water quality at each location to OW3B-13 can be made.

General Chemistry and Metals analytical results are summarized in Table 5.4A. Organics (VOCs and PAHs) results are summarized in Table 5.4B. Historical data is provided in Appendix G-1.

The following paragraphs describe the observations of shallow overburden water quality during the current monitoring period.

North Side of Landfill (Upgradient)

Water quality at MW1B-13 is generally similar to that observed at OW3B-13, however concentrations of chloride, sodium and TDS continue to be higher at this location. The proximity of this well to Brooks Road is interpreted to be the reason for these elevated parameters as road salt application on Brooks Road is a source of these parameters, particularly in shallow groundwater. Hardness is also elevated at MW1B-13 but with low concentrations of alkalinity, boron, and DOC, this is not interpreted to be related to the landfill.

Water quality at OW9B-06 is generally similar to that at OW3B-13, although concentrations of sodium and chloride are slightly elevated. Concentrations of sodium and chloride have been slowly increasing at this location since 2010 but have been generally stable or decreasing since 2019. The well is located in close proximity to the landfill; however, the water quality results do not suggest significant impairment of shallow groundwater at this location as the remainder of indicator parameters are at or not significantly elevated over background levels. Concentrations of alkalinity are slightly elevated over levels reported at OW3B-13 however alkalinity levels have remained relatively stable suggesting that the landfill is not the source of the slightly elevated alkalinity or increasing chloride observed. In addition, alkalinity concentrations are similar to those reported at historical background monitoring well OW1B-07.

Sulphate concentrations at MW1B-13 are elevated. Historically, sulphate has been frequently reported in samples from this well at concentrations greater than 1,000 mg/L. Similar sulphate levels have also been reported at OW9B-06. The absence of other leachate indicator parameters suggest that these levels are naturally occurring. Elevated sulphate levels are also observed within shallow overburden groundwater elsewhere on the Site. The source of the sulphate concentrations is suspected to be the influence of basal overburden/shallow bedrock flow zone water quality, as this flow zone frequently exhibits sulphate concentrations greater than 4,000 mg/L at the nested basal overburden/shallow bedrock monitoring well MW1A-13. Sulphate concentrations in the basal overburden/shallow bedrock unit are greater than 2,000 mg/L at most monitoring locations.

East Side of Landfill

MW2B-07 is a shallow overburden groundwater monitoring well located along the east side of the landfill. MW2B-07 was dry in November 2021.

Water quality at MW2B-07 shows evidence of influence from landfilling with slightly elevated concentrations of chloride, sodium, hardness and TDS. There is some evidence of a trend of increases in these parameter concentrations during recent monitoring events. Continued monitoring will provide additional insight into this potential trend.

Elevated naturally occurring concentrations of sulphate at this location represents substantial proportions of the elevated TDS reported.

West Side of Landfill

Monitoring wells MW1-03, MW2-03, MW3-03 and MW10B-18 are shallow overburden groundwater monitoring wells located to the west of the landfill. These monitoring wells are located in close proximity to Brooks Road. Since the beginning of 2019, MW1-03, MW2-03, and MW3-03 have been included in the monitoring program for hydraulic monitoring purposes only.

As illustrated on the concentration versus time plots included in Appendix G-2, water quality at MW1-03, MW2-03 and MW3-03 has not been assessed since fall 2018. Groundwater quality at these wells is similar to background water quality other than trends of increasing sodium, chloride and TDS. The source of these increases is interpreted to be road salt application along Brooks Road. This is consistent with previous interpretations.

Water quality at MW10B-18 is also essentially at background levels, except for chloride concentrations. In the absence of other indicators of landfill-related impacts, the mildly elevated chloride concentrations are not interpreted to be landfill-related.

South Side of Landfill

Monitoring well OW5B-06 is located to the south of the landfill approximately 80 m from the landfill footprint and 50 m upgradient of the south Site boundary. Water quality at OW5B-06 was historically consistent with background water quality, however trends of increases in chloride, sodium, hardness, TDS and to a lesser extent boron, were observed between 2013 and 2016. Since 2016 water quality has demonstrated decreasing trends in these parameters. The source of these trends in water quality is not known at this time. It should be noted that elevated concentrations of sulphate at this location represent a substantial proportion of the TDS concentrations reported.

Considering the improvements in water quality at this location during recent monitoring years, it is recommended that monitoring continue, and future reports consider the historical context of trends in water quality at this location. A discussion of the geochemical characteristics of water quality at select monitoring wells is provided under *Geochemical Fingerprint – Piper Diagram*, below.

Water quality at OW1B-06 is similar to background levels, however, increases in chloride concentrations have been observed between 2014 and 2016. This pattern is similar to that observed at OW5B-06, located to the east of OW1B-06. Hardness, sodium and to a lesser extent TDS, are slightly elevated above background levels. Elevated sulphate concentrations contribute to the elevated TDS concentrations reported.

Water quality at OW8B-06 is similar to background water quality, with slightly elevated chloride, sodium and TDS. This monitoring well is located in close proximity to Brooks Road and road salt is likely a source of these parameters at this monitoring well. Boron concentrations are slightly elevated over background levels. Other leachate indicator parameters are at or near background levels. In May 2020, chloride, sodium, and TDS increased sharply (particularly chloride). The concentrations of these parameters have decreased since May 2021 but remain elevated above historical concentrations. The sudden increase may indicate well integrity issues. The well seal should be inspected thoroughly during the spring 2022 monitoring event.

Monitoring wells MW11B-19 and MW12B-19 were installed in proximity to the south Site boundary in 2019 and therefore have limited groundwater results. Water quality at MW11B-19 shows evidence of influence from landfilling with slightly elevated but stable concentrations of alkalinity, boron, hardness, and TDS. Sodium concentrations are elevated above OW3B-13 background concentrations and are increasing.

Water quality at MW12B-19 shows evidence of influence from landfilling with slightly elevated but stable concentration of alkalinity, boron, hardness, sodium and TDS.

Sulphate concentrations are elevated at both monitoring wells MW11B-19 and MW12B-19, suggesting that water quality at these locations is naturally poor, contributing to the elevated TDS concentrations reported.

Organics

In June 2021, PAH detections were identified from samples collected from shallow monitoring wells MW2B-07, MW5B-09, OW3B-13, OW8B-06 for parameters including: 1-Methylnaphthalene/2-Methylnaphthalene,

Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene/Benzo(j)fluoranthene, Benzo(k)fluoranthene, Chrysene, Fluoranthene, Phenanthrene, and Pyrene. Benzo(a)pyrene concentrations at MW2B-07 (0.022 µg/L) and OW8B-06 (0.057 µg/L), located to the east and south of the landfill, respectively, were identified above the ODWS of 0.01 µg/L for the June 2021 samples. Benzo(a)pyrene has historically been detected above the ODWS at these locations. No other exceedances of PAHs were identified.

In May 2020, chloroform was detected at MW11B-19 (2.7 µg/L) above the ODWS of 2.4 µg/L. Concentrations in June 2021 decreased and were detected at 1.4 µg/L. There were no other detections of VOCs reported in any samples from 2021. PAH and VOC parameter concentrations at shallow overburden unit monitoring wells are presented in Table 5.4B.

Geochemical Fingerprint – Piper Diagram

In order to supplement the evaluation of potential landfill-related impacts to shallow overburden groundwater quality, an analysis of the geochemical “fingerprints” of shallow groundwater quality and leachate was undertaken. This analysis was accomplished through plotting major anion and cation on a Piper diagram for the June 2021 shallow overburden unit groundwater chemistry (Figure 5.7). A Piper diagram presents the major ions as percentages and is used to determine patterns in the geochemical character of water samples. Cations (positive ions) and anions (negative ions) are potted in two triangles at the base of the diagram. The compositions from the base triangles are then projected up to the central diamond. This central diamond therefore presents the data from all of the major ions on a single plot. On a Piper diagram, samples with similar geochemical character will plot relatively close to one another. Because the major ions are used, a Piper diagram is useful for detecting large differences in the geochemical characteristics between water samples. Data on the central diamond presents a line of evidence that assists in interpreting the likelihood of a monitoring location being affected by landfill-derived impacts. The likelihood of impacts can be gauged by the monitoring well’s proximity to leachate and other locations showing definite leachate-derived impacts. The following shallow overburden monitoring wells are used to plot the Piper diagram: MW1B-13, OW3B-13, OW9B-06, MW2B-07, MW10B-18, OW8B-06, OW1B-06, OW5B-06, MW11B-19, and MW6B-07.

The Piper diagram demonstrates that the pattern of major ions associated with the leachate chemistry is different from the pattern of major ions observed in shallow overburden monitoring wells. It is important to note that OW5B-06 (located immediately downgradient of the landfill footprint) plots far away from the leachate source. This pattern indicates that the elevated concentrations of analytes within groundwater, including OW5B-06, are not likely attributable to leachate migration beyond the landfill footprint. This finding is further substantiated with the apparent immobility of groundwater chemistry in the shallow overburden groundwater, as historically observed around the decommissioned OLA.

5.4.2 Basal Overburden/Shallow Bedrock Unit

The basal overburden/shallow bedrock unit was assessed in 2021 based on groundwater monitoring data collected from ten basal overburden/shallow bedrock monitoring wells, as listed in Table 5.2. Of these monitoring wells, ten are located throughout the Site (MW1A-13, MW2A-01, OW1A-06, OW3A-13, OW5A-06, OW8A-06, OW9A-06, MW10A-18, MW11A-19, MW12A-19), and of the three off-Site basal overburden/shallow bedrock monitoring wells, two (MW5A-09, MW6A-07) are located approximately 150 m south of the Site, and one (MW4A-09) is located to the west of, and in close proximity to the OLA. Since the beginning of 2019, MW4A-09 has been included in the monitoring program for hydraulic monitoring purposes only. Off-Site groundwater monitoring of the basal overburden/shallow bedrock unit downgradient of the Site is currently monitored at MW5A-09 and MW6A-07.

General Chemistry and Metals analytical results are summarized in Table 5.5A. Organics (VOCs and PAHs) results are summarized in Table 5.5B. Historical data, including concentration versus time plots of landfill indicator parameters are provided in Appendix G.

5.4.2.1 On-Site Basal Overburden/Shallow Bedrock Monitoring

Monitoring wells MW1A-13, OW3A-13 and OW9A-06 are located upgradient relative to the landfill. Accordingly, water quality from these locations is interpreted to represent water quality flowing on-Site from upgradient. Water quality

data from OW3A-13 has been included on the concentration versus time plots in Appendix G-2 so that comparison of water quality at each location to OW3A-13 can be made.

It is noted that water quality within the basal overburden/shallow bedrock flow zone is generally poor, including at upgradient monitoring locations. Concentrations of alkalinity, sulphate, hardness and TDS are all naturally elevated, often well above their respective ODWS.

The following paragraphs describe the observations of basal overburden/shallow bedrock groundwater quality during the current monitoring period.

North Side of Landfill (Upgradient)

Water quality at upgradient monitoring wells MW1A-13, OW3A-13 and OW9A-06 is generally poor with elevated concentrations of alkalinity, sulphate, hardness and TDS. Water quality, though variable, is generally stable over time. Concentrations of chloride and sodium decreased significantly between 2013 and 2016 at MW1A-13.

East Side of Landfill

MW2A-01 is completed within the basal overburden/shallow bedrock flow zone along the east side of the landfill. Water quality at this location is similar to that observed upgradient of the landfill. There is no indication of landfill-related water quality alterations at this location.

West Side of Landfill

MW4A-09 and MW10A-18 are completed within the basal overburden/shallow bedrock flow zone along the west side of the landfill. Water quality at this MW4A-09, prior to 2019, is similar to that observed upgradient of the landfill. There is no indication of landfill-related water quality alterations at this location. This location is currently used for hydraulic monitoring purposes only.

Water quality at this MW10A-18 is similar to that observed upgradient of the landfill. There is no indication of landfill-related water quality alterations at MW10A-18.

South Side of Landfill

Monitoring wells OW1A-06, OW5A-06, OW8A-06, MW11A-19 and MW12A-19 are completed within the basal overburden/shallow bedrock flow zone to the south of the landfill. Water quality at OW1A-06, OW5A-06 and OW8A-06 continues to be similar to upgradient and demonstrates no evidence of impact from the landfill.

Monitoring wells MW11A-19 and MW12A-19 were installed in mid-2019 have been sampled five and four times, respectively. Sample results suggest water quality is similar to upgradient locations and unaffected by the landfill. The November 2020 results from MW11A-19 show elevated concentrations of alkalinity and DOC. In 2021, alkalinity and DOC were similar to background water quality indicating that the fall 2020 results are not consistent with the previous two samples and following two sampling events.

Organics

During the current monitoring period, for comparison and informational purposes, all VOC and PAH parameter concentrations at basal overburden/shallow bedrock monitoring locations were below their respective ODWS and Table 2 criteria as shown in Table 5.5B. In light of the general absence of evidence of landfill-related water quality impacts in this flow zone, the occasional low-level detections of VOCs or PAHs reported in these monitoring wells are not considered to be landfill-related.

5.4.2.2 Off-Site Basal Overburden/Shallow Bedrock Aquifer Monitoring

Basal overburden/shallow bedrock aquifer monitoring wells MW6A-07 and MW5A-09 were installed to monitor water quality downgradient of the Site. The 2021 monitoring results for general chemistry and metals are provided in Table 5.5A. During the current monitoring period, for comparison and informational purposes, all VOC and PAH parameter concentrations at off-Site basal overburden/shallow bedrock monitoring locations were below their

respective ODWS and Table 2 criteria as shown in Table 5.5B. Phenanthrene was detected in the groundwater at monitoring well MW5A-09 in May 2020 and June 2021. In light of the general absence of evidence of landfill-related water quality impacts in this flow zone, the occasional low-level detections of VOCs or PAHs reported in these monitoring wells are not interpreted to be landfill-related. Historical data, including concentration versus time plots for leachate indicator parameters, are provided in Appendix G.

In general, the results from these monitoring wells are consistent with current and historical observations obtained from on-Site basal overburden/shallow bedrock monitoring locations. The concentration versus time plots provided in Appendix G-2 illustrate that water quality at these monitoring locations is very similar to that observed upgradient of the landfill.

On the basis of the pattern in water quality observed at MW6A-07 and MW5A-09, there is no evidence of landfill-related water quality impacts in the basal overburden/shallow bedrock water quality off-Site.

5.4.3 Bedrock Unit Monitoring

The bedrock unit is monitored through groundwater monitoring data collected from six on-Site bedrock monitoring wells (MW1S-07, MW1D-07, MW2S-07, MW2D-07, OW8S-07, OW8D-07). The bedrock unit is divided into two hydraulic units (intermediate bedrock and deep bedrock). In general, the water quality in the bedrock units is poor and comparable to the basal overburden/shallow bedrock aquifer unit.

General Chemistry and Metals analytical results are summarized in Table 5.6A. Organics (VOCs and PAHs) results are summarized in Table 5.6B. Historical data, including concentration versus time plots of landfill indicator parameters are provided in Appendix G.

It should be noted that MW1S-07 was not sampled following the 2017 monitoring events due to excessive sediment infilling within the monitoring well. The source of the infilling is suspected to be re-grading undertaken around the well during 2018. Water quality results following the monitoring well repair in August 2019 are comparable with historic ranges.

Water quality in the bedrock unit is poor and is characterized by elevated concentrations of hardness, sulphate, TDS, boron, iron, and manganese. These parameters generally exceed their respective ODWS. Water quality is generally stable at each monitoring well, with the exception of some variability noted at monitoring well MW1D-07.

A comparison of nested wells illustrates that water quality in the deep and shallow well nests for are generally similar in quality for leachate indicator parameters for MW1D/S-07 and MW2D/S-07 well nests. Water quality from the deep bedrock location OW8D-07 is characterized by lower alkalinity and sodium, and higher boron and chloride compared to the other five bedrock monitoring wells locations.

Based on the pattern of leachate indicator parameter concentrations in the bedrock unit monitoring wells, there is no evidence of landfill-related water quality impacts in the bedrock unit.

Sample results from bedrock unit monitoring wells, in particular monitoring well MW1D-07 and MW1S-07, have historically reported low-level detections above the ODWS of various PAH parameters. In light of the absence of landfill-related impacts, and the multiple flow zones between this monitoring well and the landfill, the PAH detections are considered unrelated to the landfill.

5.5 Surface Water Quality

The 2021 surface water quality monitoring program was performed by GHD. A sample key of the surface water samples collected and analyzed is presented in Table 5.7 and a summary of the surface water quality results for the 2017 through 2021 monitoring periods is provided in Tables 5.8A and 5.8B. Assessment of the potential influence of leachate impacts on surface water quality is undertaken primarily through comparing the pattern of leachate indicator parameter concentrations at each monitoring station against the criteria listed in the Water Management Policies, Guidelines, Provincial Water Quality Objectives (PWQO), published by the MECP in July 1994, and reprinted February 1999 is also presented in this Section.

Historical surface water quality results are provided in AppendixG-1. Concentration versus time plots of leachate indicator parameters at each surface water monitoring station are included in Appendix G-2.

The surface water monitoring locations include three off-site background locations: SW1, SW8, and SW9. All three have been established to document the background water quality in the local ditches and ponds. The on-Site surface water monitoring locations include one pond (SW5) located in the southern portion of the Site and one on-Site surface water ditch (SW2) located at the discharge from the Site SWMS. Off-Site surface water monitoring locations include two ponds (SW6 and SW7) located to the south of the Site, one drainage ditch located immediately downstream of the Site discharge point (SW3), and one drainage ditch (SW4) situated approximately 1 kilometre (km) south and downstream of the Site. SW9 is located immediately north of the Site, north of OW3A/B-13.

Throughout the year, many of the surface water locations are generally dry or not flowing. In March 2021, SW4 was the only surface water location that had a sample collected from flowing conditions. The surface water monitoring locations sampled during the current monitoring period are presented on Figure 4.1. The following provides a summary of the surface water quality for the reporting period.

5.5.1 Background Surface Water Quality

The location of SW1 is west of Brooks Road, and approximately 300 m north of the Site, as presented on Figure 4.1.

The concentration versus time plots included in Appendix G-2 present the historical pattern in leachate indicator parameter concentrations at background monitoring stations SW1 and SW8. The concentration patterns demonstrate that leachate indicator parameters exhibit significant variability, which is likely attributable to seasonal effects and the sensitivity of surface water quality to precipitation and run-off.

Samples obtained from SW1 are used to assess the quality of the background surface water in the local ditches in the vicinity of the Site. The high variability in chloride, sodium, and TDS concentrations at SW1 is likely attributable to seasonal road salt application along Brooks Road.

SW8 is located in an off-Site pond approximately 230 m south of the Site and approximately 310 m east of Brooks Road. This pond is not hydraulically connected to the Site and, due to its distance from the Site and Brooks Road, the water quality in this pond is considered background for assessing surface water quality on and in the vicinity of the Site. Water quality at SW8 exhibits lower variability than that observed at SW1, particularly for chloride, sodium, and TDS. Due to the location of SW8, water quality at this station is not likely affected by road salt. A pattern of increases in DOC concentrations is apparent at SW8. The increase is not landfill related but may be related to a buildup of organic, plant, material in the pond.

SW9 was installed in May 2020. The analytical results at SW9 indicate variable water quality that has been influenced by turbidity, such as elevated alkalinity, hardness, and total dissolved solids. Additional data is required to comment on the usefulness of the additional surface water monitoring station.

During the current monitoring period, VOC and PAH parameter concentrations were not detected above laboratory reporting limits at background surface water monitoring locations.

The background surface water monitoring results collected from SW1 and SW8 during 2021 were generally consistent with historical results.

5.5.2 On-Site Surface Water Quality

SW5 is located on-Site in a low-lying area where ponded water is frequently observed. The concentration versus time plots included in Appendix G-2 illustrate that water quality at SW5 is largely similar to that observed at the background monitoring locations.

Water quality at SW5 is essentially within historical background levels with similar parameter concentration ranges and demonstrating a degree of variability. At SW5 the following parameters did not meet their respective PWQO during the current monitoring period: field measured dissolved oxygen, total phenolics, phosphorus, aluminum, chromium, and iron. SW5 has historically exhibited elevated concentrations of boron over background concentrations.

In general, concentrations of parameters detected at SW5 during the 2021 monitoring period were similar to those noted at background locations SW1 and SW8. With the exception of toluene in November, there were no VOC or PAH parameter concentrations detected above the laboratory method reporting limits at SW5 during the current monitoring period.

The surface water monitoring results collected from SW5 during 2021 were generally consistent with historical results.

5.5.3 Downstream Surface Water Quality

Downstream surface water quality is assessed at five monitoring stations (SW2, SW3, SW4, SW6, and SW7). SW2 is located at the point of discharge from the SWMS and an on-Site swale adjacent to the Site entrance to the off-Site ditch along Brooks Road. Two surface water monitoring stations (SW3 and SW4) are located within drainage ditches downgradient of the Site. SW3 is located immediately downstream near the southwest corner of the Site and SW4 is located approximately 1,040 m south of the southeast corner of the Site. Two off-Site areas of ponded water (SW6 and SW7) are included in the monitoring program. SW6 is located immediately to the south of SW5, and SW7 is located south of the west-half of the Site.

SW2 was established in 2019 following completion of the final configuration of the SWMS. As illustrated on the concentration versus time plots included in Appendix G-2, the initial water quality results for SW2 demonstrate water quality that is within background ranges for leachate indicator parameters with the exception of elevated boron and hardness. No VOC parameter concentrations were detected above laboratory reporting limits at SW2 during the current monitoring period. SW3 was sampled once in 2021 (June). The leachate indicator parameter concentrations presented on the concentration versus time plots included in Appendix G-2 suggest water quality at this monitoring point shows concentrations of alkalinity, hardness, chloride, and TDS slightly over background levels during the current monitoring period. Water quality at this location has demonstrated variability in terms of alkalinity, chloride, and TDS concentrations. This variability is similar to that observed at SW1 and reflects the sensitivity of surface water quality in drainage ditches to runoff and precipitation as well as seasonal sources of impacts like road salt application. Since 2019, there has been an increasing trend in sodium concentrations. No VOC parameter concentrations were detected above laboratory reporting limits at SW3 during the current monitoring period.

Surface water monitoring location SW4 is located downstream of SW3. Water quality at SW4 is essentially at background levels with similar parameter concentrations ranges and demonstrating a degree of variability. At SW4 the following parameters did not meet their respective PWQO during the current monitoring period: field measured dissolved oxygen, phenolics, phosphorus, aluminum, chromium, and iron. The concentrations of these parameters at SW4 are similar to historical concentration ranges reported in background surface water quality. There were no VOC or PAH parameter concentrations detected above the laboratory reporting limit during the current monitoring period at SW4.

Based on the water quality results at SW4 during 2021, there is no evidence of landfill-related water quality impacts at this location.

SW6 is located in ponded water off-Site to the south of SW5. As illustrated on the concentration versus time plots provided in Appendix G-2, SW6 leachate indicator parameter concentrations, with the exception of boron and hardness, are within historical background ranges and variability. At SW6 the following parameters did not meet their respective PWQO during the current monitoring period: total phenolics, phosphorus, aluminum, boron, chromium, iron, and fluoranthene. The concentrations of these parameters are similar to concentrations reported in historical background surface water quality.

During the June 2021 monitoring, the following PAH parameters were detected at SW6: benzo(a)pyrene, benzo(b/j)fluoranthene, fluoranthene, and pyrene. No PAHs were detected above the laboratory reporting limits during the November 2021 monitoring event. No VOC parameter concentrations were detected above the laboratory reporting limit during the current monitoring period at SW6. In the absence of other significant indications of leachate-related surface water quality impacts, the PAH detections reported are not considered to be related to the leachate impacts. Elevated PAHs may be related to historic slag stockpiles in the vicinity of the Site and the use of road ballast along the Site entrance. The exact source of the detected parameters is not known.

At SW6, hardness has been elevated since 2013 and boron has been demonstrating an increasing trend since 2012, with the exception of the November 2021 boron concentration result. With the exception of boron and hardness, water quality results at SW6 during 2021 indicate no evidence of landfill-related water quality impacts at this location.

Monitoring location SW7 is located to the south of the Site within a pond located approximately 50 m to the east of Brooks Road. As illustrated on the concentration versus time plots in Appendix G-2, leachate indicator parameter concentrations at SW7 are generally similar to concentrations observed in background water quality. The occasional higher phosphorus concentrations in this pond are likely related to agricultural sources, as this pond is located adjacent to crop fields. Chloride, sodium and TDS are occasionally elevated over the levels observed at SW8 which is likely related to the proximity of SW7 to Brooks Road. At SW7 the following parameters did not meet their respective PWQO during the current monitoring period: pH, total phenolics, phosphorus, aluminum, boron, chromium, and iron. Concentrations of these parameters at SW7 are similar to concentrations historically reported in background surface water quality. There were no VOC or PAH parameter concentrations detected above the laboratory method detection limit during the current monitoring period at SW7.

Based on the water quality results at SW7 during 2021, there is no evidence of landfill-related water quality impacts at this location.

To conclude the discussion on surface water quality, minor surface water quality impacts are noted at SW3 and SW6 with elevated concentrations of hardness and boron, and several PAHs at SW6. These impacts are limited in extent as they are not observed at the downstream monitoring station SW4; albeit SW4 is located a considerable distance downstream. Based on the pattern in water quality at SW3 and SW6, the source of these impacts does not appear to be leachate-related.

5.6 Surface Water Flows

Surface water flow velocity and depth/width of flow was measured at SW4 during the following March 2021 monitoring event. These measurements were used to estimate the flow rates at monitoring stations where flow was apparent. The results of the 2021 surface water flow monitoring are provided along with the field measured parameters in Table 5.8A.

5.7 Landfill Gas Monitoring Results

The 2021 LFG monitoring was performed by GHD in January, February, March, April, July, September, and December. Monitoring was performed at a total of 12 gas probes, including 4 nested pairs of gas probes (GP-1S, GP-1D, GP-2S, GP-2D, GP-3S, GP-3D, GP-4S, GP-4D) and 4 individual gas probes (GP5-19, GP6-19, GP7-19, GP8-19). The 2021 landfill gas monitoring results are presented in Table 5.9.

In accordance with ECA No. A110302, LFG monitoring results have been assessed in comparison to the following levels:

– Methane gas at the Site boundary to be less than 2.5 percent by volume (% v/v)
    - Consistent with the compliance level for LFG migration at the landfill site boundary with guidance from O.Reg. 232/98, and ECA No. A110302 Section 6.2.a.

In 2021 there were no detections of methane at the gas probes above 2.5% v/v. The 2021 monitoring results were generally consistent with historical monitoring data. The majority of gas probes were identified to be flooded during the monitoring period, as the water levels were measured to be above the top of the screen. Only an open screen will allow soil gas from the surrounding soil to enter a gas probe as water is general considered a barrier to gas migration. Gas composition readings were not collected from flooded gas probes as the monitoring results would not be considered representative of the surrounding soil gas conditions.

Below provides discussion of the 2021 LFG monitoring results.

– Gas probes, GP-1S, GP-1D, and GP5-19 are located near the northwest corner of the Site. The nearest off-Site dwelling/structure is a private property, which is located approximately 300 m to the northwest of the gas probes.
    - Gas probe GP1-S could not be monitored in 2021 due to a damaged lock and casing preventing access. It is recommended gas probe GP1-S is repaired so that monitoring can be continued.
    - Gas probe GP-1D was flooded during the monitoring period. Gas composition readings were not collected from gas probe GP1-D as the monitoring results would not be considered representative of the surrounding soil gas conditions.
    - Gas probe GP5-19 was operational during the January, April, and December monitoring events. Methane was not detected at gas probe GP5-19 in January and April as concentrations were less than 0.3% v/v. Methane was detected at a concentration of 0.7% v/v during the December monitoring event, which is less than the ECA requirement of 2.5% v/v methane at the Site boundary. GP5-19 was flooded during the other monitoring events, and therefore no gas readings were obtained.
– Gas probes GP-2S and GP-2D are located west of the landfill between GP-3S/D and GP-1S/D.
    - GP-2D was identified to be blocked at ground surface during the current monitoring period, and therefore no gas readings were obtained. It is recommended the owner consider repairing the gas probe so that monitoring can be continued.
    - Gas probe GP-2S was flooded during the monitoring events in the monitoring period, and therefore no gas readings were obtained.
– Gas probes GP-3S and GP-3D are located between the landfill and the on-Site trailers. GP-3D and GP-3S were flooded during the current monitoring period, and therefore no gas readings were obtained.
– Gas probes GP-4S, GP-4D, and GP7-19 are located in proximity to the SWMS pond and LTS effluent holding tanks.
    - Gas probe GP-4S was flooded during the monitoring events in the monitoring period, and therefore no gas readings were obtained.
    - GP-4D was operational during the February, March, April, July, and September monitoring events. Methane was not detected at GP-4D as concentrations were less than 0.3% v/v. GP-4D was flooded during the other monitoring events, and therefore no gas readings were obtained.
    - GP7-19 was operational during the January, February, March, and July monitoring events. Methane was not detected at GP7-19 as concentrations were less than 0.3% v/v. GP7-19 was flooded during the other monitoring events, and therefore no gas readings were obtained.
– Gas probe GP6-19 is located in the vicinity of the on-Site office/maintenance building. GP6-19 was operational during all monitoring events in the monitoring period. Methane was not detected at GP6-19 as concentrations were less than 0.3% v/v.
– Gas probe GP8-19 is located adjacent to the leachate treatment system. GP8-19 was flooded during the monitoring events in the monitoring period, and therefore no gas readings were obtained.

5.8 Industrial Sewage Works Monitoring Results

The Site also operated under an amended Industrial Sewage Works ECA No. 1122-BKUPSM (dated February 3, 2020) for the SWMS and leachate collection, treatment, and disposal system. During 2021 stormwater from capped portions of the waste disposal area was directed towards the SWMS.

The LTS is operated by CWI. CWI prepared a 2021 Annual Report (CWI Report) which provides a summary of the LTS including a description and operational parameters as required in the Industrial Sewage Works ECA. The following summarizes the CWI Report:

1. Influent leachate samples were collected on a monthly and quarterly basis for respective required parameters.
2. The annual average treatment system flow rate was 41 m^3/day, and the peak treatment system flow rate was 88 m^3/day. The peak daily flow rate is below the treatment system rated capacity of 200 m^3/day.

3. Operational problems were encountered and addressed.
4. Routine maintenance was conducted.
5. There were no bi-pass or abnormal discharges during the reporting period.
6. No treated effluent was discharged to the roadside ditch from the LTS in 2021.

A copy of the 2021 annual report prepared by CWI is presented in Appendix H.

6. Groundwater and Surface Water Compliance Assessment

6.1 Groundwater

6.1.1 Evaluation of Site Using RUC

In 2015, GHD undertook a detailed review of the available database of groundwater and leachate quality data for the Site. The purpose of this review was to use this information in the development of a Site-specific Trigger Level Program (TLP) and Contingency Response Plan (CRP). Updated D&O report was submitted and approved in December 2018. Additionally, an updated D&O report submitted and approved in June 2021 in support of an application for approval of an amendment to the ECA. The updated D&O report included a revised TLP and CRP. Appendix I includes the results of this review and outlines the updated TLP and CRP for the Site. The purpose of the TLP is to provide timely identification of potential Site-related water quality impairment and in turn permit implementation of appropriate contingency measures to mitigate the potential for non-compliance.

Groundwater compliance at the Site is based on Site boundary groundwater quality and how it compares to Site-specific Reasonable Use Concept (RUC) criteria. The RUC criteria are calculated from generic ODWS and background concentrations. For the purposes of the TLP, 85 percent of the Site-specific RUC criteria are used as the trigger levels. Accordingly, the TLP is intended to provide advance warning of potential Site groundwater compliance issues.

The RUC criteria are re-calculated annually as more data is added to the database. The RUC criteria used for this assessment were established using background water quality data collected from monitoring wells located upgradient of the landfill. The RUC established for the shallow overburden unit was derived from background groundwater quality data gathered at MW1B-01/MW1B-07/MW1B-13, OW3B-85/OW3B-07/OW3B-13, and OW9B-92/OW9B-06 as summarized in Table 6.1. The RUC established for the basal overburden/shallow bedrock unit were derived from background groundwater quality data gathered at MW1A-01/MW1A-07/MW1A-13, OW3A-85/OW3A-07/OW3A-13, and OW9A-06, as summarized in Table 6.2. The revised calculated RUCs are based on the average median concentration (median 2017 - 2021 concentrations for each parameter at each location are averaged) reported in the background/upgradient monitoring wells, except for PAH and VOC parameters, which were assigned a concentration value of zero, as recommended by the MECP.

In previous reports, OW5B-06 was included as a southern boundary shallow monitoring well. Exceedances of the chloride trigger level were historically noted at OW5B-06 and an evaluation of the degree, nature, and potential source(s) of the water quality impact(s), was undertaken during 2018-2019. Based on the evaluation undertaken in response to consecutive trigger level exceedances, a recommendation was made to install additional monitoring wells on the southern property boundary, downgradient of OW5A/B-19. Monitoring wells MW11A/B-19 and MW12A/B-19 were installed in 2019 and have been incorporated into the environmental monitoring program. In light of the installed southern property boundary monitoring wells, OW5A/B-06 were removed from the Site's trigger level program.

As noted in Appendix I, the following parameters were selected as trigger parameters for groundwater quality:

– General Chemistry: chloride
– Metals: boron, chromium, lead
– PAHs: naphthalene, phenanthrene, pyrene, benzo(a)pyrene
– VOCs: benzene, ethylbenzene, toluene

The following subsections discuss the results of the 2021 TLP for groundwater in the shallow overburden unit and basal overburden/shallow bedrock unit.

6.1.2 Shallow Overburden Unit

The groundwater impact assessment undertaken for the current monitoring period for the Site has focused on shallow overburden wells located downgradient of the current landfill, including the western boundary of the Site (MW10B-18), the eastern portion of the Site (MW2B-07), and along the southern boundary of the Site (OW1B-06, OW8B-06, MW11B-19, and MW12B-19).

Table 6.3A provides a comparison of the 2021 data at the shallow overburden unit boundary wells to the calculated Trigger Levels, with exceedances of Trigger Levels highlighted. As noted in Table 6.3A, all results were below their respective trigger levels with the following exceptions:

– Chloride concentrations at OW8B-06 during the June and November 2021 monitoring events.
– Boron concentrations at OW8B-06 during the November 2021 monitoring event.
– Benzo(a)pyrene at OW8B-06 during the June 2021 monitoring event.

Monitoring well OW8B-06 is located south of the landfill footprint in the southwest corner of the property, adjacent to Brooks Road. As indicated in the TLP included in Appendix I, Tier II monitoring is triggered when a parameter exceeds its respective trigger level at a single trigger location in two consecutive sampling events.

Although the chloride trigger level continues to be exceeded at OW8B-06 (four consecutive sampling events throughout 2020 and 2021), the proximity of this well to Brooks Road is interpreted to be the reason for these elevated chloride as road salt application on Brooks Road is a source.

Benzo(a)pyrene concentrations at OW8B-06 have historically been detected (2017 and 2018) and have fluctuated above and below the laboratory detection limit. Elevated PAHs are interpreted to be related to historic slag stockpiles in the vicinity of the Site and the use of road ballast along the Site entrance. The exact source of the detected parameters is not known.

A boron exceedance of the RUC was detected in November 2021. Boron concentrations from June 2021 were below the RUC. In the absence of other significant indications of leachate-related groundwater quality impacts and VOC detections, the chloride, benzo(a)pyrene and boron detections reported are not interpreted to be related to the landfill.

No RUC were exceeded for the trigger parameters at monitoring wells located on the property boundary.

6.1.3 Basal Overburden/Shallow Bedrock Unit

The basal overburden/shallow bedrock unit beneath the OLA is overlain by a clay aquitard of very low hydraulic conductivity, and thus the potential for water quality impact in this unit is minimal. For the 2021 monitoring period, the basal overburden/shallow bedrock included in the TLP (Appendix I) include wells located in the southern portion of the Site (OW1A-06, OW8A-06, MW11A-19, MW12A-19), the eastern portion of the Site (MW2A-01), and the western property boundary (MW10A-18).

Table 6.4A, provides a comparison of the 2021 data at the basal overburden/shallow bedrock unit boundary wells to the calculated Trigger Levels, with exceedances of Trigger Levels highlighted. As noted in Table 6.4A, all results for basal overburden/shallow bedrock unit trigger wells were below their respective trigger levels in all samples collected during 2021.

6.2 Surface Water (SWMS Pond)

During the 2021 monitoring period the Site-specific surface water TLP corresponded with Table 7 of the Industrial Sewage ECA. A copy of the Industrial Sewage ECA is available in Appendix B, and a summary of the surface water TLP and CRP is provided in Appendix I.

The surface water trigger parameters and corresponding levels from Table 7 of the Industrial Sewage ECA are presented as follows:

Table 7 – Trigger Parameters

Parameter	Trigger Level
Un-ionized Ammonia	0.02 mg/L
Arsenic	0.005 mg/L
Boron	1.5 mg/L
pH (unitless)	6.5 to 8.5

Samples collected from the SWMS Pond during routine quarterly monitoring and prior to discharge were compared to the trigger levels. The 2021 quarterly monitoring occurred on March 26, June 1, August 31, and November 12. Tabulated results of the 2021 monitoring of the SWMS Pond are presented in Table 5.10.

Laboratory analyzed pH (8.87) did not meet the trigger level on June 1, 2021, and the field measured pH (6.32) did not meet the trigger level on November 12, 2021. Condition 11 (10) of the Sewage ECA states that re-sampling of the SWMS Pond is required within 2 weeks of receipt of analytical data when an exceedance of the trigger level is identified. Confirmatory sampling of the pond was not conducted within 2 week of receipt of the pH exceedances from the SWMS Pond on June 1, 2021 or November 12, 2021 and this represents a non-conformance with this condition of the ECA.

The SWMS Pond analytical results were below the TLP for all parameters for the August 31, 2021 sampling event, collected between the March and November 2021 SWMS pond sampling events.

The remaining water quality results from the June and November samples do not suggest that there was any impact to water quality within the SWMS Pond on these occasions. On the basis of the water quality, there is no evidence of a discharge of impacted water off-site, despite the pH results reported.

7. Site Operations and Development

7.1 Site Operations

7.1.1 Daily Operations

Hours of operations are 6 am to 6 pm Monday to Friday and 6 am to 2 pm Saturdays. The hours for receiving waste are 7 am to 5 pm, Monday to Friday and 7 am to 1 pm Saturdays.

7.1.2 Site Entrance

The Site access is provided from Brooks Road via a driveway located approximately 30 m north of the south Site boundary. The main entrance is equipped with a lockable entrance gate to prohibit unauthorized vehicles from entering the Site.

A weigh scale is located inside the entrance gate. All waste haulage vehicles must pass over the scale when entering and leaving the Site.

A mobile office/site trailer is located at the Site entrance and is utilized for the Site operator and personnel responsible for daily landfill operations.

7.1.3 Volumes and Site Life

According to ECA A110302, the total waste disposal capacity for the Site is 1,045,065 m^3. BRE surveyed the landfill disposal area in December 2021. The remaining airspace as of December 2021 was calculated to be 180,553 m^3. Waste density was calculated based on total tonnage placed in 2021 (183,977 tonnes) and airspace consumed in 2021 (79,777 m^3); the corresponding apparent waste density is 2.31 tonnes/m^3. The higher apparent waste density in 2021 may be the result of waste consolidation.

Assuming waste filling at a rate between 150,000 to 250,000 tonnes per year and varying waste densities achieved, the remaining Site life is estimated at between 2.78 and 0.89 years.

The type of material received primarily consisted of non-hazardous contaminated soil. The following is a summary of the waste/contaminated soil received each month in 2021:

Month	Tonnes
January	17,384.87
February	11,422.56
March	19,380.59
April	15,127.59
May	17,430.50
June	19,072.45
July	15,336.13
August	11,921.25
September	8,177.94
October	12,533.00
November	19,859.67
December	16,331.91
Total	**183,977.34**

7.1.4 Daily Cover

During landfilling in 2021, non-hazardous contaminated soil was used as daily cover in accordance with the Landfill ECA; therefore, no additional soil from the on-Site stockpiles was used for daily cover.

7.1.5 Interim and Final Cover Works

Interim cover was applied to Stage 3 in 2021. Interim cover thickness varied between 300 mm and 750 mm. Interim cover soil was obtained from the on-Site stockpiles. Interim cover installation was completed in Stage 2 during 2021.

7.1.6 Engineered Controls

No additional engineered controls were installed in 2021.

7.1.7 Leachate Collection, Treatment and Removal

During the 2021 reporting period, leachate levels within the LCS were maintained to prevent mounding within the landfill. As previously indicated, the leachate is pumped from the LCS to storage tanks for on-Site treatment or hauled from the storage tanks to an off-Site licensed facility for treatment and disposal. The on-Site LTS treated 14,872 m^3 of leachate based on the CWI sewage treatment flow data. A total of 19,409.71 m^3 of treated leachate and contact water from Stage 3 was hauled off-Site for disposal in 2021.The following table provides a monthly summary of leachate treated and total effluent/contact water hauled off-Site in 2021.

Month	Treated Effluent (m^3)	Treated Effluent/Contact Water Hauled (m^3)
January	1,099	1,787.81
February	969	1,564.09
March	502	2,151.76
April	448	1,318.18
May	949	875.44
June	1,447	1,473.71
July	1,485	1,429.62
August	1,547	1,441.77
September	1,392	1,278.80
October	1,525	1,400.02
November	1,722	2,543.88
December	1,787	2,143.63
Total	**14,872**	**19,409.71**

Treated effluent was hauled to the Haldimand County Dunnville wastewater treatment plant in 2021. No effluent was directed to the Brooks Road ditch during the current reporting period.

In accordance with the LRP, the Site is required to reach leachate elevation targets annually. To be in compliance with the LRP and Landfill ECA Condition 5, the leachate elevation targets must be achieved within 15 days of the anniversary of the issuance of the Landfill ECA (March 27). As shown in Section 5.2.1, the leachate elevation has decreased in 2021 as a result of the leachate removal activities described above. Leachate levels as of March 12, 2021 (within 15 days of the compliance date of March 27, 2021) were below the targeted leachate level of 196 m AMSL as per the dates outlined in Schedule “C” and the capacity-based target of 195.7 m AMSL as per the estimated landfilled volume of 815,000 m^3 as outlined in Scheduled “D”.

The MECP issued Notice of Violation 1-90395772 on December 17, 2021. The Notice of Violation required the completion and submission of a Short-Term Leachate Removal Actions Summary to identify measures to be taken to address leachate elevations at the Site to meet the leachate elevations listed in Schedule “D” of ECA A110302. A copy of the Notice of Violation and is provided as Appendix J. BRE provided a response to the Notice of Violation on January 5, 2022.

7.1.8 Public Complaints

In accordance with the ECA, a Public Complaints Procedure was developed for the Site. The initial Public Complaints Procedure was revised to incorporate comments received from the Public Liaison Committee (PLC) and was approved, with amendments, by the PLC on December 15, 2004. An updated Public Complaints Procedure was prepared in accordance with the EA Notice of Approval and approved by the MECP in October 2020. A copy of the public complaint procedure is provided in Appendix K. A sign at the Site entrance provides a contact phone number for

registering complaints. Further contact details are provided on the BRE website. Complaints can also be registered 24 hours/day through the MECP's Spills Action Centre.

Based on information received from BRE and copies of correspondence provided to GHD, two odour complaints were documented in 2021. Verification activities and corrective actions were completed by BRE when possible. In the follow-up to several of the complaints, odours were not detected. The majority of the complaints were made to the MECP and by the time they were received by BRE it was unable to verify the complaint.

As indicated above, the complaints received from the public during the 2021 monitoring period were related to only to odour.

To reduce the potential for off-Site odour impacts, the following operational measures were recommended based on historical odour monitoring completed by GHD in 2016 and carried out by BRE during

– Continue with the odour monitoring program established by BRE.
– If odours are noted at the property boundary, increase the amount of daily cover applied on the waste.
– Minimize the active working face. Apply interim cover at a minimum thickness of 300 mm on areas of the landfill where landfilling has ceased for 6 months or more.
– Limit exposed areas of the leachate collection system and control passive odour emissions from the east above ground leachate storage tank.
– When not in use, ensure blind flanges are placed on leachate collection system cleanouts and sump risers.
– Use odour control granules as required to mitigate odour sources within the Site.
– Increase removal of leachate to lower the leachate level within the waste.

An Odour Management Plan (OMP), included the June 2021 D&O report, was prepared for persons engaging in activities at the Site to be aware of all odorous sources at the Site, potential causes of odourous emissions and to implement best practices and procedures to minimize odours. The OMP was followed in 2021.

7.1.9 Public Liaison Committee

As required by the ECA, a PLC was established in 2004 to serve as a forum for the dissemination of information, consultation, review and exchange of information regarding the operation of the Site. Due to COVID-19, PLC meetings were conducted in 2021 by way of electronic updates (e-updates). Three e-updates were provided in March, June and November 2021.

7.2 Site Development

The approved development plan for the Site is described in the reports entitled "Design and Operations Report, Edwards Landfill Site, Haldimand County, Ontario" dated November 2003 (D&O), "Updated Site Decommissioning Plan, Edwards Landfill Site" dated July 2010 (Decommissioning Report), Design and Operations Report Interim Expansion dated December 2018, Design and Operations Report Vertical Expansion dated April 2019, and Design and Operations Report Vertical Expansion – Rev. 1 dated June 2021.

The Site design provides for three disposal stages that were constructed in a progressive manner from east (Stage 1) to west (Stage 3). The landfill design has been laid out such that the Site entrance features, and Stage 1 could be constructed outside the limits of the OLA. The D&O report for the interim expansion (December 2018) provides for additional filling in Stage 4, located on top of a portion of Stages 1 and 2A. The D&O report for the vertical expansion provides for additional filling over the existing landfill footprint.

As the refuse/cover soil reaches final contours the final cover is to be constructed. In conjunction with final cover construction, the perimeter ditching is to be constructed to direct clean surface water runoff away from the active stage and into the SWMS Pond.

The final SWMS, including perimeter ditching, will be constructed in stages as landfilling progresses to final contours. Runoff from any landfill cell that has a completed interim cap will be conveyed to the constructed SWMS Pond via storm water ditching around the perimeter of the landfill.

7.2.1 Work Completed In 2021

Construction activities conducted in 2021 included the following main tasks:

– Operation of Dissolved Air Flotation Unit (DAF) unit pilot to increase leachate treatment plant output
– Installation of interim cover within portions of Stage 3
– onstruction of internal landfill access roads
– Interim cover installation in Stage 2
– Installation of perimeter animal exclusion and silt fencing
– Installation of screening berm along west side of Site

7.2.2 Regulatory Activities

In 2021, regulatory activities related to the Site included issuance of the amended Landfill ECA for the purpose of implementing the fill rate amendment. BRE was issued a Notice of Violation on December 17, 2021 relating to the management of leachate levels in the landfill.

7.3 Development Work Scheduled For 2022

Work scheduled for 2022 includes the following:

– Continual improvements to the permanent leachate treatment system
– Improvement to the road and entrance surfaces (asphalt paving) in accordance with the amended Landfill ECA

8. Financial Assurance

In accordance with Condition 2 of the Landfill ECA, the total financial assurance provided by BRE totals $9,956.333. A copy of the surety bond is provided in Appendix L. The bond is automatically renewed each year on December 20th on the same terms and conditions.

9. ECA Compliance Status

During the 2021 reporting period SWMS Pond laboratory analyzed pH did not meet the trigger level on June 1, 2021, and the field measured pH did not meet the trigger level on November 12, 2021. This represents a non-conformance with this condition of the ECA. Table 9.1 provides a summary of ECA conditions applicable to the Site during the 2021 reporting period and the compliance status.

10. Annual Monitoring Report Completion Checklist

Appendix M of the document entitled “Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water, Technical Guidance Document” (MECP, November 2010) includes a monitoring and screening checklist which is intended to provide the MECP with a quick reference for Site information and relevant monitoring results for the monitoring period. A completed checklist is provided in Appendix M of this report. As there is still some uncertainty regarding the nature of the declaration included in the checklist, the checklist has not been signed, but has been completed, as possible, and is included for reference.

11. Conclusions

Environmental Monitoring

a. This report covers the 2021 environmental monitoring data collected by GHD.
b. The 2021 environmental monitoring program consisted of leachate, groundwater, surface water, and gas probe sampling and monitoring.
c. Quarterly surface water monitoring events and semi-annual groundwater monitoring events were completed in 2021.

Leachate Levels and Water Quality

a. The leachate is generally characterized by elevated conductivity, alkalinity, COD, DOC, phenols, phosphorus, aluminum, arsenic, boron, chromium, iron, manganese, and sodium. Chloride is moderately elevated. The leachate also exhibits trace organics based on the presence of low concentrations of VOCs: benzene, cis-1,2-dichloroethene, ethylbenzene, xylenes (m&p, o), and toluene and PAHs: acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.
b. Leachate level monitoring was carried out monthly throughout 2021 in accordance with the Landfill ECA. Leachate level monitoring will continue to be completed monthly within the waste mound and LCS in 2022.

Groundwater Flow and Gradients

a. The 2021 groundwater flow directions in the shallow overburden unit were generally in a southerly direction with an average hydraulic gradient of 0.003 m/m in November 2021.
b. Review of the basal overburden/shallow bedrock levels indicate a relatively flat hydraulic gradient in the range of 0.0017 m/m.

Groundwater Quality

a. Groundwater data gathered in 2021 further confirms that natural background water quality within the on-Site shallow overburden unit is generally characterized by elevated levels of alkalinity, hardness, DOC, TDS, sulphate, and iron. The basal overburden/shallow bedrock unit is characterized by naturally elevated levels of sulphate, hardness, TDS, iron, and manganese.
b. The RUC and trigger level values for chloride were both exceeded in the groundwater quality of the shallow overburden unit at on-Site monitoring well OW8B-06 in June and November 2021. The proximity of this well to Brooks Road is interpreted to be the reason for these elevated chloride as road salt application on Brooks Road is a source.

c. The RUC and trigger level values for benzo(a)pyrene were both exceeded in the groundwater quality of the shallow overburden unit at on-Site monitoring well OW8B-06 in June 2021. Detectable PAHs at OW8B-06 are interpreted to be related to historic slag stockpiles in the vicinity of the Site and the use of road ballast along the Site entrance.

d. The trigger level value for boron was exceeded in the groundwater quality of the shallow overburden unit at on-Site monitoring well OW8B-06 in November 2021. In the absence of other significant indications of leachate-related groundwater quality impacts the boron trigger level exceedance are not interpreted to be related to the landfill.

e. There were no trigger level exceedances in groundwater samples collected from basal overburden/shallow bedrock monitoring wells during the current monitoring period.

f. There is no evidence of landfill related impacts to water quality in the basal overburden/shallow bedrock or deeper bedrock units.

Surface Water Quality

a. Water quality at background locations SW1, SW8, and SW9 indicated minor exceedances of several general chemistry and metals PWQOs. The background surface water monitoring results collected from SW1 and SW8 during 2021 were generally consistent with historical results. Results from SW9 are still variable and indicate elevated concentrations of alkalinity, hardness, and total dissolved solids. Additional sampling is required to understand water quality at SW9. VOC and PAH parameter concentrations were not detected above laboratory reporting limits at any background surface water monitoring location.

b. Water quality at SW6 has historically demonstrated some evidence of PAH and metals impacts. The source of these concentrations in the ditch at this location is not known but may be related to historic slag stockpiles and ballast used near the Site entrance. It is unlikely that leachate from the Site is the source of the concentrations identified.

c. Water quality at SW3 has historically been variable with elevated concentrations of hardness and boron observed during the 2021 monitoring period.

d. Based on the results of the 2021 surface water monitoring program, there is no direct evidence that landfilling-related activities are impacting water quality at the downstream surface water monitoring locations (SW4, SW5, SW6, SW7).

Landfill Gas

a. On-Site gas probes were monitored during the current monitoring period. Consistent with historical results, many gas probes were not operational due to flooding.

b. There were no detections of methane at the gas probes above 2.5% v/v. The highest concentration of combustible gas in 2021 was 0.7% v/v at GP5-19 in December. Methane was not detected at the other gas operational gas probes in 2021.

Industrial Sewage Works

a. An Annual Report of the leachate treatment system was prepared by CWI, with a summary copied as follows:

   i) Influent leachate samples were collected on a monthly and quarterly basis for respective required parameters.

   ii) The annual average treatment system flow rate was 41 m^3/day and the peak treatment system flow rate was 88 m^3/day. The peak daily flow rate is below the treatment system rated capacity of 200 m^3/day.

   iii) Operational problems were encountered and addressed.

   iv) Routine maintenance was conducted.

   v) There were no bi-passes or abnormal discharges during the reporting period.

   vi) No treated effluent was discharged to the roadside ditch from the LTS in 2021.

SWMS Pond

a. Monitoring of the SWMS Pond was carried-out in March, June, August, and November 2021.
b. Discharge of surface water from the SWMS Pond occurred during the reporting year.
c. Laboratory analyzed pH did not meet the trigger level on June 1, 2021, and the field measured pH did not meet the trigger level on November 12, 2021.
d. Confirmatory sampling of the pond was not conducted following the pH exceedances from the SWMS Pond on June 1, 2021 or November 12, 2021 and this represents a non-conformance with this condition of the ECA.
e. The remaining water quality results from the June and November samples do not suggest that there was any impact to water quality within the SWMP on these occasions. On the basis of the water quality, there is no evidence of a discharge of impacted water off-site, despite the pH results reported. As such the SWMS Pond is considered to be functioning properly.
f. The 2021 monitoring & reporting period operated under the Industrial Sewage ECA.

Summary of Site Operations and Development

During 2021 reporting period, the Site was actively receiving waste.

a. The 2021 quantity of waste disposed is estimated at 183,977 metric tonnes. The remaining Site life is calculated at approximately 2.78 and 0.89 years at varying waste densities.
b. The on-Site LTS treated 14,872 m3 of leachate and 19,409.71 m^3 of treated leachate/contact water was hauled off-Site for disposal in 2021.
c. The Site construction activities completed during the 2021 reporting period, consisted of the completion of interim cover in Stage 2, installation of interim cover over portions of Stage 3, visual fencing along the western berm and animal exclusionary and silt fence construction.
d. A total of two complaints were made in 2021. The complaints were related to odour. A complaint procedure is in place that includes a contact telephone number. A daily OMP was implemented by BRE. BRE has taken active operational measures to help reduce the potential for off-Site odours, including the use odour control granules.
e. Three e-updates were provided in place of PLC meetings were held in 2021.

Financial Assurance

In accordance with Condition 2 of the Landfill ECA, BRE has provided a total of $9,956,333 within an Environmental Protection Act Bond surety rider.

ECA Compliance

During the 2021 reporting period SWMS pond laboratory analysed pH did not meet the trigger level on June 1, 2021, and the field measured pH did not meet the trigger level on November 12, 2021. This represents a non-conformance with this condition of the ECA.

12. Recommendations

Based on the results of the 2021 Monitoring Program, the following recommendations are provided:

Environmental Monitoring

a. Implement the environmental monitoring program outlined in the amended Landfill ECA, and the Industrial Sewage Works ECA, as amended.
b. The surface seal at OW8B-06 should be inspected for integrity during 2022. The well may require repairs.
c. Assess blockage in MW1S-07 identified during the November 2021 monitoring and sampling event.

d. Consider repairing gas probes GP1-S and GP2-D so that monitoring can continue.

Stormwater Management

a. Carry out stormwater sampling from the SWMS in accordance with the Industrial Sewage ECA, as amended.

Leachate Management

a. Continue to remove leachate from the landfill through the operation of the on-Site LTS.
b. Continue to haul or dispose of treated effluent generated above the approved daily roadside ditch discharge rate to the Haldimand County WWTPs or otherwise as lawfully permitted.
c. Assess compliance with the annual leachate level requirements in accordance with Condition 5 of the Landfill ECA.
d. Carry out LTS sampling in accordance with the Industrial Sewage ECA in 2022.

Site Operations

a. Reduce potential for nuisance odours by:
    i. Continuing to conduct daily inspections and take steps to mitigate any odour identified at the property boundary.
    ii. Increase the amount of daily cover applied on the waste if odour is identified during daily inspections.
    iii. Minimize the active working face. Apply interim cover at a minimum thickness of 300 mm on areas of the landfill where landfilling has ceased for 6 months or more.
    iv. Limit exposed areas of the leachate collection system and control passive odour emissions from the east above ground leachate storage tank.
    v. When not in use, ensure blind flanges are placed on leachate collection system cleanouts and sump risers.
    vi. Use odour control granules as required to mitigate odour sources within the Site.
    vii. Lower the leachate level within the waste.
    viii. Follow the procedures within the Odour Management Plan.

All of Which is Respectfully Submitted,

Benjamin O. Kempel, P.Geo.

Brian Packer, B.Sc., P.Geo.

Ryan Loveday, P. Eng.

Figures

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

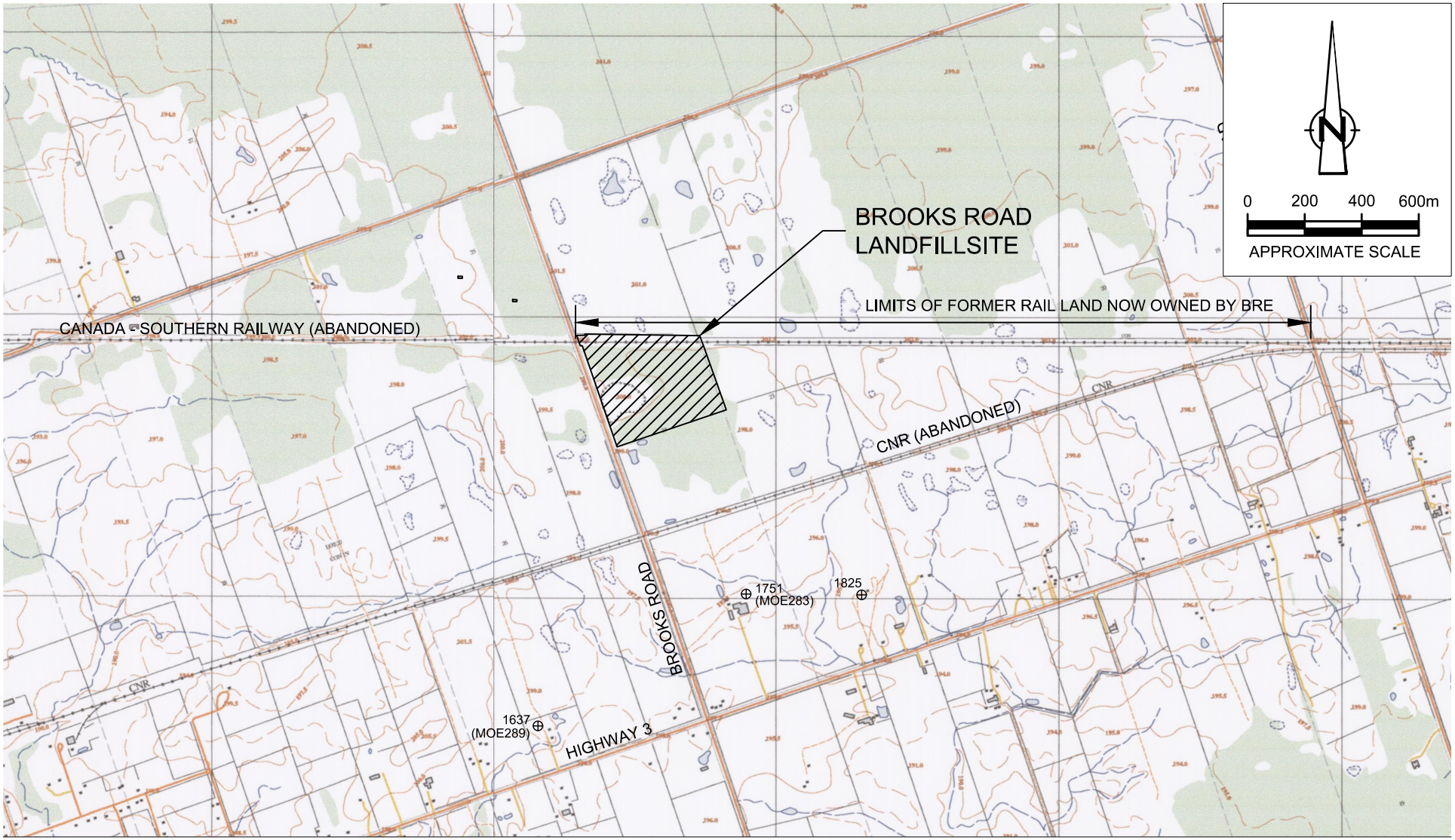
Project No. **18235-214**
Date **Feb 15, 2022**

SITE LOCATION MAP

Figure 1.1

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA001.dwg
Plot Date: 28 February 2022 9:45 AM

SOURCE: MAPART; SOUTH CENTRAL ONTARIO



LEGEND

1637 (MOE289) ⊕ RESIDENTIAL WELL LOCATION

GHD

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

LOCAL SITE SETTING

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 1.2

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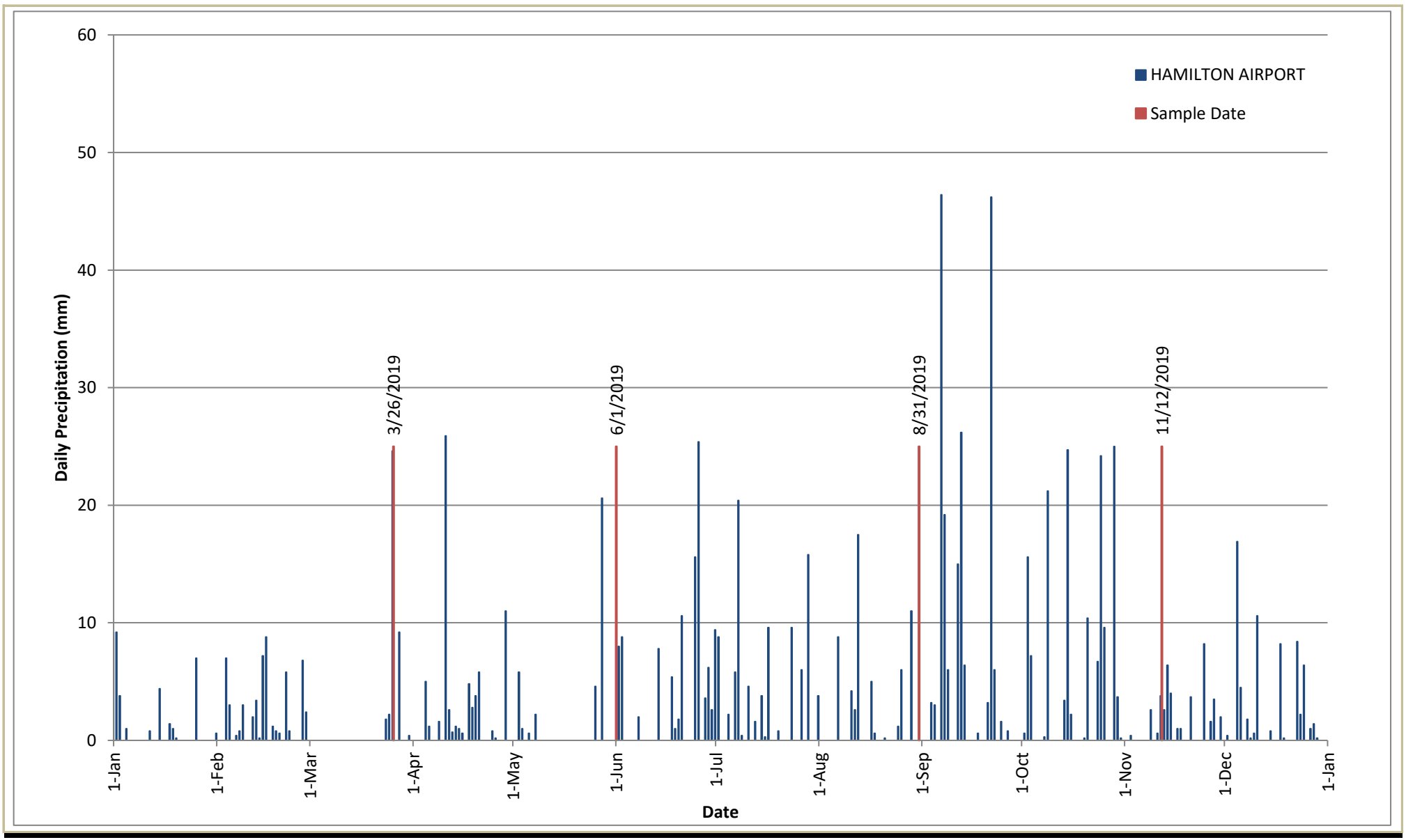

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

Project No. **18235**
Date **March 2022**

2021 DAILY PRECIPITATION

FIGURE 1.3

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\018235\Workshare\018235-RPT\018235-RPT-113-2021 Operations and Monitoring Report\18235-RPT-113-Figures\Figure 1.3.xlsx
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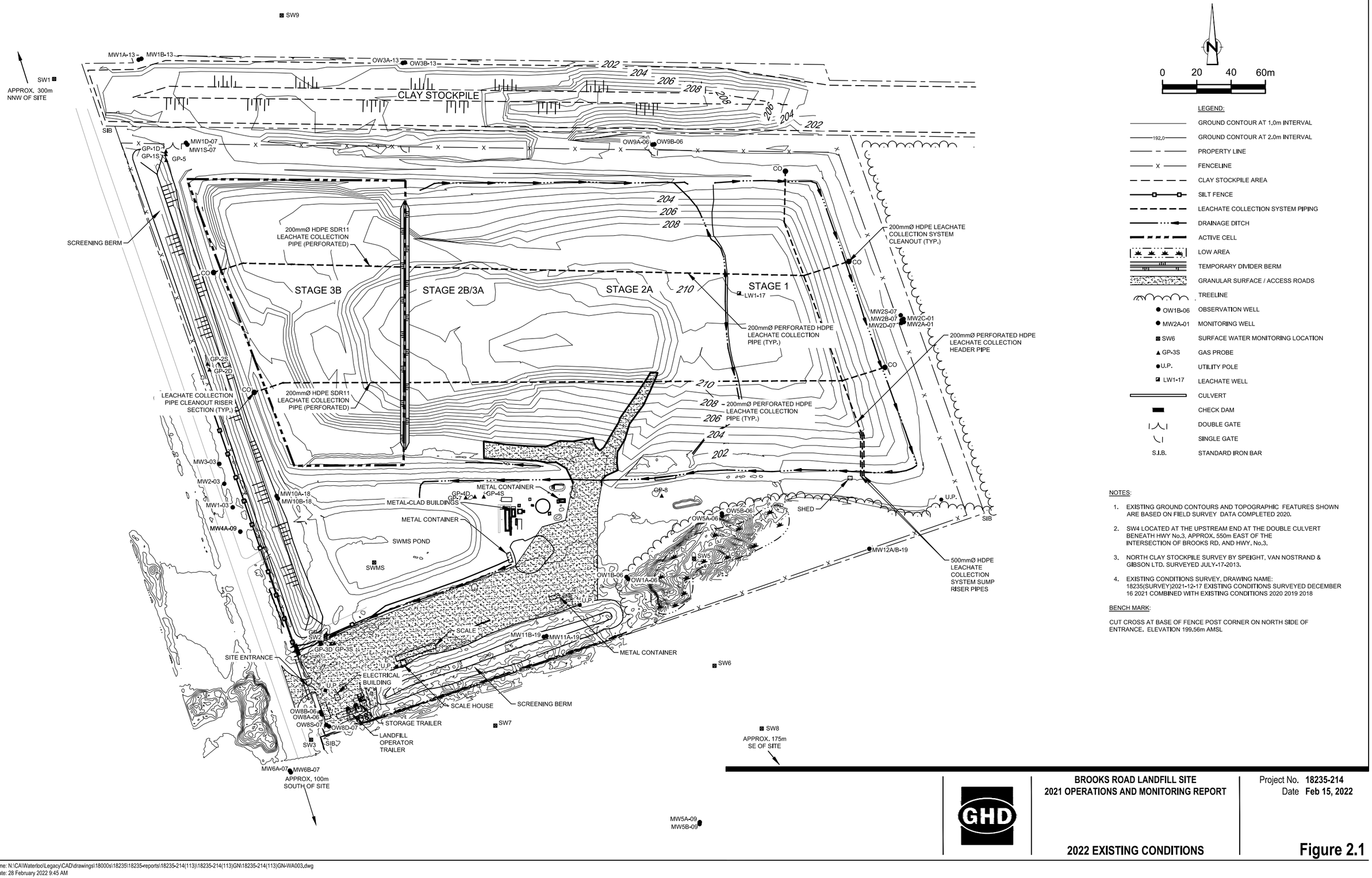
Data Source: Environment Canada data collected from the Hamilton International Airport weather station.



NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED 2020.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
3. NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY-17-2013.
4. EXISTING CONDITIONS SURVEY, DRAWING NAME: 18235(SURVEY)2021-12-17 EXISTING CONDITIONS SURVEYED DECEMBER 16 2021 COMBINED WITH EXISTING CONDITIONS 2020 2019 2018

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

Project No. **18235-214**
Date **Feb 15, 2022**

2022 EXISTING CONDITIONS

Figure 2.1

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA003.dwg
Plot Date: 28 February 2022 9:45 AM

SOURCE: MICROSOFT PRODUCT SCREEN SHOT REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION, ACQUISITION DATE 2020, ACCESSED MARCH, 2020

LEGEND

PROPERTY LINE

SW5 SURFACE WATER MONITORING LOCATION

TEMPORARY DEWATERING SEDIMENTATION POND

GHD

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

SURFACE WATER MONITORING LOCATIONS

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 4.1

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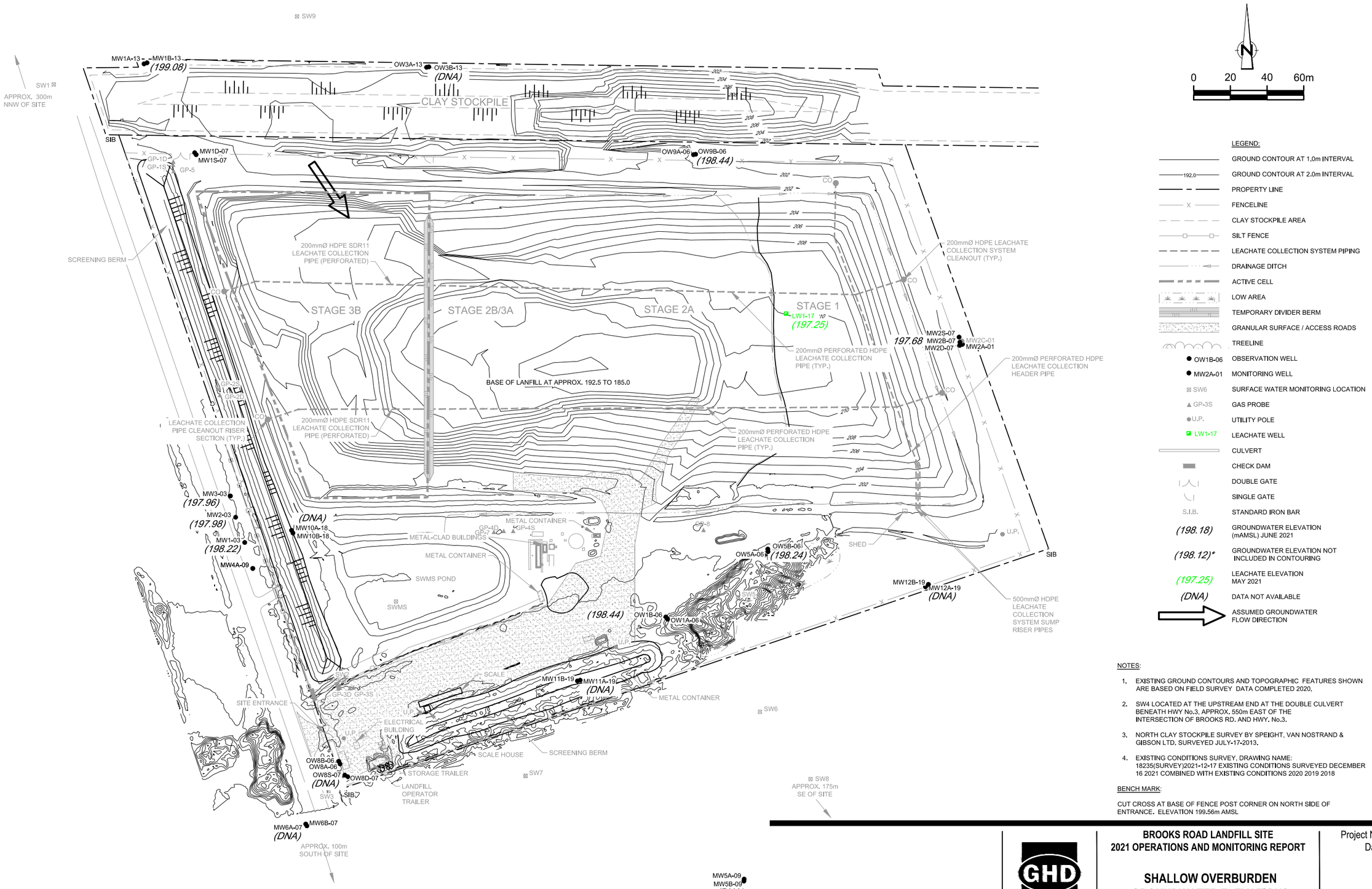

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED 2020.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
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BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

GHD

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

SHALLOW OVERBURDEN GROUNDWATER ELEVATIONS JUNE 2021

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 5.1

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA005.dwg
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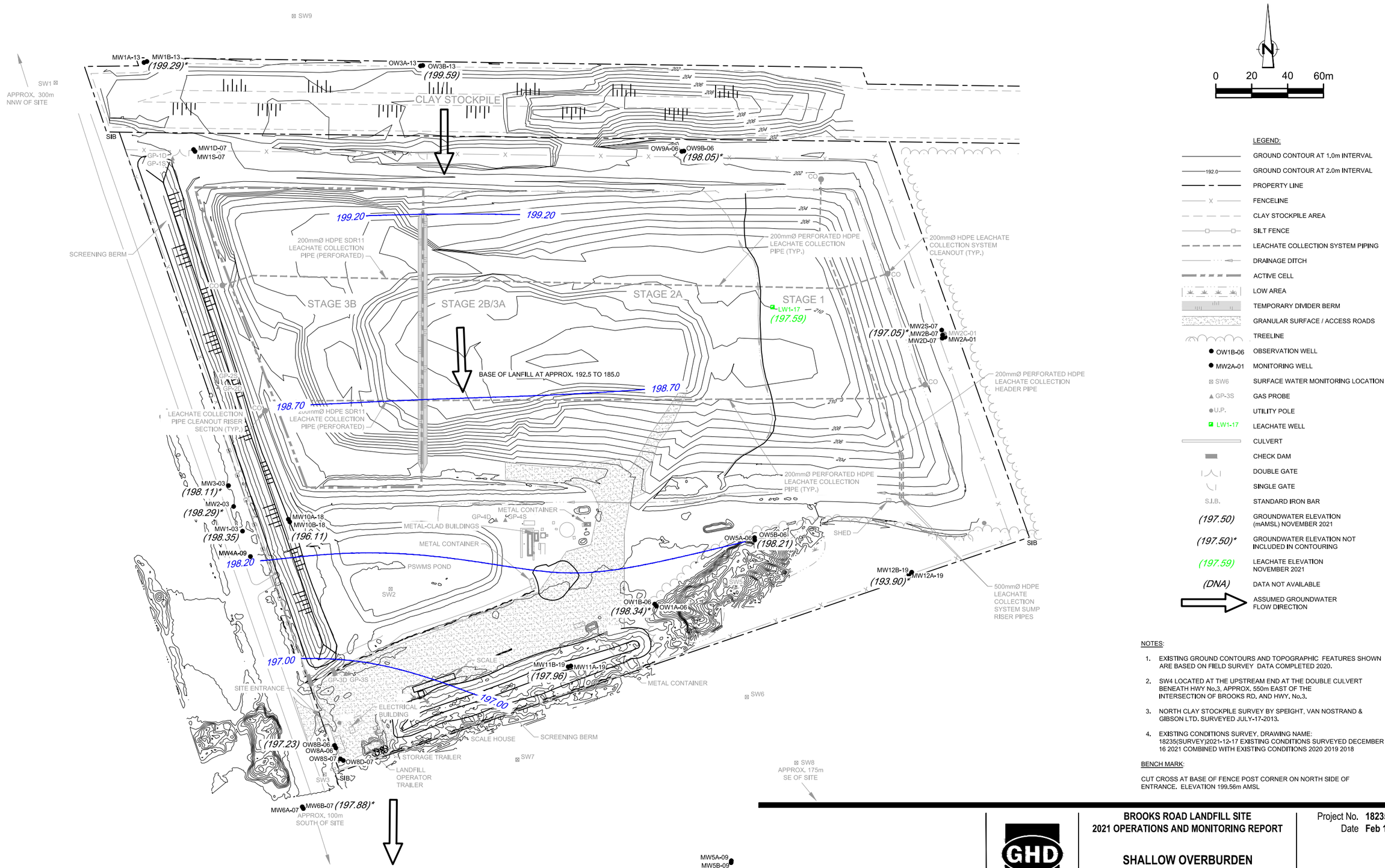

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED 2020.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
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4. EXISTING CONDITIONS SURVEY, DRAWING NAME: 18235(SURVEY)2021-12-17 EXISTING CONDITIONS SURVEYED DECEMBER 16 2021 COMBINED WITH EXISTING CONDITIONS 2020 2019 2018

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

SHALLOW OVERBURDEN GROUNDWATER CONTOURS NOVEMBER 2021

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 5.2

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA006.dwg
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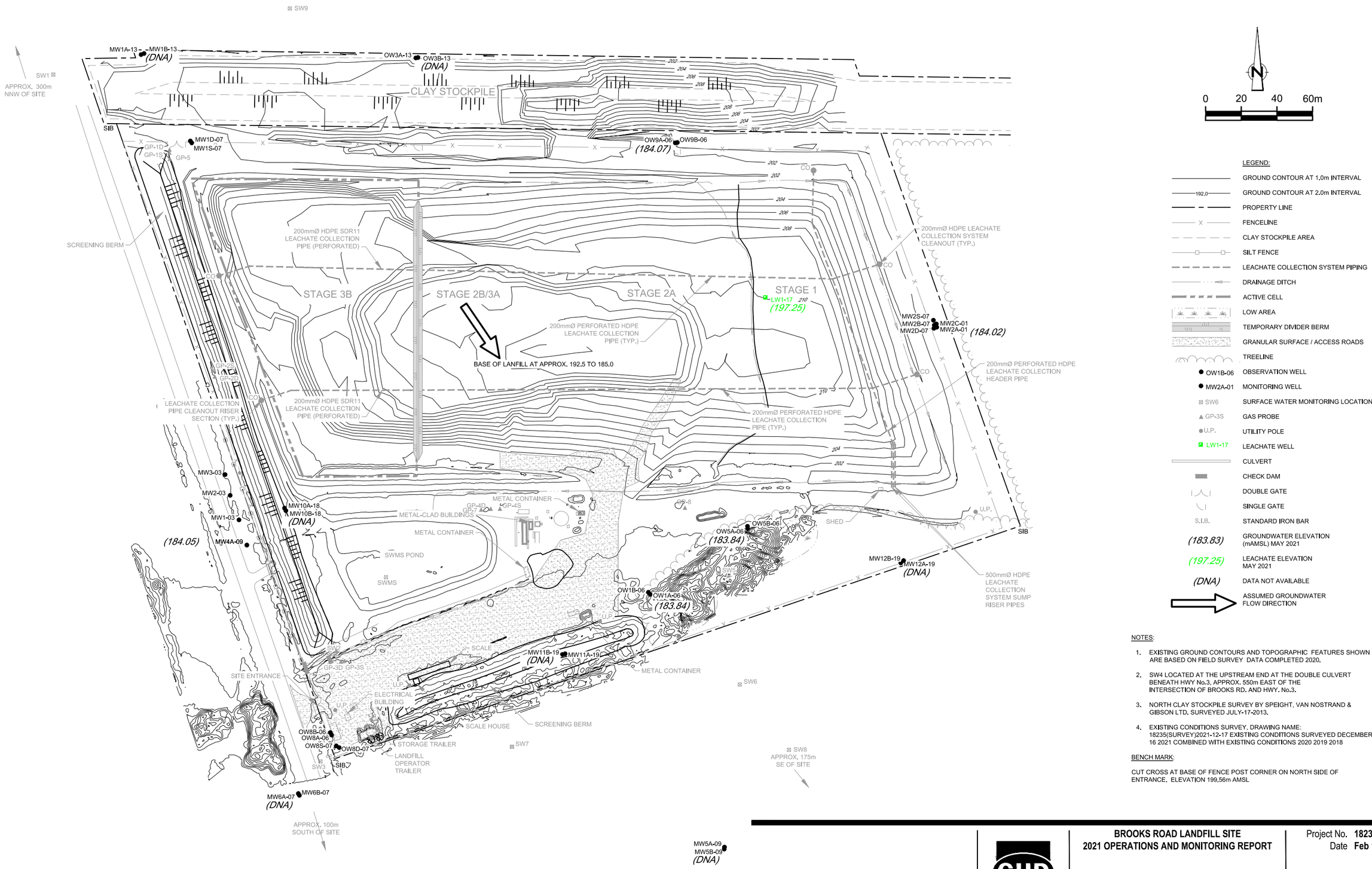

NOTES:

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2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
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BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

BASAL OVERBURDEN / SHALLOW BEDROCK GROUNDWATER ELEVATIONS JUNE 2021

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 5.3

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA007.dwg
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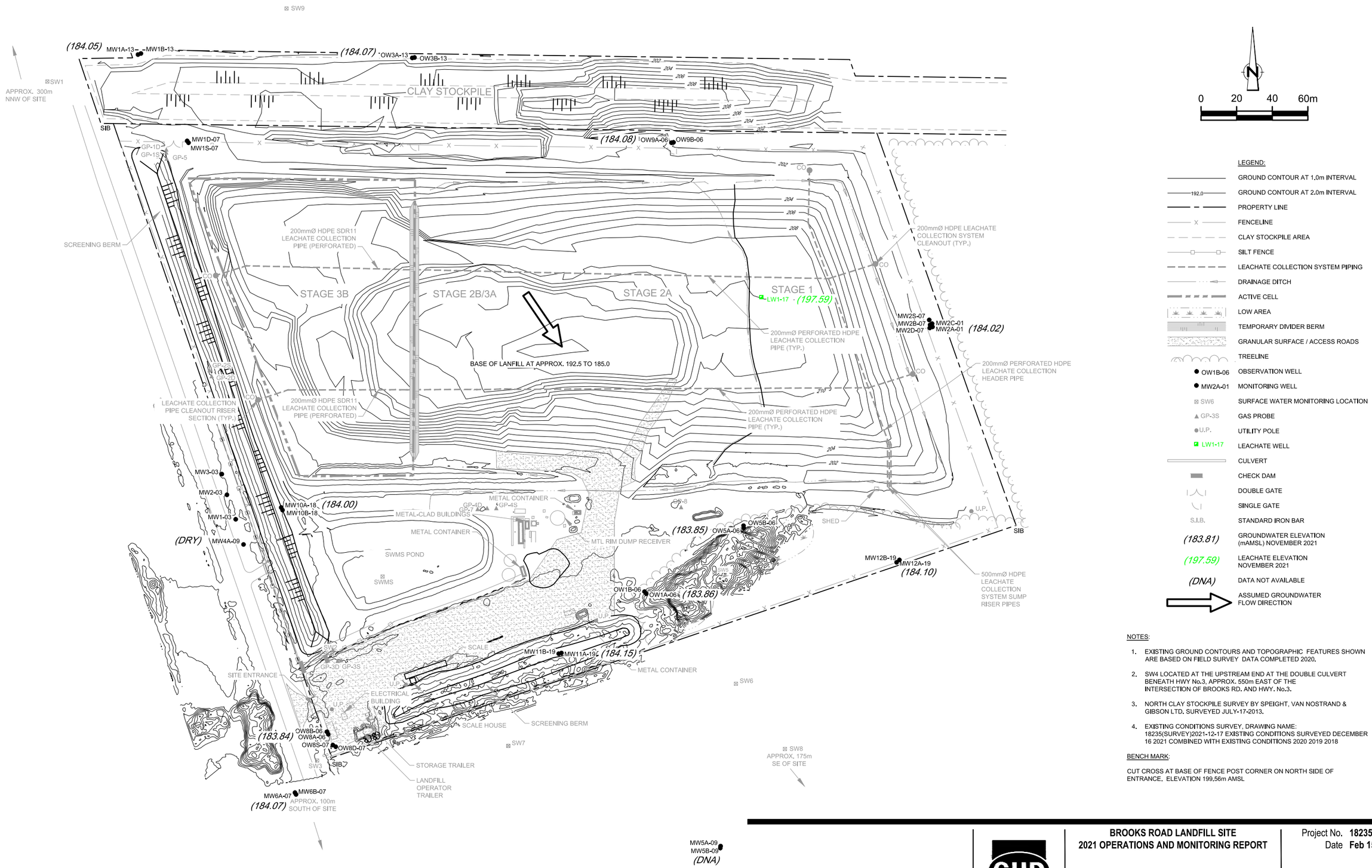

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED 2020.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
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BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

GHD

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

BASAL OVERBURDEN / SHALLOW BEDROCK GROUNDWATER ELEVATIONS NOVEMBER 2021

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 5.4

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA008.dwg
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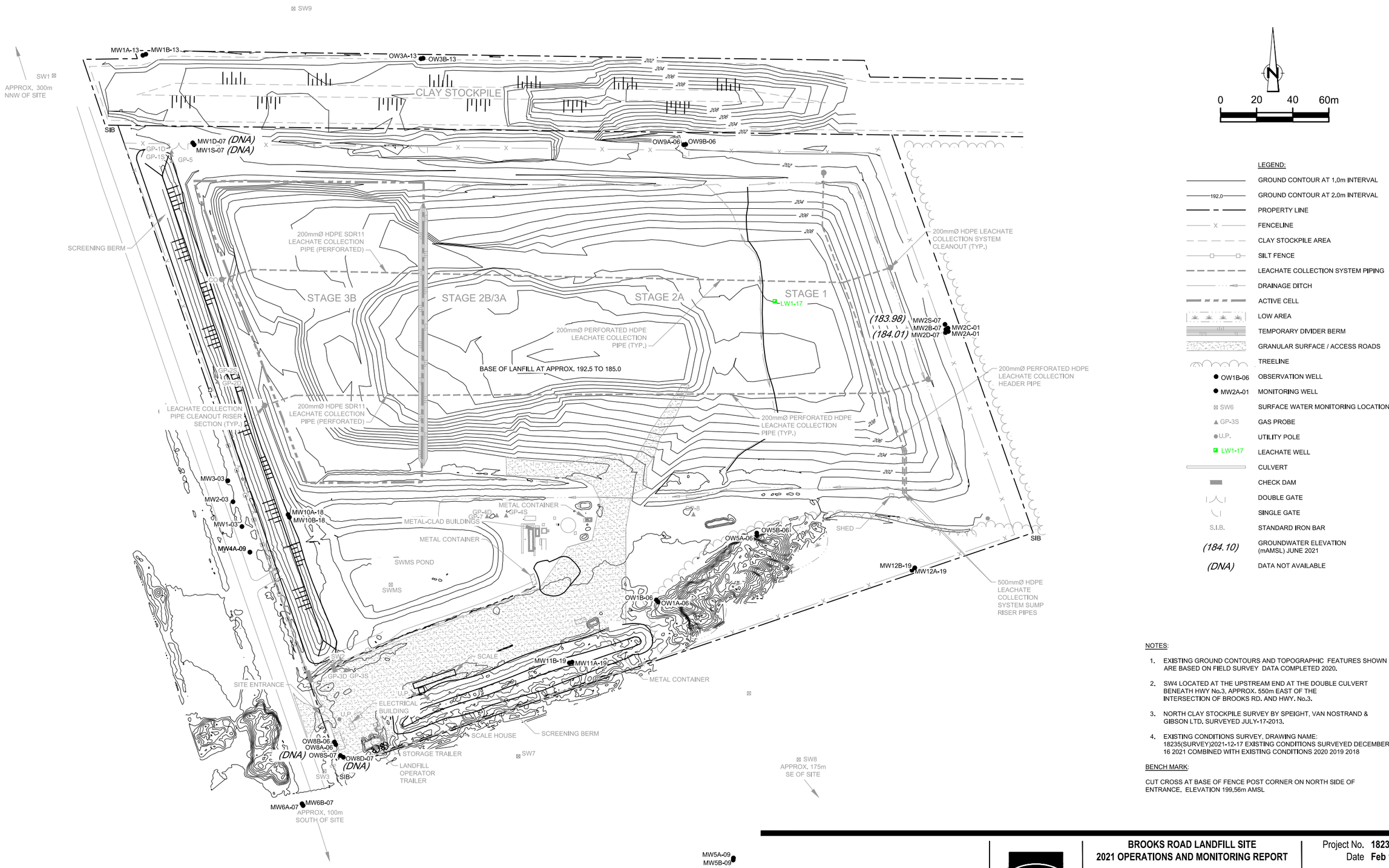

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED 2020.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
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4. EXISTING CONDITIONS SURVEY, DRAWING NAME: 18235(SURVEY)2021-12-17 EXISTING CONDITIONS SURVEYED DECEMBER 16 2021 COMBINED WITH EXISTING CONDITIONS 2020 2019 2018

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

GHD

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

BEDROCK GROUNDWATER ELEVATIONS JUNE 2021

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 5.5

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA009.dwg
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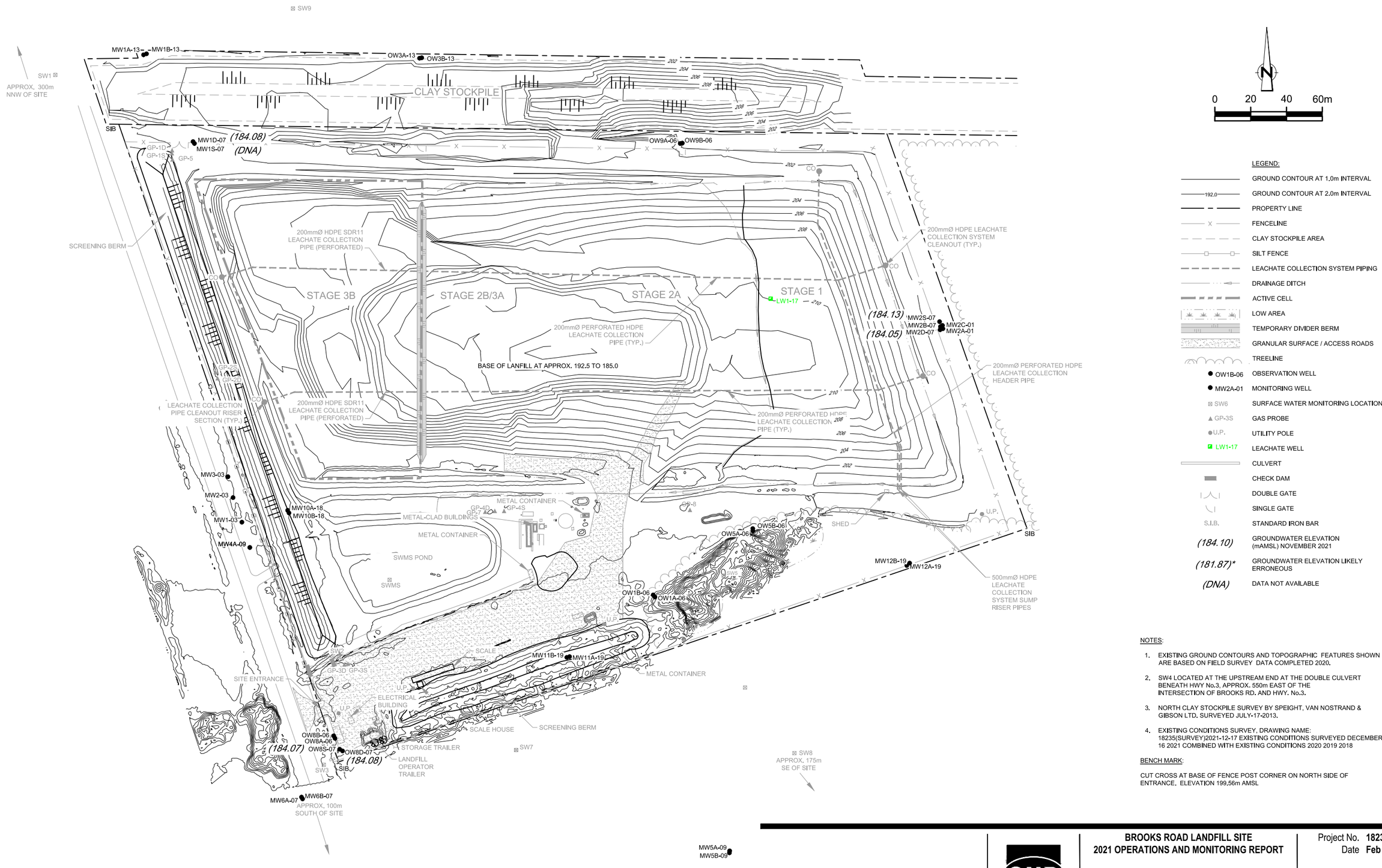

NOTES:

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BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

BROOKS ROAD LANDFILL SITE
2021 OPERATIONS AND MONITORING REPORT

BEDROCK GROUNDWATER ELEVATIONS NOVEMBER 2021

Project No. **18235-214**
Date **Feb 15, 2022**

Figure 5.6

Filename: N:\CA\Waterloo\Legacy\CAD\drawings\18000s\18235\18235-reports\18235-214(113)\18235-214(113)GN\18235-214(113)GN-WA010.dwg
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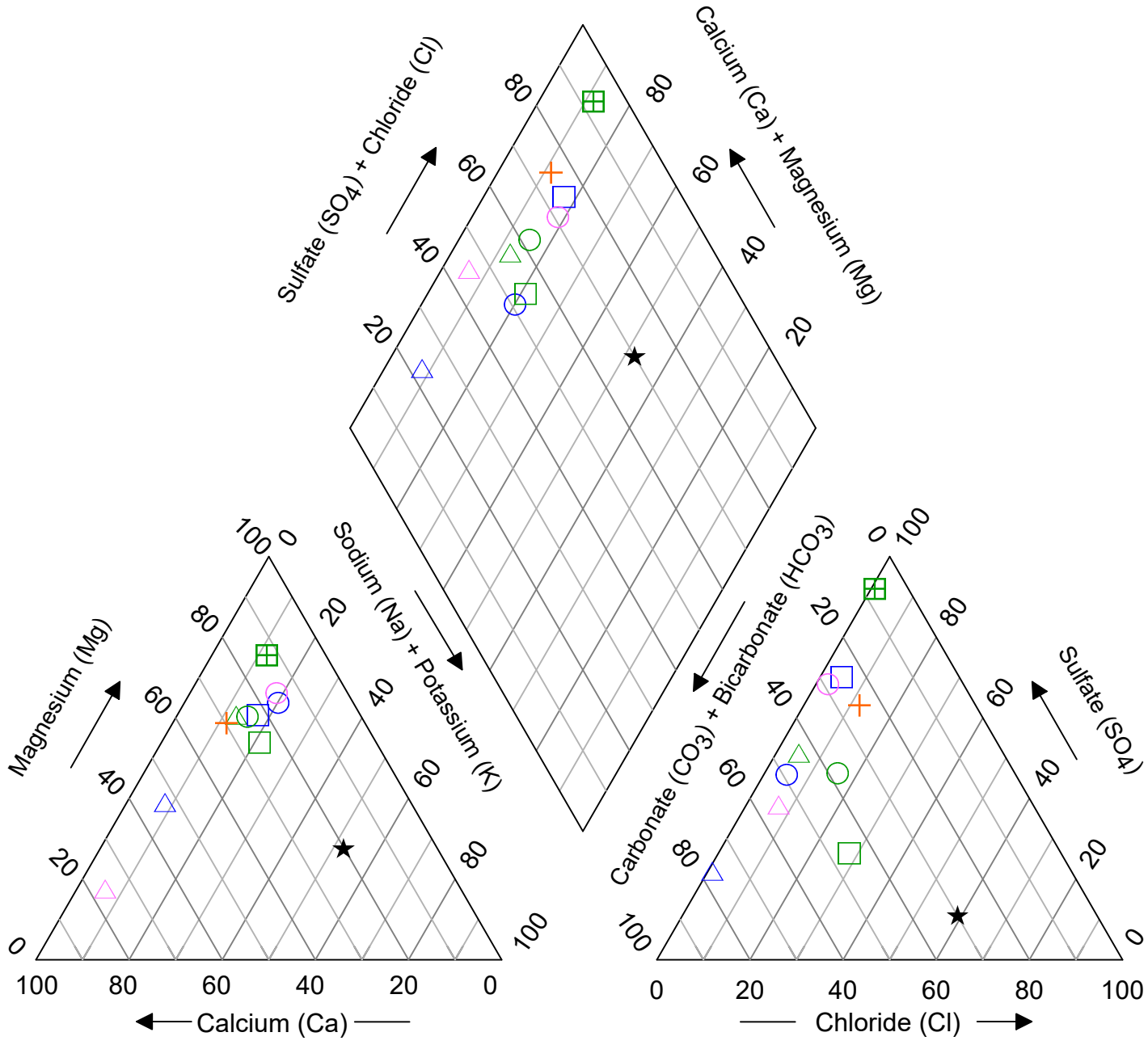

LEGEND

Upgradient	Cross-Gradient	Downgradient	Leachate	Off-Site Downgradient
□ MW1B-13	○ MW2B-07	□ OW8B-06	★ Leachate	+ MW6B-07
△ OW3B-13	△ MW10B-18	△ OW1B-06		
○ OW9B-06		○ OW5B-06		
		⊞ MW11B-19		

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO
2021 OPERATIONS AND MONITORING REPORT

JOB NUMBER 18235-214
DATE February 23, 2022

JUNE 2021 SHALLOW OVERBURDEN GROUNDWATER DATA - PIPER PLOT

FIGURE 5.7

Workshare file: \ghdnet\ghd\CA\Waterloo\Projects\662\018235\Workshare\018235-RPT\018235-RPT-113-2021 Operations and Monitoring Report\18235-RPT-113-Figures\piper plots\18235-Piper GW-June 2021-F

Tables

Table 4.1A

Environmental Monitoring Program
2021 Environmental Monitoring Program
Brooks Road Landfill Site
Haldimand County, Ontario

	Location	March	May	August	November
Groundwater [1]	OW1A-06		B		A
	OW1B-06		B		A
	OW3A-13		B		A
	OW3B-13		B		A
	OW5A-06		B		A
	OW5B-06		B		A
	OW8A-06		B		A
	OW8B-06		B		A
	OW8D-07 (Gypsum Mine)		B		WL-only
	OW8S-07 (Gypsum Mine)		B		WL-only
	OW9A-06		B		A
	OW9B-06		B		A
	MW1-03		WL-only		WL-only
	MW1A-13		B		A
	MW1B-13		B		A
	MW1D-07 (Gypsum Mine)		B		WL-only
	MW1S-07 (Gypsum Mine)		B		WL-only
	MW2-03		WL-only		WL-only
	MW2A-01		B		A
	MW2B-07		B		A
	MW2C-01				
	MW2D-07 (Gypsum Mine)		B		WL-only
	MW2S-07 (Gypsum Mine)		B		WL-only
	MW3-03		WL-only		WL-only
	MW4A-09		WL-only		WL-only
	MW5A-09		B		A
	MW5B-09		B		A
	MW6A-07		B		A
	MW6B-07		B		A
	MW10A-18		B		A
	MW10B-18		B		A
	MW11A-19		B		A
	MW11B-19		B		A
	MW12A-19		B		A
	MW12B-19		B		A
Surface Water [2]	SW1	C	B	C	B
	SW2	C	B	C	B
	SW3	C	B	C	B
	SW4	C	B	C	B
	SW5	C	B	C	B
	SW6	C	B	C	B
	SW7	C	B	C	B
	SW8	C	B	C	B
	SW9	C	B	C	B
	SWMS Pond [3]	D	D	D	D
LCS	Leachate Collection System	WL-only	B	WL-only	WL-only
LW	LW1-17	WL-only	WL-only	WL-only	WL-only
QA/QC	Groundwater Duplicate		B		A
	Surface Water Duplicate	C	B	C	B
	Field Blank	C	B	C	B

Notes:

[1] Groundwater levels will be measured at all monitoring wells during the May and November sampling events

[2] Surface water levels and flows will be measured during all surface water sampling events at all surface water locations

[3] List E - Trigger Parameter samples are collected and reviewed prior to discharging water from the SWMS Pond

Refer to Table 2 for the list of parameters

List A - indicator parameters (groundwater)

List B - inorganic chemistry, metals, PAHs, VOCs

List C - indicator parameters (surface water)

List D - TDS Pond Parameters

List E - Effluent Discharge Parameters

Table 4.1B

Environmental Monitoring Program
2021 List of Analytical Parameters
Brooks Road Landfill Site
Haldimand County, Ontario

List (s)	Analytical Group	Analytical Parameters
A	Indicator Parameters (groundwater)	alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, DOC, turbidity
B	Inorganic Chemistry	alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulfate, DOC, TDS, suspended solids, phenol, BOD_5, COD, pH, total phosphorus, conductivity, turbidity
B	Metals	arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, nickel, potassium, calcium, aluminum
B	PAHs	naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene,
B	VOCs	chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, acetone, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, methyl-t-butyl ether, 1,1-dichloroethane, methyl ethyl ketone, cis-1,2-dichloroethene, chloroform, 1,2-dichloroethane, 1,1,1-trichloroethane, carbon tetrachloride, benzene, 1,2-dichloropropane, trichloroethene, bromodichloromethane, cis-1,3-dichloropropene, methyl isobutyl ketone, trans-1,3-dichloropropene, 1,1,2-trichloroethane, toluene, 2-hexanone, dibromochloromethane, 1,2-dibromoethane, tetrachloroethene, 1,1,1,2-tetrachloroethane, chlorobenzene, ethylbenzene, m,p,o-xylenes, bromoform, styrene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene
C	Indicator Parameters (surface water)	alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, pH, total phosphorus, TDS, suspended solids, sulphate, BOD5, COD, phenol, turbidity, temperature (field), and dissolved oxygen (field)
D	PSWMS Pond Parameters	General Chemistry: alkalinity, conductivity, hardness, pH, chloride, sulphate, nitrite, nitrate, ammonia, TSS, TDS, COD, total phosphorus, TKN, BOD_5, phenols Metals: arsenic, barium, boron, cadmium, chromium, copper, iron, lead, mercury, zinc Organics: ethylbenzene, naphthalene, benzo(a)pyrene Field Parameters: conductivity, dissolved oxygen, pH, temperature
E	PSWMS Pond Trigger Parameters	TSS, pH, un-ionized ammonia, iron, total phosphorus, zinc, boron, toluene, fluorene, napthalene Field Parameters: conductivity, dissolved oxygen, pH, temperature

Table 5.1

Summary of Groundwater Elevations
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Well No.		Ground Elevation	Top of Riser Elevation	17-May-17	26-Jul-17	30-Nov-17	30-May-18	12-Jul-18	20-Aug-18	8-Nov-18	30-May-19	28-Nov-19	22-May-20	23-26-Nov-20	1-3-Jun-21	23-26-Nov-21
Shallow Overburden																
MW1B-13	(7)	199.70	200.50	199.21	198.78	199.08	199.05	198.81	--	199.01	199.31	199.33	199.36	198.89	199.08	199.29
MW2B-07	(4)	200.50	201.46	200.17	197.16	DRY	197.94	197.14	--	DRY	198.19	197.01	DRY	DRY	197.68	197.05
MW2C-01	(1)	200.35	201.09	NM	NM	NM	Removed from monitoring program			--	--	--	Removed from monitoring program			--
MW1-03	(1)	199.40	200.19	198.34	198.26	198.36	198.33	198.28	--	198.23	198.33	198.33	198.36	198.34	198.22	198.35
MW2-03	(1)	199.44	200.27	198.28	198.02	198.40	198.29	198.18	--	198.42	198.38	198.38	198.45	198.64	197.98	198.29
MW3-03	(1)	199.30	200.20	198.30	197.73	197.71	198.30	197.94	--	198.27	198.43	198.16	198.57	198.46	197.96	198.11
MW5B-09	(6)	198.65	199.51	DRY	DRY	DRY[12]	DRY	DRY	--	DRY	194.65	DRY	195.99	DRY	DNA	NM
MW6B-07	(6)	198.65	199.43	197.81	197.81	197.83	197.88	197.29	--	197.95	197.95	197.92	198.19	197.87	DNA	197.88
OW1B-06	(3)	199.47	200.35	198.89	198.06	198.38	198.62	198.35	--	198.84	196.95	198.75	198.91	198.95	198.44	198.34
OW3B-13	(7)	200.50	201.22	199.42	199.19	199.41	199.41	199.28	--	199.46	199.47	199.46	199.53	199.29	DNA	199.59
OW5B-06	(3)	198.72	199.67	198.18	197.50	198.12	198.20	198.00	--	198.22	198.36	198.18	198.07	198.24	198.24	198.21
OW8B-06	(3)	198.29	199.33	197.56	197.22	197.53	197.55	197.39	--	197.69	197.79	197.73	197.74	197.15	DNA	197.23
OW9B-06	(4)	199.88	201.18	199.42	199.09	198.55	199.44	198.97	--	198.55	199.84	199.98	199.81	198.09	198.44	198.05
MW10B-18	(13)	201.09	201.99	--	--	--	--	NM	--	NM	194.79	195.34	NM	195.69	DNA	196.11
MW11B-19	(14)	203.02	203.69	--	--	--	--	--	--	--	--	198.10	197.85	197.43	DNA	197.96
MW12B-19	(14)	199.70	200.55	--	--	--	--	--	--	--	--	194.58	199.16	DRY	DNA	193.90
Basal Overburden / Shallow Bedrock																
MW1A-13	(7)	199.64	200.42	184.15	184.08	183.99	NM	184.06	--	183.90	184.16	183.95	184.21	183.94	DNA	184.05
MW2A-01	(1)	200.35	201.19	184.01	183.96	184.00	184.12	184.06	--	183.92	184.15	183.96	184.23	183.98	184.02	184.02
MW4A-09	(6)	199.25	200.15	184.05	183.99	184.02	DRY	184.09	--	183.95	184.20	DRY	184.25	183.98	184.05	DRY
MW5A-09	(6)	198.53	199.39	184.11	184.09	183.84[12]	184.39	184.13	--	183.99	184.21	184.01	184.28	184.06	DNA	NM
MW6A-07	(6)	198.57	199.39	184.06	183.98	184.04	184.15	184.08	--	183.95	184.20	184.02	184.20	183.98	DNA	184.07
OW1A-06	(3)	199.47	200.24	183.81	183.76	183.81	183.92	183.86	--	183.70	183.97	183.80	184.00	183.78	183.84	183.86
OW3A-13	(7)	200.51	201.23	184.04	183.60	184.01	184.13	184.05	--	183.91	184.17	184.03	184.21	183.94	DNA	184.07
OW5A-06	(3)	198.72	199.72	183.83	183.79	183.85	183.97	183.89	--	183.74	184.00	183.83	184.05	183.82	183.84	183.85
OW8A-06	(3)	198.29	199.33	183.84	183.74	183.83	183.94	183.88	--	183.73	183.99	183.82	184.02	183.78	DNA	183.84
OW9A-06	(4)	199.88	201.08	184.08	184.00	184.06	184.17	184.10	--	183.96	184.20	184.09	184.24	184.03	184.07	184.08
MW10A-18	(13)	201.13	202.04	--	--	--	--	NM	--	NM	184.10	183.98	184.17	183.92	DNA	184.00
MW11A-19	(14)	203.00	203.76	--	--	--	--	--	--	--	--	184.09	184.28	184.05	DNA	184.15
MW12A-19	(14)	199.76	200.60	--	--	--	--	--	--	--	--	184.06	184.28	184.06	DNA	184.10

Table 5.1

Summary of Groundwater Elevations
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Well No.		Ground Elevation	Top of Riser Elevation	17-May-17	26-Jul-17	30-Nov-17	30-May-18	12-Jul-18	20-Aug-18	8-Nov-18	30-May-19	28-Nov-19	22-May-20	23-26-Nov-20	1-3-Jun-21	23-26-Nov-21
Bedrock Wells (shallow and deep)																
MW1S-07	(4)(15)	199.65	201.11	184.09	184.02	NM	184.18	184.13	--	NM	Damaged	184.01	184.26	183.97	DNA	NM
MW2S-07	(4)	200.49	201.13	184.10	184.05	NM	184.21	184.15	--	NM	184.25	184.05	184.32	184.09	183.98	184.13
OW8S-07	(5)	198.98	199.67	184.10	184.02	NM	184.16	184.11	--	NM	184.23	184.07	184.25	183.85	DNA	184.07
MW1D-07	(4)(15)	199.72	201.21	184.05	183.99	NM	184.15	184.11	--	NM	184.18	184.15	184.18	183.98	DNA	184.08
MW2D-07	(4)	200.63	201.16	184.05	183.98	NM	184.16	184.08	--	NM	184.18	183.98	184.25	184.06	184.01	184.05
OW8D-07	(5)	198.98	199.32	184.09	184.01	NM	184.15	184.11	--	NM	184.25	184.05	184.28	181.87*	DNA	184.08
Leachate Well																
LW1-17	(10)		211.61	--	--	197.13(11)	197.63	197.40	197.59	197.49	198.55	198.73	198.88	197.59	197.25	197.59

Notes:

All units in meters above mean sea level (m AMSL)
(1) Surveyed on February 18, 2005
(2) Surveyed on May 1, 2001
(3) Surveyed on January 9, 2007
(4) Surveyed on June 13, 2007
(5) Surveyed on July 26, 2007
(6) Surveyed on March 31, 2010
(7) Surveyed on July 17, 2013
(8) Water level not considered reliable, monitoring well replaced
(9) Water level elevation obtained from others and considered unreliable
(10) Surveyed in February 2020
(11) Leachate well also measured by BRE on December 12, 2017
(12) Monitoring Wells MW5A-09 and MW5B-09 were accessed and measured on December 27, 2017
(13) surveyed on July 26, 2018
(14) surveyed on December 17, 2019
(15) risers adjusted in August 2019
NM Not Measured
NS Not Surveyed
DNA Data Note Available
* Groundwater elevation likely erroneous

Sample Key - Groundwater Monitoring
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location	Date	Sample ID	Parameters Analyzed/Comments
Leachate Monitoring			
LCS - Landfill ECA	6/3/2021	LST-18235-0521-DD-001	Inorganic Chemistry, Metals, PAHs, VOCs
Shallow Overburden Wells			
MW12B-19	6/2/2021	--	Insufficient Volume
	11/8/2021	--	Water Level Only - Insufficient Volume
MW11B-19	6/2/2021	GW-18235-0521-DD-016	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-008	Indicator Parameters
MW10B-18	6/3/2021	GW-18235-0521-DD-011	Inorganic Chemistry, Metals, PAHs, VOCs
	11/12/2021	GW-18235-1121-BK-022	Indicator Parameters
MW1B-13	6/2/2021	GW-18235-0521-DD-015	Inorganic Chemistry, Metals, PAHs, VOCs
	11/9/2021	GW-18235-1121-BK-012	Indicator Parameters
MW2B-07	6/2/2021	GW-18235-0521-DD-023	Inorganic Chemistry, Metals, PAHs, VOCs
	11/9/2021	--	Dry
MW5B-09	6/3/2021	GW-18235-0521-DD-028	Inorganic Chemistry, Metals, PAHs, VOCs
	11/9/2021	--	Not Measured
MW6B-07	6/1/2021	GW-18235-0521-DD-032	Inorganic Chemistry, Metals, PAHs, VOCs
	11/10/2021	GW-18235-1121-BK-019	Indicator Parameters
OW1B-06	6/2/2021	GW-18235-0521-DD-008	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-005	Indicator Parameters
OW3B-13	6/2/2021	GW-18235-0521-DD-018	Inorganic Chemistry, Metals, PAHs, VOCs
	11/9/2021	GW-18235-1121-BK-014	Indicator Parameters
OW5B-06	6/2/2021	GW-18235-0521-DD-004	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-003	Indicator Parameters
OW8B-06	6/2/2021	GW-18235-0521-DD-009	Inorganic Chemistry, Metals, PAHs, VOCs
	11/10/2021	GW-18235-1121-BK-018	Indicator Parameters
OW9B-06	6/2/2021	GW-18235-0521-DD-003	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-001	Indicator Parameters
MW1-03	3-Jun-2021	--	Water Level
	11/8/2021	--	Water Level
MW2-03	3-Jun-2021	--	Water Level
	11/8/2021	--	Water Level
MW3-03	3-Jun-2021	--	Water Level
	11/8/2021	--	Water Level

Notes:

Indicator Parameters	Alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, and DOC.
Inorganic Chemistry	Alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulphate, DOC, TDS, suspended solids, phenol, BOD_5, COD, pH, total phosphorus, potassium, conductivity, and calcium.
Metals	Arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, and nickel.
VOCs	Volatile Organic Compounds.
PAHs	Polycyclic Aromatic Hydrocarbons.

Sample Key - Groundwater Monitoring
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location	Date	Sample ID	Parameters Analyzed/Comments
Basal Overburden/Shallow Bedrock Wells			
MW12A-19	**22-May-2020**		Inorganic Chemistry, Metals, PAHs, VOCs
	11/10/2021	GW-18235-1121-BK-016	Indicator Parameters
MW11A-19	6/1/2021	GW-18235-0521-DD-029	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-007	Indicator Parameters
MW10A-18	6/3/2021	GW-18235-0521-DD-006	Inorganic Chemistry, Metals, PAHs, VOCs
	11/9/2021	GW-18235-1121-BK-009	Indicator Parameters
MW1A-13	6/2/2021	GW-18235-0521-DD-012	Inorganic Chemistry, Metals, PAHs, VOCs
	11/9/2021	GW-18235-1121-BK-010/011	Indicator Parameters
MW2A-01	6/2/2021	GW-18235-0521-DD-024	Inorganic Chemistry, Metals, PAHs, VOCs
	11/10/2021	GW-18235-1121-BK-015	Indicator Parameters
MW4A-09	3-Jun-2021	--	Water Level
	11/8/2021	--	Water Level
MW5A-09	6/1/2021	GW-18235-0521-DD-030	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	--	Not Measured
MW6A-07	6/1/2021	GW-18235-0521-DD-031	Inorganic Chemistry, Metals, PAHs, VOCs
	11/10/2021	GW-18235-1121-BK-020/021	Indicator Parameters
OW1A-06	6/2/2021	GW-18235-0521-DD-020	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-006	Indicator Parameters
OW3A-13	6/2/2021	GW-18235-0521-DD-017	Inorganic Chemistry, Metals, PAHs, VOCs
	11/9/2021	GW-18235-1121-BK-013	Indicator Parameters
OW5A-06	6/2/2021	GW-18235-0521-DD-007	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-004	Indicator Parameters
OW8A-06	6/2/2021	GW-18235-0521-DD-005/010	Inorganic Chemistry, Metals, PAHs, VOCs
	11/10/2021	GW-18235-1121-BK-017	Indicator Parameters
OW9A-06	6/2/2021	GW-18235-0521-DD-001/002	Inorganic Chemistry, Metals, PAHs, VOCs
	11/8/2021	GW-18235-1121-BK-002	Indicator Parameters
Bedrock Wells			
MW1D-07	6/2/2021	GW-18235-0521-DD-013	Inorganic Chemistry, Metals, PAHs, VOCs
MW1S-07	6/2/2021	GW-18235-0521-DD-014	Inorganic Chemistry, Metals, PAHs, VOCs
MW2D-07	6/2/2021	GW-18235-0521-DD-022/027	Inorganic Chemistry, Metals, PAHs, VOCs
MW2S-07	6/2/2021	GW-18235-0521-DD-021	Inorganic Chemistry, Metals, PAHs, VOCs
OW8D-07	6/3/2021	GW-18235-0521-DD-025	Inorganic Chemistry, Metals, PAHs, VOCs
OW8S-07	6/3/2021	GW-18235-0521-DD-026	Inorganic Chemistry, Metals, PAHs, VOCs

Notes:

Indicator Parameters	Alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, and DOC.
Inorganic Chemistry	Alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulphate, DOC, TDS, suspended solids, phenol, BOD_5, COD, pH, total phosphorus, potassium, conductivity, and calcium.
Metals	Arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, and nickel.
VOCs	Volatile Organic Compounds.
PAHs	Polycyclic Aromatic Hydrocarbons.

Table 5.3

Summary of Leachate Analytical Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					Leachate				
Sample ID:					LW-18235-0717-DD-033	LST-18235-0818-DD-001	LW-18235-071219-JL-01	LST-18235-0520-DD-001	LST-18235-0521-DD-001
Sample Date:					7/26/2017	8/20/2018	7/12/2019	5/22/2020	6/3/2021
Parameters	Units	ODWS[1] a	PWQO[2] b	ODWS Source					
Field Parameters									
Conductivity, field	uS/cm	-	-		8520	5930	6580	5310	NA
Dissolved oxygen (DO), field	mg/L	-	4-999		-	3.98[b]	0[b]	0.97[b]	NA
pH, field	s.u.	6.5-8.5	6.5-8.5	OG	6.93	9.92[ab]	6.60	6.77	NA
Temperature, field	Deg C	15	-	AO	20.0[a]	17.80[a]	20.14[a]	20.44[a]	NA
Turbidity, field	NTU	5.0	-	MAC	-	38.7[a]	23.9[a]	3.1	NA
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	-	OG	2270[a]	2350[a]	2710[a]	2140[a]	820[a]
Ammonia-N	mg/L	-	-		125	118	195	140	232
Biochemical oxygen demand (BOD)	mg/L	-	-		89.6	165	134	78	44
Chemical oxygen demand (COD)	mg/L	-	-		590	690	1010	535	695
Chloride	mg/L	250	-	AO	724[a]	555[a]	842[a]	595[a]	1130[a]
Conductivity	uS/cm	-	-		5980	5690	6710	5290	7310
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	-	AO	136[a]	221[a]	257[a]	15.6[a]	188[a]
Hardness	mg/L	80-100	-	OG	1800[a]	2040 J[a]	1920[a]	1560 J+[a]	1640[a]
Nitrate (as N)	mg/L	10.0	-	MAC	< 0.40	< 0.40	< 0.20	< 0.20	< 0.40
Nitrite (as N)	mg/L	1.0	-	MAC	< 0.20	< 0.20	< 0.10	< 0.10	< 0.20
pH, lab	s.u.	6.5-8.5	6.5-8.5	OG	7.42	7.38	7.08	7.20	7.27
Phenolics (total)	mg/L	-	0.001		0.026[b]	0.152[b]	0.15[b]	0.0637[b]	0.0015[b]
Phosphorus	mg/L	-	0.01		1.77[b]	1.27[b]	1.15[b]	1.26[b]	1.42[b]
Sulfate	mg/L	500	-	AO	690[a]	271	133	155	287
Total dissolved solids (TDS)	mg/L	500	-	AO	3660[a]	3560[a]	3790[a]	2980[a]	4120[a]
Total kjeldahl nitrogen (TKN)	mg/L	-	-		212	146	279	199	254
Total suspended solids (TSS)	mg/L	-	-		30.2	513	12.5	22.1	5.4
Trihalomethanes	mg/L	0.100	-	MAC	< 0.0032	-	-	< 0.0032	< 0.0032
Turbidity	NTU	5.0	-	MAC	392[a]	-	-	-	-
Xylenes (total)	mg/L	0.09	-	MAC	0.0109	-	-	-	-
Metals									
Aluminum	mg/L	0.10	0.075	OG	0.20[ab]	0.453[ab]	0.113[ab]	0.063	< 0.50[ab]
Arsenic	mg/L	0.01	0.005	IMAC	0.0527[ab]	0.0578[ab]	0.0907[ab]	0.0513[ab]	0.030[ab]
Barium	mg/L	1.0	-	MAC	0.335	0.272	0.368	0.287	0.395
Beryllium	mg/L	-	0.011		< 0.0010	< 0.0010	< 0.0010	-	-
Boron	mg/L	5.0	0.2	IMAC	6.26[ab]	7.50[ab]	10.1[ab]	6.50[ab]	10.0[ab]
Cadmium	mg/L	0.005	0.0002	MAC	< 0.00010	< 0.000050	< 0.000050	< 0.000050	< 0.00050[b]
Calcium	mg/L	-	-		373	408	318	289	281
Chromium	mg/L	0.05	0.001	MAC	0.0210[b]	0.0264[b]	0.0360[b]	0.0305[b]	< 0.050[b]
Cobalt	mg/L	-	0.0009		0.0028[b]	0.0028[b]	0.0032[b]	0.0028[b]	< 0.010[b]
Copper	mg/L	1.0	0.005	AO	< 0.010[b]	< 0.010[b]	< 0.010[b]	< 0.0050	< 0.050[b]
Iron	mg/L	0.30	0.3	AO	< 0.50[ab]	0.70[ab]	0.16	< 0.10	< 1.0[ab]
Lead	mg/L	0.010	0.005	MAC	< 0.0010	0.00130	0.00082	< 0.00050	< 0.0050
Magnesium	mg/L	-	-		212	248	251	203	228
Manganese	mg/L	0.05	-	AO	0.320[a]	0.340[a]	0.249[a]	-	-
Mercury	mg/L	0.001	0.0002	MAC	< 0.000010	< 0.000010	< 0.000010	-	-
Molybdenum	mg/L	-	0.04		0.00089	0.00142	0.00135	0.00088	< 0.0050
Nickel	mg/L	-	0.025		0.0453[b]	0.0421[b]	0.0441[b]	0.0262[b]	< 0.050[b]
Potassium	mg/L	-	-		123	126	141	118	169
Silver	mg/L	-	0.0001		< 0.00050[b]	< 0.00050[b]	< 0.00050[b]	< 0.00050[b]	< 0.0050[b]
Sodium	mg/L	20/200	-	AO	531[a]	504[a]	579[a]	483[a]	716[a]
Thallium	mg/L	-	0.0003		< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.0010[b]
Vanadium	mg/L	-	0.006		0.0191[b]	0.0191[b]	0.0197[b]	0.0147[b]	< 0.050[b]
Zinc	mg/L	5.0	0.03	AO	< 0.030	< 0.030	< 0.030	< 0.030	< 0.30[b]

Table 5.3

Summary of Leachate Analytical Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					Leachate				
Sample ID:					LW-18235-0717-DD-033	LST-18235-0818-DD-001	LW-18235-071219-JL-01	LST-18235-0520-DD-001	LST-18235-0521-DD-001
Sample Date:					7/26/2017	8/20/2018	7/12/2019	5/22/2020	6/3/2021
Parameters	Units	ODWS[1] a	PWQO[2] b	ODWS Source					
Volatile Organic Compounds									
1,1,1,2-Tetrachloroethane	ug/L	-	20		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	10		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	70		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	800		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	40	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	5		< 0.50	< 0.20	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	200	2.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	100	IMAC	0.55	0.72	0.97	0.64	< 0.50
1,2-Dichloropropane	ug/L	-	0.7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	2.5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	4	MAC	< 1.0	0.92	1.1	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	400		< 20	52	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 30	< 20	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MI	ug/L	-	-		< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	-		< 30	72	36	< 30	< 30
Benzene	ug/L	1	100	MAC	3.06[a]	3.12[a]	3.89[a]	4.27[a]	3.40[a]
Bromodichloromethane	ug/L	-	200		< 2.0	< 1.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	60		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.9		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		-	8.4	-	-	-
Carbon tetrachloride	ug/L	2	-	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	15	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	-	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	700		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	200		0.89	0.80	1.79	0.95	0.71
cis-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 1.7	< 0.50
Dibromochloromethane	ug/L	-	40		< 2.0	< 1.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	-		-	< 1.0	-	-	-
Ethylbenzene	ug/L	140	8	MAC	6.68	8.91[b]	11.5[b]	10.4[b]	8.31[b]
Hexane	ug/L	-	-		-	< 0.50	-	-	-
m&p-Xylenes	ug/L	-	2		8.2[b]	6.1[b]	8.0[b]	3.6[b]	1.7
Methyl tert butyl ether (MTBE)	ug/L	15	200	AO	< 2.0	< 0.60	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	100	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	40		2.76	2.04	3.79	2.34	1.03
Styrene	ug/L	-	4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	50	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	0.8	MAC	4.10[b]	4.47[b]	7.37[b]	2.93[b]	1.06[b]
trans-1,2-Dichloroethene	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	20	MAC	< 0.50	< 0.50	0.61	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	-		< 5.0	< 1.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	100	-	MAC	-	< 2.0	< 1.0	-	-
Vinyl chloride	ug/L	1	600	MAC	0.70	< 0.50	0.76	0.50	< 0.50
Xylenes (total)	ug/L	90	-	MAC	-	8.1	11.8	5.9	2.7

Table 5.3

Summary of Leachate Analytical Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					Leachate				
Sample ID:					LW-18235-0717-DD-033	LST-18235-0818-DD-001	LW-18235-071219-JL-01	LST-18235-0520-DD-001	LST-18235-0521-DD-001
Sample Date:					7/26/2017	8/20/2018	7/12/2019	5/22/2020	6/3/2021
Parameters	**Units**	**ODWS[1] a**	**PWQO[2] b**	**ODWS Source**					
Semi-volatile Organic Compounds									
1-Methylnaphthalene	ug/L	-	2		-	0.421	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-		1.08	0.925	1.41	0.926	1.26
2-Methylnaphthalene	ug/L	-	2		-	0.504	-	-	-
Acenaphthene	ug/L	-	-		0.572	0.371	0.640	0.425	0.564
Acenaphthylene	ug/L	-	-		< 0.020	0.026	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	0.0008		0.032[b]	-	0.038[b]	0.032 J+[b]	0.047[b]
Benzo(a)anthracene	ug/L	-	0.0004		< 0.20[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]
Benzo(a)pyrene	ug/L	0.01	-	MAC	< 0.10[a]	0.0086	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	-		< 0.20	< 0.020	< 0.020	< 0.020	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-		-	-	-	-	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.00002		< 0.20[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]
Benzo(k)fluoranthene	ug/L	-	0.0002		< 0.20[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]
Chrysene	ug/L	-	0.0001		< 0.20[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]
Dibenz(a,h)anthracene	ug/L	-	0.002		< 0.20[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]	< 0.020[b]
Fluoranthene	ug/L	-	0.0008		< 0.20[b]	0.050[b]	0.042[b]	0.021[b]	0.034[b]
Fluorene	ug/L	-	0.2		0.343[b]	-	0.544[b]	0.350[b]	0.426[b]
Indeno(1,2,3-cd)pyrene	ug/L	-	-		< 0.20	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	7		5.77	6.79	8.55[b]	6.53	8.12[b]
Phenanthrene	ug/L	-	0.03		0.286[b]	-	0.492[b]	0.270[b]	0.411[b]
Pyrene	ug/L	-	-		< 0.20	0.055	0.034	< 0.025	0.023

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.4a

Summary of Groundwater Analytical Results – Shallow Overburden (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW2-03
Sample ID:				GW-18235-0517-DD-023	GW-18235-0717-DD-030	GW-18235-1117-DD-021	GW-18235-0518-DD-024	GW-18235-071218-DD-029	GW-18235-110818-DD-026	GW-18235-0517-DD-007	GW-18235-0717-DD-010	GW-18235-1117-DD-005	GW-18235-1117-DD-006	GW-18235-0518-DD-008	GW-18235-071218-DD-008	GW-18235-110818-DD-007	GW-18235-0519-DD-006	GW-18235-1119-DD-022	GW-18235-0520-DD-008	GW-18235-1120-HM-018	GW-18235-0521-DD-015	GW-18235-1121-BK-012	GW-18235-0517-DD-021
Sample Date:		ODWS[1]	ODWS Source	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/17/2017	7/26/2017	12/1/2017	12/1/2017 Duplicate	5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/28/2019	5/22/2020	11/23/2020	6/2/2021	11/9/2021	5/17/2017
Parameters	**Units**																						
Field Parameters																							
Conductivity, field	uS/cm	-		1970	3160	1830	952	1860	1760	262	4290	2100	2100	2750	2820	1910	2900	2700	2680	5230	2900	3200	1930
Dissolved oxygen (DO), field	mg/L	-		-	-	-	-	6.19	3.01	-	-	-	-	-	3.78	2.94	-	-	8.52	0	6.42	1.87	-
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	45	-
pH, field	s.u.	6.5-8.5	OG	7.13	7.28	6.94	6.86	6.89	7.14	7.34	7.33	6.90	6.90	7.67	7.13	7.31	7.44	7.32	6.84	6.87	7.26	7.35	7.12
Temperature, field	Deg C	15	AO	9.0	12.7	12.6	13.70	12.49	13.20	8.6	14.2	9.3	9.3	13.43	12.71	10.70	10.52	8.32	**16.51**	10.83	12.19	13.23	8.8
Turbidity, field	NTU	5.0	MAC	-	-	-	-	**41.9**	**169**	-	-	-	-	-	**>999**	**553**	-	-	**>1000**	**>1000**	-	**550**	-
Volume purged	L	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	329	349	327	365	366	365	487	468	450	448	460	450	427	446	**540**	**520**	**528**	466	473	297
Ammonia-N	mg/L	-		< 0.020	< 0.020	< 0.032	< 0.057	< 0.020	< 0.034	0.039	< 0.058	< 0.309	< 0.335	< 0.459	0.684	< 0.260	0.078	0.097	0.044	0.074	0.038	0.039	< 0.020
Biochemical oxygen demand (BOD)	mg/L	-		-	< 2.0	-	-	< 2.0	-	-	< 2.0	-	-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	-	-
Chemical oxygen demand (COD)	mg/L	-		18	24	20	20	28	23	< 100	52	52	49	730	81	70	74	98	78	161	28	32	28
Chloride	mg/L	250	AO	**328**	**351**	**278**	**262**	**266**	227	52.3	59.2	43.3	42.2	65.0	46.8	41.5	51.2	58.9	56.1	57.4	55.0	55.9	**437**
Conductivity	uS/cm	-		2020	2040	1790	1610	1730	1630	2690	2710	2290	2210	2440	2390	2200	2490	2780	2810	2770	2830	2970	2030
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	4.3	4.5	**5.4**	3.9	4.32	**6.04**	4.9	4.7	**5.1**	5.0	**7.1**	**6.64**	**6.08**	**5.93**	**7.27**	**17.8**	**6.60**	**7.44**	**7.26**	**6.9**
Hardness	mg/L	80-100	OG	-	**736**	-	-	**723**	-	-	**1420**	-	-	-	**1300**	-	**1310**	-	**1640**	-	**1690**	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	0.13	0.15	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.27	0.12	0.021	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	< 0.050	-	-	< 0.050	-	-	-	< 0.050	-	< 0.010	-	< 0.050	-	< 0.050	-	-
pH, lab	s.u.	6.5-8.5	OG	7.69	7.48	8.02	7.79	7.77	7.24	7.79	7.73	8.01	7.99	8.04	7.78	7.39	7.58	7.85	7.92	7.65	8.06	7.42	7.73
Phenolics (total)	mg/L	-		-	< 0.0020	-	-	< 0.0046	-	-	< 0.0072	-	-	-	< 0.0017	-	0.0081	-	< 0.0022	-	0.0023	-	-
Phosphorus	mg/L	-		-	0.0395	-	-	0.0710	-	-	0.165	-	-	-	0.295	-	0.539	-	0.494	-	0.86	-	-
Sulfate	mg/L	500	AO	258	287	245	246	242	233	**1200**	**1320**	**1000**	**992**	**1350**	**1140**	**966**	**1080**	**1280**	**1280**	**1280**	**1230**	**1360**	155
Total dissolved solids (TDS)	mg/L	500	AO	**1260**	**1300**	**1160**	**1120**	**1210**	**1030**	**2210**	**2280**	**1930**	**1830**	**2230**	**2190**	**1720**	**2220 J**	**2340**	**2470**	**2220**	**2470**	**2360**	**1260**
Total kjeldahl nitrogen (TKN)	mg/L	-		-	0.15	-	-	< 0.15	-	-	0.63	-	-	-	1.69	-	< 1.5	-	2.0	-	1.40	-	-
Total suspended solids (TSS)	mg/L	-		-	58.0	-	-	135	-	-	519	-	-	-	1190	-	1040	-	740	-	791	-	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	-	-
Turbidity	NTU	5.0	MAC	**84.1**	**70.0**	**61.9**	**56.0**	**138**	**54.6 J**	**581**	**777**	**1470 J**	**3060 J**	**>4000**	**2200**	**1090 J**	-	-	-	-	-	-	**92.8**
Xylenes (total)	mg/L	0.09	MAC	-	< 0.0011	-	-	< 0.0011	-	-	< 0.0011	-	-	-	< 0.0011	-	-	-	-	-	-	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	0.0124	-	-	0.065	-	-	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-	-
Arsenic (dissolved)	mg/L	0.010	IMAC	-	< 0.0010	-	-	0.00031	-	-	0.0020	-	-	-	< 0.0010	-	0.0012	-	< 0.0010	-	< 0.0010	-	-
Barium (dissolved)	mg/L	1.0	MAC	0.109	0.109	0.104	0.0863	0.134	0.0911	0.0516	0.0542	0.0583	0.0569	0.0485	0.0454	0.0313	0.0721	0.0514	0.0514	0.0516	0.0430	0.0536	0.0999
Beryllium (dissolved)	mg/L	-		-	< 0.0010	-	-	< 0.00010	-	-	< 0.0010	-	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	0.032	0.042	0.037	0.039	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	0.000011	-	-	< 0.00010	-	-	-	0.000162	-	0.000093	-	0.000086	-	0.000201	-	-
Calcium (dissolved)	mg/L	-		215	209	195	214	201	198	217	182	178	181	132	212	160	205	151	197	164	181	252	222
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.00050	-	-	< 0.0050	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-
Cobalt (dissolved)	mg/L	-		-	< 0.0010	-	-	< 0.00010	-	-	0.0104	-	-	-	< 0.0010	-	0.0030	-	0.0013	-	0.0017	-	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	0.00133	-	-	< 0.0020	-	-	-	0.0057	-	0.0041	-	< 0.0033	-	0.0024	-	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.010	< 0.010	< 0.010	0.039	< 0.10	0.17	< 0.10	< 0.10	**0.49**	< 0.10	< 0.10	< 0.10	**0.51**	< 0.10	0.29	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.000050	-	-	< 0.00050	-	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-
Magnesium (dissolved)	mg/L	-		57.5	52.1	48.1	58.6	54.0	40.6	193	235	137	137	269	188	120	195	299	280	300	300	236	46.5
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.0050	-	-	0.00512	-	-	**0.918**	-	-	-	0.0204	-	**0.261**	-	**0.0892**	-	**0.192**	-	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-	-	< 0.000010	-	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	-
Molybdenum (dissolved)	mg/L	-		-	0.00123	-	-	0.00117	-	-	0.00733	-	-	-	0.00913	-	0.00634	-	0.00491	-	0.00467	-	-
Nickel (dissolved)	mg/L	-		-	< 0.0050	-	-	0.00089	-	-	0.0123	-	-	-	< 0.0050	-	0.0070	-	0.0086	-	0.0055	-	-
Potassium (dissolved)	mg/L	-		-	2.39	-	-	2.61	-	-	3.21	-	-	-	3.96	-	2.47	-	3.00 J+	-	3.33	-	-
Silver (dissolved)	mg/L	-		-	< 0.00050	-	-	< 0.000050	-	-	< 0.00050	-	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-
Sodium (dissolved)	mg/L	20/200	AO	**121**	**101**	**124**	**106**	**115**	**90.5**	**144**	**130**	**101**	**106**	**138**	**127**	**119**	**132**	**140**	**142**	**145**	**156**	**156**	**117**
Thallium (dissolved)	mg/L	-		-	< 0.00010	-	-	0.000016	-	-	< 0.00010	-	-	-	0.00021	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-
Vanadium (dissolved)	mg/L	-		-	< 0.0050	-	-	< 0.00050	-	-	< 0.0050	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.0010	-	-	< 0.010	-	-	-	< 0.010	-	< 0.010	-	< 0.010	-	0.017	-	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.4a

Summary of Groundwater Analytical Results – Shallow Overburden (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW5B-09	MW5B-09
Sample ID:				GW-18235-0717-DD-028	GW-18235-1117-DD-019	GW-18235-0518-DD-022	GW-18235-071218-DD-027	GW-18235-110818-DD-024	GW-18235-0517-DD-013	GW-18235-0717-DD-018	GW-18235-0518-DD-014	GW-18235-071218-DD-017	MW2B-07~20181108~N	GW-18235-0519-DD-012	GW-18235-0521-DD-023	GW-18235-0517-DD-022	GW-18235-0717-DD-029	GW-18235-1117-DD-020	GW-18235-0518-DD-023	GW-18235-071218-DD-028	GW-18235-110818-DD-025	MW5B-09~20180530~N	MW5B-09~20180712~N
Sample Date:				7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/17/2017	7/26/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	6/2/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2018	7/12/2018
Parameters	**Units**	**ODWS[1]**	**ODWS Source**																			
Field Parameters																						
Conductivity, field	uS/cm	-		2830	1660	705	1830	1720	2340	3960	2560	2810	-	2810	2970	875	1990	970	667	1240	1210	-	-
Dissolved oxygen (DO), field	mg/L	-		-	-	-	6.03	3.79	-	-	-	3.96	-	-	8.17	-	-	-	-	5.82	3.57	-	-
Not sampled	none	-		-	-	-	-	-	-	-	-	-	D	-	-	-	-	-	-	-	-	D	D
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	-	-	-	-	-	-	-	73	-	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	7.22	6.90	7.07	7.37	7.15	7.39	7.45	6.61	6.58	-	7.37	7.27	7.13	7.25	6.91	6.82	7.06	7.25	-	-
Temperature, field	Deg C	15	AO	12.3	12.4	14.06	13.58	11.80	9.0	11.7	10.7	11.97	-	9.09	11.45	8.5	12.6	12.1	12.38	12.19	12.84	-	-
Turbidity, field	NTU	5.0	MAC	-	-	-	**54.0**	**116**	-	-	-	**>999**	-	-	**1000**	-	-	-	-	**49.0**	**100**	-	-
Volume purged	L	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	325	315	335	351	279	**513**	**578**	496	**549**	-	435	**619**	407	488	439	406	412	278	-	-
Ammonia-N	mg/L	-		< 0.020	< 0.020	< 0.161	0.060	< 0.022	< 0.020	< 0.042	< 0.139	0.126	-	0.012	0.011	0.035	< 0.020	< 0.124	< 0.120	0.029	< 0.254	-	-
Biochemical oxygen demand (BOD)	mg/L	-		< 2.0	-	-	< 2.0	-	-	< 2.0	-	< 2.0	-	< 3.0	< 3.0	-	< 2.0	-	-	< 2.0	-	-	-
Chemical oxygen demand (COD)	mg/L	-		25	42	37	34	37	31	740	350	520	-	34	22	38	42	33	41	33	42	-	-
Chloride	mg/L	250	AO	**350**	**284**	**287**	**282**	**296**	22.3	26.4	25.3	25.9	-	24.5	32.0	105	121	109	97.2	112	137	-	-
Conductivity	uS/cm	-		1820	1640	1540	1650	1620	2270	2510	2230	2420	-	2110	3100	1260	1480	1380	1100	1190	1120	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	**7.4**	**9.7**	**6.7**	**6.93**	**10.3**	4.8	4.9	4.9	**5.33**	-	**6.08**	**11.8**	**7.6**	**8.4**	**8.5**	**6.9**	4.10	**15.9**	-	-
Hardness	mg/L	80-100	OG	**671**	-	-	**656**	-	-	**1280**	-	**1130**	-	**1350**	**1710**	-	**562**	-	-	**566**	-	-	-
Nitrate (as N)	mg/L	10.0	MAC	0.11	< 0.10	< 0.10	0.13	0.11	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.020	< 0.10	0.13	< 0.10	0.10	0.34	0.41	< 0.10	-	-
Nitrite (as N)	mg/L	1.0	MAC	< 0.050	-	-	< 0.050	-	-	< 0.050	-	< 0.050	-	< 0.010	< 0.050	-	< 0.050	-	-	< 0.050	-	-	-
pH, lab	s.u.	6.5-8.5	OG	7.57	7.95	7.79	7.78	7.21	7.79	7.71	7.89	7.85	-	7.62	8.20	7.70	7.63	8.02	7.85	7.85	7.39	-	-
Phenolics (total)	mg/L	-		< 0.0039	-	-	< 0.0021	-	-	< 0.0054	-	< 0.0020	-	0.0113	0.0067	-	< 0.0079	-	-	< 0.0016	-	-	-
Phosphorus	mg/L	-		0.0600	-	-	0.0732	-	-	46.4	-	4.50	-	0.187	0.837	-	0.188	-	-	0.0730	-	-	-
Sulfate	mg/L	500	AO	150	153	144	142	169	**843**	**1070**	**1000**	**1040**	-	**871**	**1390**	92.5	209	189	171	137	128	-	-
Total dissolved solids (TDS)	mg/L	500	AO	**1150**	**1070**	**1080**	**1150**	**1080**	**1740**	**2210**	**2000**	**2080**	-	**1810 J**	**2670**	**744**	**830**	**910**	**744**	**814**	**743**	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-		0.41	-	-	0.39	-	-	23.3	-	3.4	-	0.32	1.00	-	0.68	-	-	0.42	-	-	-
Total suspended solids (TSS)	mg/L	-		85.6	-	-	80.7	-	-	20900	-	4170	-	164	1350	-	250	-	-	55.3	-	-	-
Trihalomethanes	mg/L	0.100	MAC	< 0.0032	-	-	< 0.0032	-	-	< 0.0032	-	< 0.0032	-	-	< 0.002	-	< 0.0032	-	-	< 0.0032	-	-	-
Turbidity	NTU	5.0	MAC	**79.7**	**88.2**	**202**	**85.8**	**104 J**	**317**	**>4000**	**>4000**	**>4000**	-	-	-	**151**	**206**	**87.0**	**216**	**59.2**	**48.4 J**	-	-
Xylenes (total)	mg/L	0.09	MAC	< 0.0011	-	-	< 0.0011	-	-	< 0.0011	-	< 0.0011	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	< 0.0050	-	-	< 0.050	-	-	< 0.050	-	< 0.050	-	< 0.050	0.075	-	< 0.0050	-	-	< 0.0050	-	-	-
Arsenic (dissolved)	mg/L	0.010	IMAC	0.00040	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	< 0.0010	-	0.00055	-	-	0.00064	-	-	-
Barium (dissolved)	mg/L	1.0	MAC	0.0955	0.0868	0.0766	0.0801	0.0665	0.0795	0.0596	0.0713	0.140	-	0.0805	0.0836	0.0352	0.0486	0.0447	0.0371	0.0357	0.0397	-	-
Beryllium (dissolved)	mg/L	-		< 0.00010	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	< 0.0010	-	< 0.00010	-	-	< 0.00010	-	-	-
Boron (dissolved)	mg/L	5.0	IMAC	0.022	< 0.10	0.025	< 0.10	0.025	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.10	< 0.10	0.045	0.037	< 0.10	0.037	0.034	0.031	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	0.000017	-	-	< 0.000050	-	-	< 0.00010	-	< 0.000050	-	< 0.000050	< 0.000050	-	0.000015	-	-	0.000011	-	-	-
Calcium (dissolved)	mg/L	-		201	164	186	195	174	138	123	105	118	-	116	130	133	140	127	113	133	130	-	-
Chromium (dissolved)	mg/L	0.05	MAC	< 0.00050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	< 0.00050	-	-	< 0.00050	-	-	-
Cobalt (dissolved)	mg/L	-		< 0.00010	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	< 0.0010	-	0.00011	-	-	0.00012	-	-	-
Copper (dissolved)	mg/L	1.0	AO	< 0.00214	-	-	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	< 0.0020	-	< 0.00216	-	-	0.00239	-	-	-
Iron (dissolved)	mg/L	0.30	AO	0.015	< 0.10	0.035	< 0.10	< 0.010	< 0.10	< 0.10	< 0.10	0.16	-	< 0.10	**0.41**	< 0.010	0.037	< 0.10	0.032	< 0.010	< 0.010	-	-
Lead (dissolved)	mg/L	0.01	MAC	< 0.000050	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	< 0.00050	-	< 0.000050	-	-	< 0.000050	-	-	-
Magnesium (dissolved)	mg/L	-		41.2	35.8	40.4	41.2	37.4	214	237	107	202	-	257	337	34.6	51.9	55.0	60.4	56.9	38.0	-	-
Manganese (dissolved)	mg/L	0.05	AO	0.0251	-	-	< 0.0050	-	-	0.0213	-	0.0358	-	< 0.0050	**0.0683**	-	0.00764	-	-	0.00357	-	-	-
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.000010	< 0.0000050	-	< 0.000010	-	-	< 0.000010	-	-	-
Molybdenum (dissolved)	mg/L	-		0.00144	-	-	0.00105	-	-	0.00263	-	0.00207	-	0.00301	0.00245	-	0.00129	-	-	0.00127	-	-	-
Nickel (dissolved)	mg/L	-		0.00145	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	0.00108	-	-	0.00098	-	-	-
Potassium (dissolved)	mg/L	-		1.69	-	-	1.73	-	-	5.66	-	4.63	-	6.21	6.36	-	1.27	-	-	1.31	-	-	-
Silver (dissolved)	mg/L	-		< 0.000050	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	< 0.00050	-	< 0.000050	-	-	< 0.000050	-	-	-
Sodium (dissolved)	mg/L	20/200	AO	**115**	**105**	**104**	**106**	**118**	**115**	**119**	**70.2**	**112**	-	**132**	**171**	**46.0**	**56.1**	**52.2**	**58.0**	**57.7**	**58.0**	-	-
Thallium (dissolved)	mg/L	-		< 0.000010	-	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	< 0.00010	-	< 0.000010	-	-	< 0.000010	-	-	-
Vanadium (dissolved)	mg/L	-		< 0.00050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	< 0.00050	-	-	< 0.00050	-	-	-
Zinc (dissolved)	mg/L	5.0	AO	0.0011	-	-	< 0.010	-	-	< 0.010	-	< 0.010	-	< 0.010	< 0.010	-	0.0010	-	-	< 0.0010	-	-	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.4a

Summary of Groundwater Analytical Results – Shallow Overburden (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW5B-09	MW5B-09	MW5B-09	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW10B-18	MW10B-18
Sample ID:				GW-18235-0519-DD-022	GW-18235-0520-DD-002	GW-18235-0521-DD-028**	GW-18235-0517-DD-004	GW-18235-0517-DD-005	GW-18235-0717-DD-005	GW-18235-0717-DD-006	GW-18235-1117-DD-002	GW-18235-1117-DD-003	GW-18235-0518-DD-005	GW-18235-071218-DD-005	GW-18235-110818-DD-005	GW-18235-0519-DD-021	GW-18235-1119-DD-004	GW-18235-0520-DD-004	GW-18235-1120-HM-002	GW-18235-0521-DD-032**	GW-18235-1121-BK-019	GW-18235-0519-DD-017	GW-18235-0519-DD-028
Sample Date:		**ODWS[1]**	**ODWS Source**	5/30/2019	5/22/2020	6/3/2021	5/17/2017	5/17/2017 Duplicate	7/26/2017	7/26/2017 Duplicate	12/1/2017	12/1/2017 Duplicate	5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	11/23/2020	6/1/2021	11/10/2021	5/30/2019	5/30/2019 Duplicate
Parameters	**Units**																					
Field Parameters																						
Conductivity, field	uS/cm	-		3600	2610	NA	1620	1620	4160	4160	2020	2020	2110	2410	2840	2320	2860	2550	2770	NA	2590	1940	1940
Dissolved oxygen (DO), field	mg/L	-		-	6.27	NA	-	-	-	-	-	-	-	3.40	2.60	3.68	6.73	3.47	1.81	NA	3.74	-	-
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	NA	-	-	-	-	-	-	-	-	-	+16	-	-	-	NA	79	-	-
pH, field	s.u.	6.5-8.5	OG	7.24	7.64	NA	7.41	7.41	7.15	7.15	6.78	6.78	6.64	7.25	7.12	7.26	6.74	7.3	7.05	NA	7.55	7.11	7.11
Temperature, field	Deg C	15	AO	9.47	12.21	NA	8.8	8.8	13.4	13.4	9.0	9.0	11.7	13.90	11.62	-	10.50	12.94	12	NA	14.89	10.94	10.94
Turbidity, field	NTU	5.0	MAC	-	0	NA	-	-	-	-	-	-	-	**34.0**	**6.13**	**50.3**	**>999**	**213**	**179**	NA	**58**	-	-
Volume purged	L	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	481	**518**	**509**	389	385	412	421	426	412	355	384	409	424	461	458	441	430	440	463	455
Ammonia-N	mg/L	-		< 0.010	< 0.010	0.190	< 0.020	< 0.020	< 0.020	< 0.020	< 0.179	< 0.070	< 0.380	< 0.020	< 0.276	< 0.010	0.034	< 0.010	< 0.010	< 0.010	0.049	0.270	0.272
Biochemical oxygen demand (BOD)	mg/L	-		< 3.0	< 3.0	< 3.0	-	-	< 2.0	< 2.0	-	-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	-	< 3.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-		56	56	14	24	36	17	14	25	26	19	19	23	16	13	18	13	< 10	15	78	83
Chloride	mg/L	250	AO	16.1	15.1	14.4	169	137	136	123	127	138	206	169	193	167	159	177	142	139	169	27.7	27.9
Conductivity	uS/cm	-		3390	3080	4210	2120	2130	2540	2560	2560	2470	2000	2390	2660	2630	2660	2560	2670	2670	2730	1120	1120
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	**8.97**	**6.63 J+**	**5.9**	3.8	3.8	3.9	3.9	4.4	4.7	4.0	4.47	4.74	**5.16**	4.83	**5.32 J+**	**6.51**	4.32	**6.33**	**10.1**	**8.65**
Hardness	mg/L	80-100	OG	**1950**	**2120**	**2990**	-	-	**1440**	**1470**	-	-	-	**1280**	-	**1520**	-	**1610**	-	**1560**	-	**620**	**605**
Nitrate (as N)	mg/L	10.0	MAC	0.133	< 0.20	< 0.20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.029	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.087	0.085
Nitrite (as N)	mg/L	1.0	MAC	< 0.010	< 0.10	< 0.10	-	-	< 0.050	< 0.050	-	-	-	< 0.050	-	< 0.010	-	< 0.050	-	< 0.050	-	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	OG	7.73	8.10	7.09	7.87	7.87	7.71	7.71	8.01	8.05	7.88	7.82	7.39	7.56	7.74	8.02	7.93	7.68	8.03	6.96	6.96
Phenolics (total)	mg/L	-		0.0128	< 0.0015	0.0030	-	-	< 0.0134	< 0.0088	-	-	-	< 0.0020	-	0.0132	-	< 0.0010	-	0.0030	-	0.0083 J	0.0236 J
Phosphorus	mg/L	-		0.388	0.739	2.15	-	-	0.0167	0.0166	-	-	-	0.0080	-	0.148	-	0.0560	-	0.0152	-	0.883	0.973
Sulfate	mg/L	500	AO	**1790**	**1510**	**2780**	**714**	**599**	**1030**	**1040**	**1140**	**1080**	**730**	**1010**	**1080**	**1020**	**1110**	**967**	**1160**	**1030**	**1080**	206	206
Total dissolved solids (TDS)	mg/L	500	AO	**3100 J**	**2870**	**4360**	**1560**	**1600**	**2140**	**2130**	**2210**	**2070**	**1570**	**2090**	**2120**	**2530 J**	**2250**	**2200**	**2270**	**2160**	**2280**	**767**	**808**
Total kjeldahl nitrogen (TKN)	mg/L	-		< 1.5	1.7	0.70	-	-	< 0.15	0.15	-	-	-	< 0.15	-	0.27	-	0.20	-	< 0.50	-	1.20	1.27
Total suspended solids (TSS)	mg/L	-		2590	4240	7030	-	-	29.3	23.7	-	-	-	6.5	-	81.0	-	65.2	-	18.4	-	1370	1540
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	< 0.002	-	-	< 0.0032	< 0.0032	-	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	-	-	-
Turbidity	NTU	5.0	MAC	-	-	-	**22.5**	**13.8**	**27.9**	**26.8**	**19.2**	**20.8**	**24.2**	**7.51**	**25.4 J**	-	-	-	-	-	-	-	-
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	-	< 0.0011	< 0.0011	-	-	-	< 0.0011	-	-	-	-	-	-	-	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	< 0.050	< 0.050	< 0.050	-	-	< 0.050	< 0.050	-	-	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.0050	< 0.0050
Arsenic (dissolved)	mg/L	0.010	IMAC	0.0012	0.0034	0.0083	-	-	< 0.0010	< 0.0010	-	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	0.00153	0.00154
Barium (dissolved)	mg/L	1.0	MAC	0.0459	0.0255 J+	0.0100	0.0143	0.0149	0.0167	0.0164	0.0122	0.0121	0.0112	< 0.0155	0.0179	0.0112	0.0146	0.0150 J+	0.0159	0.0156	0.0193	0.108	0.109
Beryllium (dissolved)	mg/L	-		< 0.0010	< 0.0010	< 0.0010	-	-	< 0.0010	< 0.0010	-	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.00010	< 0.00010
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	0.19	0.50	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.045	0.045
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.000050	< 0.000050	< 0.000050	-	-	< 0.00010	< 0.00010	-	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	0.000019	0.000020
Calcium (dissolved)	mg/L	-		118	200	550	166	176	165	169	162	164	158	189	209	193	201	182	207	211	201	206	201
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	< 0.0050	< 0.0050	-	-	< 0.0050	< 0.0050	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.00050	< 0.00050
Cobalt (dissolved)	mg/L	-		< 0.0010	< 0.0010	0.0013	-	-	< 0.0010	< 0.0010	-	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	0.00086	0.00086
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	< 0.0020	0.0020	-	-	< 0.0020	< 0.0020	-	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	0.00170	0.00171
Iron (dissolved)	mg/L	0.30	AO	< 0.10	**0.48**	**3.10**	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.23	< 0.10	< 0.10	< 0.10	< 0.10	0.093	0.095
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	< 0.00050	< 0.00050	-	-	< 0.00050	< 0.00050	-	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.000050	< 0.000050
Magnesium (dissolved)	mg/L	-		401	394	393	252	253	249	254	152	151	139	196	227	252	276	281	276	250	232	25.7	24.9
Manganese (dissolved)	mg/L	0.05	AO	< 0.0050	0.0144	**0.200**	-	-	**0.120**	**0.121**	-	-	-	< 0.0050	-	0.0072	-	< 0.0050	-	< 0.0050	-	**0.361**	**0.356**
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	< 0.0000050	< 0.0000050	-	-	< 0.000010	< 0.000010	-	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	< 0.000010	< 0.000010
Molybdenum (dissolved)	mg/L	-		0.00436	0.00383	0.00471	-	-	0.00106	0.00110	-	-	-	0.00117	-	0.00101	-	0.00092	-	0.00103	-	0.00169	0.00170
Nickel (dissolved)	mg/L	-		< 0.0050	< 0.0050	< 0.0050	-	-	< 0.0050	< 0.0050	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	0.00158	0.00158
Potassium (dissolved)	mg/L	-		6.97	6.65	5.46	-	-	2.95	2.97	-	-	-	1.78	-	2.03	-	2.78 J+	-	2.18	-	2.97	2.98
Silver (dissolved)	mg/L	-		< 0.00050	< 0.00050	< 0.00050	-	-	< 0.00050	< 0.00050	-	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.000050	< 0.000050
Sodium (dissolved)	mg/L	20/200	AO	**169**	**168**	**121**	**91.5**	**89.5**	**79.7**	**82.2**	**86.3**	**87.3**	**99.5**	**82.8**	**95.3**	**84.6**	**86.3**	**86.1**	**86.0**	**88.9**	**97.0**	17.7	17.5
Thallium (dissolved)	mg/L	-		< 0.00010	< 0.00010	< 0.00010	-	-	< 0.00010	< 0.00010	-	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	0.000023	0.000022
Vanadium (dissolved)	mg/L	-		< 0.0050	< 0.0050	< 0.0050	-	-	< 0.0050	< 0.0050	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	0.00135	0.00133
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	< 0.010	< 0.010	-	-	< 0.010	< 0.010	-	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	0.0018	0.0018

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.4a

Summary of Groundwater Analytical Results – Shallow Overburden (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW10B-18	MW10B-18	MW10B-18	MW10B-18	MW10B-18	MW11B-19	MW11B-19	MW11B-19	MW11B-19	MW11B-19	MW12B-19	MW12B-19	MW12B-19	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06
Sample ID:				GW-18235-1119-DD-001	GW-18235-0520-DD-026	GW-18235-1120-HM-004	GW-18235-0521-DD-011**	GW-18235-1121-BK-022	GW-18235-1119-DD-010	GW-18235-0520-DD-028	GW-18235-1120-HM-005	GW-18235-0521-DD-016**	GW-18235-1121-BK-008	GW-18235-1119-DD-032	GW-18235-0520-DD-030	GW-18235-0520-DD-032	GW-18235-0517-DD-017	GW-18235-0717-DD-022	GW-18235-1117-DD-015	GW-18235-0518-DD-018	GW-18235-071218-DD-021	GW-18235-110818-DD-017	GW-18235-0519-DD-032
Sample Date:		**ODWS[1]**	**ODWS Source**	**11/29/2019**	**5/22/2020**	**11/26/2020**	**6/3/2021**	**11/12/2021**	**12/2/2019**	**5/22/2020**	**11/26/2020**	**6/2/2021**	**11/8/2021**	**11/29/2019**	**5/22/2020**	**5/22/2020 Duplicate**	**5/17/2017**	**7/26/2017**	**12/1/2017**	**5/30/2018**	**7/12/2018**	**11/8/2018**	**5/30/2019**
Parameters	**Units**																						
Field Parameters																							
Conductivity, field	uS/cm	-		1730	1250	1500	NA	1390	5540	7030	8.56	NA	7980	3740	2790	2790	1970	3370	2140	2160	2420	2310	2140
Dissolved oxygen (DO), field	mg/L	-		3.51	2.62	4.5	NA	2.58	0.74	3.03	1.54	NA	3.34		4.13	4.13	-	-	-	-	4.23	2.89	
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	NA	220	-	-	-	NA	107	-	-	-	-	-	-	-	-	-	-75
pH, field	s.u.	6.5-8.5	OG	6.79	6.98	5.58	NA	6.74	6.90	7	5.4	NA	7.22	7.24	7.23	7.23	7.32	7.23	6.90	6.56	7.08	7.12	7.15
Temperature, field	Deg C	15	AO	9.09	14.38	10.47	NA	13.12	8.11	14.85	9.71	NA	11.45	6.83	10.95	10.95	7.7	11.9	10.5	10.2	12.57	10.53	-
Turbidity, field	NTU	5.0	MAC	>999	0	>1000	NA	>1000	384	627	>1000	NA	313	396	404	404	-	-	-	-	53.0	152	150
Volume purged	L	-		-	-	-	-	7	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	430	406	411	442	411	554	684	698	694	698	1040	993	981	528	544	565	515	500	560	675
Ammonia-N	mg/L	-		0.191	0.023	0.054	0.057	0.035	0.206	0.052	0.011	< 0.010	0.019	0.015	0.017	0.021	< 0.020	< 0.020	< 0.129	< 0.054	< 0.020	< 0.061	< 0.010
Biochemical oxygen demand (BOD)	mg/L	-		-	< 3.0	-	3.4	-	-	< 3.0	-	< 3.0	-	-	< 3.0	< 3.0	-	< 2.0	-	-	< 2.0	-	< 3.0
Chemical oxygen demand (COD)	mg/L	-		134	46	33	47	49	63	39	39	27	49	60	30	32	10	17	13	25	25	21	20
Chloride	mg/L	250	AO	31.1	24.2	33.0	37.6	47.2	34	22	20	30	24	18.5	36.6	36.6	63.0	63.3	61.4	68.7	69.6	66.9	48.4
Conductivity	uS/cm	-		1190	1180	1290	1310	1370	5850	8260	8470	8820	8660	3610	2980	2980	2090	2110	2060	1940	1970	2130	2240
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	8.55	7.56 J+	9.37	7.49	7.50	13.7	10.3	11.3	11.4	9.61	14.8	9.24 J+	9.19 J+	3.5	4.5	4.1	4.7	4.11	5.16	3.98
Hardness	mg/L	80-100	OG	-	714	-	712	-	-	6540	-	7420	-	-	1760	1760	-	1060	-	-	1180	-	1340
Nitrate (as N)	mg/L	10.0	MAC	0.20	0.36	0.14	< 0.10	< 0.10	< 0.40	< 0.40	< 0.40	0.84	< 0.40	< 0.20	0.21	< 0.20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13	< 0.020
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	< 0.050	-	-	< 0.20	-	< 0.20	-	-	< 0.10	< 0.10	-	< 0.050	-	-	< 0.050	-	< 0.010
pH, lab	s.u.	6.5-8.5	OG	7.31	7.55	7.37	7.19	7.46	7.57	7.70	7.58	7.32	7.75	7.54	7.92	8.01	7.92	7.68	7.95	7.83	7.85	7.35	7.37
Phenolics (total)	mg/L	-		-	< 0.0049	-	0.0042	-	-	< 0.0010	-	0.0025	-	-	< 0.0013	< 0.0010	-	< 0.0046	-	-	< 0.0010	-	0.0184
Phosphorus	mg/L	-		-	0.456	-	0.488	-	-	0.258	-	0.102	-	-	0.0351	0.0295	-	0.0475	-	-	0.0340	-	0.188
Sulfate	mg/L	500	AO	267	264	314	298	319	4310	7250	6820	8320	8040	1670	1190	1170	671	716	713	722	708	753	734
Total dissolved solids (TDS)	mg/L	500	AO	878	949	1000	909	946	6260	9940	9830	11000	10000	3170	2290	2360	1580	1640	1590	1640	1680	1620	1680
Total kjeldahl nitrogen (TKN)	mg/L	-		-	1.10	-	0.810	-	-	0.96	-	0.350	-	-	0.40	0.35	-	< 0.15	-	-	< 0.15	-	0.28
Total suspended solids (TSS)	mg/L	-		-	685	-	996	-	-	974	-	1410	-	-	80.1	109	-	106	-	-	64.9	-	137
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-	< 0.002	-	-	< 0.0032	< 0.0032	-	< 0.0032	-	-	< 0.0032	-	-
Turbidity	NTU	5.0	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	37.3	67.2	43.2	174	76.6	85.5 J	-
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	0.0070	-	< 0.050	-	-	0.384	-	0.996	-	-	< 0.050	< 0.050	-	< 0.050	-	-	< 0.050	-	< 0.050
Arsenic (dissolved)	mg/L	0.010	IMAC	-	0.00056	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	-	0.0012	0.0012	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	0.0946	0.0800	0.0852	0.0741	0.0586	0.0250	0.0256 J+	0.0166	0.0227	0.0177	0.0321	0.0325	0.0296	0.0278	0.0334	0.0312	0.0315	0.0317	0.0328	0.0254
Beryllium (dissolved)	mg/L	-		-	< 0.00010	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	0.052	< 0.10	< 0.10	0.043	0.32	0.42	0.40	0.43	0.42	0.25	0.11	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.10	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.000010	-	< 0.000050	-	-	< 0.000050	-	< 0.000050	-	-	< 0.000050	< 0.000050	-	< 0.00010	-	-	< 0.000050	-	< 0.000050
Calcium (dissolved)	mg/L	-		227	238	255	232	259	363	475	457	434	399	148	88.7	89.5	134	169	142	209	189	217	129
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.00050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Cobalt (dissolved)	mg/L	-		-	< 0.00010	-	< 0.0010	-	-	0.0013	-	< 0.0010	-	-	< 0.0010	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	-	< 0.00252	-	0.0023	-	-	< 0.0022	-	0.0031	-	-	< 0.0020	< 0.0020	-	< 0.0037	-	-	< 0.0020	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.010	< 0.10	< 0.10	0.015	< 0.10	0.30	< 0.10	0.88	0.15	2.85	0.12	0.14	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.37
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.000050	-	< 0.00050	-	-	< 0.00050	-	0.00070	-	-	< 0.00050	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.00050
Magnesium (dissolved)	mg/L	-		30.6	29.1	32.9	32.6	32.5	796	1300	1500	1540	1420	459	374	372	228	154	180	156	172	168	248
Manganese (dissolved)	mg/L	0.05	AO	-	0.0159	-	0.0802	-	-	0.148	-	0.0688	-	-	0.0868	0.0853	-	< 0.0050	-	-	< 0.0050	-	0.0212
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.0000050	-	< 0.0000050	-	-	< 0.0000050	-	< 0.0000050	-	-	< 0.0000050	< 0.0000050	-	< 0.000010	-	-	< 0.000010	-	< 0.000010
Molybdenum (dissolved)	mg/L	-		-	0.00119	-	0.00097	-	-	0.00335	-	0.00246	-	-	0.00393	0.00403	-	0.00198	-	-	0.00172	-	0.00278
Nickel (dissolved)	mg/L	-		-	0.00180	-	< 0.0050	-	-	0.0065	-	< 0.0050	-	-	< 0.0050	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Potassium (dissolved)	mg/L	-		-	3.07 J+	-	2.87	-	-	17.2	-	17.8	-	-	8.29	8.20	-	2.25	-	-	2.22	-	4.13
Silver (dissolved)	mg/L	-		-	< 0.000050	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	18.3	18.0	17.6	17.8	17.7	290	360	396	428	550	170	162	159	78.6	56.8	65.0	69.4	68.9	69.7	86.3
Thallium (dissolved)	mg/L	-		-	0.000010	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	< 0.00010
Vanadium (dissolved)	mg/L	-		-	0.00151	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.0014	-	< 0.010	-	-	< 0.010	-	< 0.010	-	-	< 0.010	< 0.010	-	0.011	-	-	< 0.014	-	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable ODWS/O. Reg 153/04 criteria.

< 0.10 Method detection limit does not meet ODWS/O. Reg 153/04 criteria.

< 0.20 Result below method detection limit.

Table 5.4a

Summary of Groundwater Analytical Results – Shallow Overburden (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW3B-13	OW5B-06	OW5B-06	OW5B-06
Sample ID:				GW-18235-1119-DD-020	GW-18235-0520-DD-020	GW-18235-1120-HM-015	GW-18235-0521-DD-008	GW-18235-1121-BK-005	GW-18235-0517-DD-009	GW-18235-0717-DD-012	GW-18235-1117-DD-008	GW-18235-0518-DD-010	GW-18235-071218-DD-010	GW-18235-110818-DD-009	GW-18235-0519-DD-004	GW-18235-1119-DD-009	GW-18235-0520-DD-010	GW-18235-1120-HM-028	GW-18235-0521-DD-018**	GW-18235-1121-BK-014	GW-18235-0517-DD-014	GW-18235-0717-DD-019	GW-18235-1117-DD-012
Sample Date:		ODWS[1]	ODWS Source	11/29/2019	5/22/2020	11/26/2020	6/2/2021	11/8/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	12/2/2019	5/22/2020	11/24/2020	6/2/2021	11/9/2021	5/17/2017	7/26/2017	12/1/2017
Parameters	**Units**																						
Field Parameters																							
Conductivity, field	uS/cm	-		2160	2070	2530	1950	2000	1080	1820	1400	640	1145	1530	1400	1370	1160	1650	NA	1110	4190	6570	3560
Dissolved oxygen (DO), field	mg/L	-		8.23	3.19	1.8	3.01	4.73	-	-	-	-	3.01	2.23	-	2.33	2.05	2.01	NA	1.72	-	-	-
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	124	108	-	-	-	-	-	-	-	-	-	-	NA	-9	-	-	-
pH, field	s.u.	6.5-8.5	OG	7.17	7.25	5.45	7.23	7.36	7.39	7.46	6.89	6.90	6.70	7.05	7.20	6.70	6.55	5.69	NA	6.98	7.13	6.99	6.86
Temperature, field	Deg C	15	AO	8.99	14.87	9.78	10.47	14.19	9.2	14.3	9.7	11.10	14.20	11.13	11.65	9.91	15.12	9.81	NA	13.07	7.9	12.1	9.8
Turbidity, field	NTU	5.0	MAC	519	329	>1000	327	307	-	-	-	-	>999	32.7	-	>999	>1000	>1000	NA	>1000	-	-	-
Volume purged	L	-		-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	612	558	638	551	590	452	462	492	448	481	501	460	583	515	485	446	496	427	428	449
Ammonia-N	mg/L	-		< 0.010	0.011	< 0.010	0.026	0.050	< 0.020	< 0.020	< 0.020	< 0.070	0.033	< 0.054	0.021	< 0.010	0.068	0.012	0.032	0.115	< 0.020	< 0.020	< 0.088
Biochemical oxygen demand (BOD)	mg/L	-		-	< 3.0	-	< 3.0	-	-	< 2.0	-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-		30	24	30	21	56	34	46	32	50	51	50	21	25	71	97	< 10	37	58	42	61
Chloride	mg/L	250	AO	55.2	47.7	45.9	39.0	40.0	5.0	3.26	4.3	2.85	4.07	4.2	1.63	3.3	1.68	4.1	2.03	< 2.5	546	497	349
Conductivity	uS/cm	-		2130	2040	2080	2030	2010	1140	1060	1240	1060	1060	1330	954	1250	1060	1530	1070	1070	4540	4160	3510
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	4.57	< 4.09	5.91	4.90	6.03	2.8	3.2	4.2	5.1	3.49	5.23	5.52	4.76	8.88 J+	11.5	4.80	6.14	12.2	13.0	10.9
Hardness	mg/L	80-100	OG	-	1250	-	1200	-	-	567	-	-	587	-	560	-	594	-	634	-	-	1890	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.020	< 0.10	< 0.020	< 0.020	< 0.10	< 0.020	< 0.10	< 0.020	< 0.10	< 0.020	< 0.10	< 0.20	< 0.20	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	< 0.050	-	-	< 0.010	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.67	7.65	7.77	7.65	7.81	7.70	7.34	7.89	7.75	7.71	7.04	7.16	7.25	7.43	7.28	7.72	7.76	7.57	7.46	7.88
Phenolics (total)	mg/L	-		-	< 0.0021	-	0.0029	-	-	< 0.0075	-	-	< 0.0010	-	0.0144	-	< 0.0013	-	0.0055	-	-	< 0.0067	-
Phosphorus	mg/L	-		-	0.195	-	0.498	-	-	0.329	-	-	0.177	-	0.0678	-	0.589	-	0.533	-	-	0.0697	-
Sulfate	mg/L	500	AO	743	699	749	618	685	244	163	233	141	180	267	120	243	133	502	123	157	1510	1690	1430
Total dissolved solids (TDS)	mg/L	500	AO	1680	1650	1640	1590	1520	782	757	863	770	745	911	645 J	867	735	1220	708	705	3700	3520	3000
Total kjeldahl nitrogen (TKN)	mg/L	-		-	0.21	-	0.470	-	-	0.71	-	-	< 0.15	-	0.15	-	< 1.5	-	0.800	-	-	0.90	-
Total suspended solids (TSS)	mg/L	-		-	590	-	156	-	-	1000	-	-	340	-	28.0	-	444	-	431	-	-	144	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	-	-	-	-	-	425	1720	362	>4000	453	646	-	-	-	-	-	-	216	106	471
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-	-	-	-	-	-	-	< 0.0011	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	< 0.050	-	-	< 0.050	-	-	< 0.050	-	< 0.050	-	0.0140	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.010	IMAC	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	0.0024	-	< 0.0010	-	0.00057	-	0.0011	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0260	0.0254 J+	0.0228	0.0229	0.0269	0.0755	0.0750	0.0989	0.0595	0.0721	0.115	0.0754	0.109	0.0847	0.147	0.0663	0.0964	0.0458	0.0406	0.0330
Beryllium (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.00010	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	0.12	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.048	< 0.10	< 0.10	< 0.10	0.23	0.25	0.23
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.000050	-	< 0.000050	-	-	< 0.00010	-	-	0.000077	-	< 0.000050	-	0.000112	-	0.000108	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-		159	176	133	147	172	128	146	173	119	114	192	143	176	150	236	146	154	422	371	326
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.00050	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	0.0041	-	< 0.0010	-	0.00190	-	0.0023	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	< 0.0020	-	-	< 0.0027	-	-	< 0.0020	-	0.0030	-	< 0.00203	-	0.0020	-	-	< 0.0026	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.22	< 0.10	< 0.10	< 0.10	0.035	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.000050	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-		198	196	226	201	174	78.7	49.2	63.3	83.5	73.6	77.9	49.5	66.3	53.4	82.8	65.5	53.5	293	234	231
Manganese (dissolved)	mg/L	0.05	AO	-	0.0186	-	0.0050	-	-	0.0267	-	-	0.361	-	0.102	-	0.271	-	0.245	-	-	0.0819	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.0000050	-	< 0.0000050	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-		-	0.00190	-	0.00170	-	-	0.00418	-	-	0.00431	-	0.00382	-	0.00244	-	0.00320	-	-	0.00311	-
Nickel (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	0.0062	-	< 0.0050	-	0.00501	-	< 0.0050	-	-	0.0107	-
Potassium (dissolved)	mg/L	-		-	2.97 J+	-	2.68	-	-	2.92	-	-	2.75	-	2.02	-	< 2.01	-	2.48	-	-	3.86	-
Silver (dissolved)	mg/L	-		-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.000050	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	75.8	76.2	82.9	74.9	72.0	33.4	17.8	18.6	30.7	24.1	22.4	14.9	21.6	26.6	23.0	23.1	22.7	279	227	195
Thallium (dissolved)	mg/L	-		-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	0.000057	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.00050	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-	< 0.010	-	0.0054 J+	-	< 0.010	-	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable ODWS/O. Reg 153/04 criteria.

< 0.10 Method detection limit does not meet ODWS/O. Reg 153/04 criteria.

< 0.20 Result below method detection limit.

Table 5.4a

Summary of Groundwater Analytical Results – Shallow Overburden (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06
Sample ID:				GW-18235-0518-DD-015	GW-18235-071218-DD-018	GW-18235-110818-DD-014	GW-18235-0519-DD-034	GW-18235-1119-DD-017	GW-18235-0520-DD-017	GW-18235-1120-HM-012	GW-18235-0521-DD-004	GW-18235-1121-BK-003	GW-18235-0517-DD-019	GW-18235-0717-DD-026	GW-18235-1117-DD-017	GW-18235-0518-DD-020	GW-18235-071218-DD-025	GW-18235-110818-DD-022	GW-18235-0519-DD-018	GW-18235-1119-DD-016	GW-18235-0520-DD-024	GW-18235-1120-HM-008	GW-18235-0521-DD-009**
Sample Date:				5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	11/26/2020	6/2/2021	11/8/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	11/26/2020	6/2/2021
Parameters	**Units**	**ODWS[1]**	**ODWS Source**																				
Field Parameters																							
Conductivity, field	uS/cm	-		3540	3370	3430	3460	3040	2500	2780	2530	2570	1590	2560	1630	1670	1820	1680	1700	1700	2480	2430	NA
Dissolved oxygen (DO), field	mg/L	-		-	5.58	2.49	-		2.44	1.69	2.53	2.80	-	-	-	-	5.46	4.05	6.27	5.95	9.37	6.54	NA
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	-	-	-	65	160	-	-	-	-	-	-	-81	-	-	-	NA
pH, field	s.u.	6.5-8.5	OG	6.53	6.18	7.07	7.47	7.20	7.18	5.28	6.99	7.32	7.28	7.32	6.96	6.74	7.92	7.27	7.31	7.18	6.84	6.8	NA
Temperature, field	Deg C	15	AO	10.9	13.80	10.72	9.27	7.10	15.5	9.95	11.87	13.82	8.6	12.1	11.2	10.1	11.58	12.06	-	9.70	13.72	12.14	NA
Turbidity, field	NTU	5.0	MAC	-	71.7	12.6	-	>999	221	694	408	302	-	-	-	-	32.8	99.1	108	4.48	260	274	NA
Volume purged	L	-		-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	462	452	479	540	586	687	627	585	637	539	508	518	501	496	507	572	661	466	555	530
Ammonia-N	mg/L	-		< 0.043	< 0.020	< 0.023	< 0.010	0.012	0.017	< 0.010	< 0.010	0.020	< 0.020	< 0.020	< 0.229	< 0.023	< 0.020	< 0.042	< 0.010	< 0.010	0.011	< 0.010	0.010
Biochemical oxygen demand (BOD)	mg/L	-		-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	-	-	< 2.0	-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	
Chemical oxygen demand (COD)	mg/L	-		46	43	45	22	42	48	23	24	19	12	17	19	< 10	30	50	< 10	16	21	16	17
Chloride	mg/L	250	AO	313	297	280	246	214	199	171	166	197	61.3	50.3	61.3	58.7	84.0	81.9	69.4	60.7	447	276	228
Conductivity	uS/cm	-		3060	3030	3170	2990	2810	2590	2580	2550	2580	1630	1600	1540	1500	1480	1590	1620	1670	2480	2100	2050
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	8.3	7.90	9.33	7.06	7.58	5.45 J+	7.46	5.59	8.52	2.4	3.3	3.1	3.2	< 2.70	6.11	5.89	7.70	5.19 J+	4.43	9.80
Hardness	mg/L	80-100	OG	-	1550	-	1590	-	1450	-	1440	-	-	647	-	-	731	-	823	-	1100	-	993
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.10	< 0.10	< 0.020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.10	0.37	0.15	0.256	< 0.10	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	< 0.010	-	< 0.050	-	< 0.050	-	-	< 0.050	-	-	< 0.050	-	< 0.010	-	< 0.050	-	< 0.050
pH, lab	s.u.	6.5-8.5	OG	7.71	7.79	7.22	7.26	7.58	7.66	7.64	7.95	7.78	7.93	7.76	8.16	7.97	7.87	7.49	7.64	7.78	7.80	7.92	7.67
Phenolics (total)	mg/L	-		-	< 0.0059	-	0.0252	-	< 0.0026	-	0.0027	-	-	< 0.0064	-	-	< 0.0010	-	0.0211	-	< 0.0018	-	0.0058	
Phosphorus	mg/L	-		-	0.0912	-	0.0782	-	0.530	-	0.136	-	-	0.0428	-	-	0.0470	-	0.0299	-	0.113	-	0.765	
Sulfate	mg/L	500	AO	1280	1190	1130	1000	975	758	847	680	655	309	245	309	301	306	305	308	329	285	304	294
Total dissolved solids (TDS)	mg/L	500	AO	2770	2670	2500	2400	2410	2050	2030	1980	1830	999	977	994	977	1030	1030	1010	1020	1800	1450	1350
Total kjeldahl nitrogen (TKN)	mg/L	-		-	0.46	-	0.56	-	0.38	-	0.400	-	-	0.18	-	-	< 0.15	-	0.19	-	0.19	-	1.20	
Total suspended solids (TSS)	mg/L	-		-	60.5	-	68.6	-	645	-	139	-	-	95.6	-	-	58.4	-	27.7	-	94.7	-	335	
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	
Turbidity	NTU	5.0	MAC	189	77.8	122 J	-	-	-	-	-	-	47.9	79.7	66.3	18.9	47.2	40.4 J	-	-	-	-	-
Xylenes (total)	mg/L	0.09	MAC	-	< 0.0011	-	-	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-	-	-	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-	-	< 0.0050	-	-	< 0.050	-	< 0.050	-	0.462	-	< 0.050
Arsenic (dissolved)	mg/L	0.010	IMAC	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	0.00027	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	0.0258	0.0274	0.0321	0.0249	0.0235	0.0248 J+	0.0237	0.0215	0.0271	0.0233	0.0231	0.0229	0.0239	0.0256	0.0268	0.0234	0.0239	0.0361	0.0362	0.0303
Beryllium (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.00010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	
Boron (dissolved)	mg/L	5.0	IMAC	0.18	0.16	0.23	0.14	0.14	< 0.10	0.13	0.10	0.10	0.86	0.819	0.95	0.89	0.91	1.08	0.75	0.67	0.62	0.79	0.80
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	-	0.000014	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	
Calcium (dissolved)	mg/L	-		294	261	311	260	211	184	175	167	179	111	97.9	107	95.2	108	129	93.5	80.1	169	124	127
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.00050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	
Cobalt (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.00010	-	-	< 0.0010	-	< 0.0010	-	0.0018	-	< 0.0010	
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0028	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	-	< 0.00236	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	< 0.0020	
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.010	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.34	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	0.000051	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	
Magnesium (dissolved)	mg/L	-		243	217	217	228	239	242	239	247	239	108	97.8	98.2	137	112	97.5	143	160	164	162	164
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.0050	-	0.0074	-	< 0.0050	-	< 0.0050	-	-	0.00071	-	-	< 0.0050	-	< 0.0050	-	0.0982	-	< 0.0050	
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	
Molybdenum (dissolved)	mg/L	-		-	0.00274	-	0.00296	-	0.00314	-	0.00299	-	-	0.00448	-	-	0.00366	-	0.00380	-	0.00278	-	0.00318	
Nickel (dissolved)	mg/L	-		-	0.0069	-	0.0059	-	< 0.0050	-	< 0.0050	-	-	0.00089	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	
Potassium (dissolved)	mg/L	-		-	2.91	-	2.56	-	3.15 J+	-	3.36	-	-	2.21	-	-	2.05	-	3.20	-	3.77 J+	-	3.82	
Silver (dissolved)	mg/L	-		-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	< 0.000050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	
Sodium (dissolved)	mg/L	20/200	AO	183	152	159	137	131	114	120	113	105	80.3	69.2	77.4	90.2	79.8	82.6	79.6	78.6	136	111	117
Thallium (dissolved)	mg/L	-		-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	< 0.000010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	
Vanadium (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.00050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	-	0.0014	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.4a

Summary of Groundwater Analytical Results – Shallow Overburden (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW8B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06
Sample ID:				GW-18235-1121-BK-018	GW-18235-0517-DD-011	GW-18235-0717-DD-014	GW-18235-1117-DD-010	GW-18235-0518-DD-012	GW-18235-071218-DD-013	GW-18235-110818-DD-012	GW-18235-0519-DD-008	GW-18235-1119-DD-029	GW-18235-0520-DD-012	GW-18235-1120-HM-025	GW-18235-0521-DD-003	GW-18235-1121-BK-001
Sample Date:				11/10/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	12/2/2019	5/22/2020	11/25/2020	6/2/2021	11/8/2021
Parameters	**Units**	**ODWS[1]**	**ODWS Source**													
Field Parameters																
Conductivity, field	uS/cm	-		1900	2100	3600	1980	2080	1960	2050	2420	2100	2170	2160	1980	2070
Dissolved oxygen (DO), field	mg/L	-		3.64	-	-	-	-	6.83	2.40	-	4.86	10.33	4.55	5.91	3.09
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		89	-	-	-	-	-	-	-	-	-	-	120	222
pH, field	s.u.	6.5-8.5	OG	7.15	7.45	7.12	6.87	6.66	6.94	7.15	7.47	**5.82**	6.87	**5.79**	7.31	7.32
Temperature, field	Deg C	15	AO	14.38	9.1	11.1	11.4	10.9	11.39	10.98	9.86	7.99	13.87	9.96	**15.04**	13.90
Turbidity, field	NTU	5.0	MAC	**182**	-	-	-	-	**>999**	**159**	-	**55.7**	**539**	**222**	**318**	**443**
Volume purged	L	-		8	-	-	-	-	-	-	-	-	-	-	-	5
General Chemistry																
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**526**	**609**	**600**	**586**	**554**	**566**	**605**	**681**	**711**	**686**	**653**	**647**	**675**
Ammonia-N	mg/L	-		0.038	< 0.020	< 0.020	< 0.142	< 0.050	< 0.020	< 0.158	0.017	< 0.010	0.016	< 0.010	< 0.010	0.073
Biochemical oxygen demand (BOD)	mg/L	-		-	-	< 2.0	-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	-
Chemical oxygen demand (COD)	mg/L	-		< 10	30	28	26	11	29	17	32	30	27	18	< 10	15
Chloride	mg/L	250	AO	184	36.8	42.0	51.5	41.9	40.6	44.4	43.4	45.0	42.0	40.7	41.8	42.6
Conductivity	uS/cm	-		1890	2160	2070	1910	1780	1810	1850	2000	2220	2240	2060	2160	2090
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	**6.23**	3.7	3.8	4.2	3.8	3.75	**5.02**	**5.05**	4.26	**5.35 J+**	**9.09**	4.55	**5.35**
Hardness	mg/L	80-100	OG	-	-	**897**	-	-	**841**	-	**988**	-	**1170**	-	**1140**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	0.032	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.050	-	-	< 0.050	-	< 0.010	-	< 0.050	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.93	7.94	7.82	8.18	7.97	8.04	7.48	7.57	7.81	7.75	7.73	8.23	7.92
Phenolics (total)	mg/L	-		-	-	< 0.0074	-	-	< 0.0017	-	0.0083	-	< 0.0015	-	0.0049	-
Phosphorus	mg/L	-		-	-	0.148	-	-	0.0880	-	0.0826	-	0.224	-	0.162	-
Sulfate	mg/L	500	AO	273	**629**	**642**	< 1.5	**532**	**506**	481	**535**	**681**	**738**	**578**	**578**	**561**
Total dissolved solids (TDS)	mg/L	500	AO	**1220**	**1430**	**1470**	**1310**	**1270**	**1290**	**1170**	**1420 J**	**1490**	**1610**	**1310**	**1500**	**1340**
Total kjeldahl nitrogen (TKN)	mg/L	-		-	-	0.26	-	-	< 0.15	-	0.19	-	< 1.5	-	0.120	-
Total suspended solids (TSS)	mg/L	-		-	-	376	-	-	87.1	-	78.7	-	429	-	424	-
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	-
Turbidity	NTU	5.0	MAC	-	**388**	**488**	**193**	**68.4**	**129**	**79.2 J**	-	-	-	-	-	-
Xylenes (total)	mg/L	0.09	MAC	-	-	< 0.0011	-	-	< 0.0011	-	-	-	-	-	-	-
Metals																
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-	< 0.050	-	0.065	-	< 0.050	-	**0.913**	-
Arsenic (dissolved)	mg/L	0.010	IMAC	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0287	0.0293	0.0278	0.0293	0.0705	0.0401	0.0321	0.0246	0.0297	0.0280	0.0273	0.0316	0.0350
Beryllium (dissolved)	mg/L	-		-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	1.23	0.13	0.13	0.11	0.12	0.11	0.16	0.11	0.12	0.12	0.13	0.12	0.12
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-
Calcium (dissolved)	mg/L	-		123	82.9	77.0	70.9	74.1	72.4	74.0	82.4	88.5	92.9	82.2	92.8	89.2
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-		-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.18	**0.78**	**0.35**
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-		116	198	171	170	171	160	177	190	208	227	203	221	214
Manganese (dissolved)	mg/L	0.05	AO	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	0.0282	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-
Molybdenum (dissolved)	mg/L	-		-	-	0.00290	-	-	0.00264	-	0.00273	-	0.00254	-	0.00220	-
Nickel (dissolved)	mg/L	-		-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-
Potassium (dissolved)	mg/L	-		-	-	4.65	-	-	4.93	-	4.77	-	5.10	-	5.23	-
Silver (dissolved)	mg/L	-		-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**102**	**155**	**127**	**115**	**120**	**114**	**108**	**132**	**144**	**148**	**125**	**126**	**123**
Thallium (dissolved)	mg/L	-		-	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-		-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable ODWS/O. Reg 153/04 criteria.

< 0.10 Method detection limit does not meet ODWS/O. Reg 153/04 criteria.

< 0.20 Result below method detection limit.

Table 5.4b

Summary of Groundwater Analytical Results – Shallow Overburden (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1-03	MW1-03	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW2-03	MW2-03	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW3-03	MW3-03	MW5B-09	MW5B-09	MW5B-09	MW6B-07	MW6B-07
Sample ID:					GW-18235-0717-DD-030	GW-18235-071218-DD-029	GW-18235-0717-DD-010	GW-18235-071218-DD-008	GW-18235-0519-DD-006	GW-18235-0520-DD-008	GW-18235-0521-DD-015	GW-18235-0717-DD-028	GW-18235-071218-DD-027	GW-18235-0717-DD-018	GW-18235-071218-DD-017	GW-18235-0519-DD-012	GW-18235-0521-DD-023	GW-18235-0717-DD-029	GW-18235-071218-DD-028	GW-18235-0519-DD-022	GW-18235-0520-DD-002	GW-18235-0521-DD-028**	GW-18235-0717-DD-005	GW-18235-0717-DD-006
Sample Date:					7/26/2017	7/12/2018	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	7/26/2017	7/12/2018	5/30/2019	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/3/2021	7/26/2017	7/26/2017 Duplicate
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																				
Volatile Organic Compounds																								
1,1,1,2-Tetrachloroethane	ug/L	-	1.1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2		< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 30	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700		< 30	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0
Bromoform	ug/L	-	25		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		-	-	-	-	-	-	< 1.0	-	-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	590		-	-	-	-	-	-	< 1.0	-	-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-
Ethylbenzene	ug/L	140	2.4	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	51		-	-	-	-	-	-	< 0.50	-	-	-	-	-	< 0.50	-	-	-	-	< 0.50	-	-
m&p-Xylenes	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50
Styrene	ug/L	-	5.4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0
Trihalomethanes	ug/L	100	-	MAC	-	-	-	-	< 3.2	-	-	-	-	-	-	< 3.2	-	-	-	-	< 3.2	-	-	-
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	90	300	MAC	-	-	-	-	< 1.1	< 1.1	< 0.50	-	-	-	-	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 0.50	-	-

Table 5.4b

Summary of Groundwater Analytical Results – Shallow Overburden (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1-03	MW1-03	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW2-03	MW2-03	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW3-03	MW3-03	MW5B-09	MW5B-09	MW5B-09	MW6B-07	MW6B-07
Sample ID:					GW-18235-0717-DD-030	GW-18235-071218-DD-029	GW-18235-0717-DD-010	GW-18235-071218-DD-008	GW-18235-0519-DD-006	GW-18235-0520-DD-008	GW-18235-0521-DD-015	GW-18235-0717-DD-028	GW-18235-071218-DD-027	GW-18235-0717-DD-018	GW-18235-071218-DD-017	GW-18235-0519-DD-012	GW-18235-0521-DD-023	GW-18235-0717-DD-029	GW-18235-071218-DD-028	GW-18235-0519-DD-022	GW-18235-0520-DD-002	GW-18235-0521-DD-028**	GW-18235-0717-DD-005	GW-18235-0717-DD-006
Sample Date:					7/26/2017	7/12/2018	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	7/26/2017	7/12/2018	5/30/2019	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/3/2021	7/26/2017	7/26/2017 Duplicate
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																				
Semi-volatile Organic Compounds																								
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2		< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	0.060	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	0.161	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.038	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.057	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.100	0.022	< 0.020	0.039	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.072[ab]	0.011[ab]	< 0.010	0.022[ab]	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	0.150[b]	0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	0.1		-	-	-	-	-	-	< 0.020	-	-	-	-	-	0.039	-	-	-	-	< 0.020	-	-
Benzo(g,h,i)perylene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.063	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.047	< 0.020	< 0.020	0.022	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.239[b]	0.033	< 0.020	0.052	< 0.020	< 0.020	< 0.020	< 0.020	0.028	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.020	0.029	< 0.020	< 0.020	0.352	0.110	< 0.020	0.076	< 0.020	< 0.020	< 0.020	< 0.020	0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.025 J	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.062	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	0.024	0.025	0.043	< 0.020	< 0.020	0.175	0.057	< 0.020	0.032	< 0.020	< 0.020	< 0.020	< 0.020	0.031	< 0.020	< 0.020
Pyrene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	0.022	0.022	0.036	< 0.020	< 0.020	0.277	0.079	< 0.020	0.061	< 0.020	< 0.020	< 0.020	< 0.020	0.045	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

(2) Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.

\- No Value/Not Analyzed.

J The result is an estimated value.

0.054 Does not meet the applicable criteria.

< 0.10 Method detection limit does not meet criteria.

< 0.20 Result below method detection limit.

Table 5.4b

Summary of Groundwater Analytical Results – Shallow Overburden (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:		MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW10B-18	MW10B-18	MW10B-18	MW10B-18	MW11B-19	MW11B-19	MW12B-19	MW12B-19	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW3B-13	OW3B-13	OW3B-13	OW3B-13
Sample ID:		GW-18235-071218-DD-005	GW-18235-0519-DD-021	GW-18235-0520-DD-004	GW-18235-0521-DD-032**	GW-18235-0519-DD-017	GW-18235-0519-DD-028	GW-18235-0520-DD-026	GW-18235-0521-DD-011**	GW-18235-0520-DD-028	GW-18235-0521-DD-016**	GW-18235-0520-DD-030	GW-18235-0520-DD-032	GW-18235-0717-DD-022	GW-18235-071218-DD-021	GW-18235-0519-DD-032	GW-18235-0520-DD-020	GW-18235-0521-DD-008	GW-18235-0717-DD-012	GW-18235-071218-DD-010	GW-18235-0519-DD-004	GW-18235-0520-DD-010
Sample Date:		7/12/2018	5/30/2019	5/22/2020	6/1/2021	5/30/2019	5/30/2019 Duplicate	5/22/2020	6/3/2021	5/22/2020	6/2/2021	5/22/2020	5/22/2020 Duplicate	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020
Parameters	**Units**																					
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]
1,2-Dichlorobenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 20	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 20	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30
Benzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-	-	< 1.0	-	-	-	< 1.0	-	< 1.0	-	-	-	-	-	-	< 1.0	-	-	-	-
Carbon tetrachloride	ug/L	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.7[b]	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	-	-	< 1.0	-	-	-	< 1.0	-	< 1.0	-	-	-	-	-	-	< 1.0	-	-	-	-
Ethylbenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	-	-	< 0.50	-	-	-	< 0.50	-	< 0.50	-	-	-	-	-	-	< 0.50	-	-	-	-
m&p-Xylenes	ug/L	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	-	< 3.2	-	-	< 3.2	< 3.2	-	-	-	-	-	-	-	-	< 3.2	-	-	-	-	< 3.2	-
Vinyl chloride	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	-	< 1.1	< 1.1	< 0.50	< 1.1	< 1.1	< 1.1	< 0.50	< 1.1	< 0.50	< 1.1	< 1.1	-	-	< 1.1	< 1.1	< 0.50	-	-	< 1.1	< 1.1

Table 5.4b

Summary of Groundwater Analytical Results – Shallow Overburden (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:		MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW10B-18	MW10B-18	MW10B-18	MW10B-18	MW11B-19	MW11B-19	MW12B-19	MW12B-19	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW3B-13	OW3B-13	OW3B-13	OW3B-13
Sample ID:		GW-18235-071218-DD-005	GW-18235-0519-DD-021	GW-18235-0520-DD-004	GW-18235-0521-DD-032**	GW-18235-0519-DD-017	GW-18235-0519-DD-028	GW-18235-0520-DD-026	GW-18235-0521-DD-011**	GW-18235-0520-DD-028	GW-18235-0521-DD-016**	GW-18235-0520-DD-030	GW-18235-0520-DD-032	GW-18235-0717-DD-022	GW-18235-071218-DD-021	GW-18235-0519-DD-032	GW-18235-0520-DD-020	GW-18235-0521-DD-008	GW-18235-0717-DD-012	GW-18235-071218-DD-010	GW-18235-0519-DD-004	GW-18235-0520-DD-010
Sample Date:		7/12/2018	5/30/2019	5/22/2020	6/1/2021	5/30/2019	5/30/2019 Duplicate	5/22/2020	6/3/2021	5/22/2020	6/2/2021	5/22/2020	5/22/2020 Duplicate	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020
Parameters	**Units**																					
Semi-volatile Organic Compounds																						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.012[ab]	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	-	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	-	< 0.020	-	-	-	< 0.020	-	< 0.020	-	-	-	-	-	-	< 0.020	-	-	-	-
Benzo(g,h,i)perylene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.
-	No Value/Not Analyzed.
J	The result is an estimated value.
0.054	Does not meet the applicable criteria.
< 0.10	Method detection limit does not meet criteria.
< 0.20	Result below method detection limit.

Table 5.4b

Summary of Groundwater Analytical Results – Shallow Overburden (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:		OW3B-13	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06
Sample ID:		GW-18235-0521-DD-018**	GW-18235-0717-DD-019	GW-18235-071218-DD-018	GW-18235-0519-DD-034	GW-18235-0520-DD-017	GW-18235-0521-DD-004	GW-18235-0717-DD-026	GW-18235-071218-DD-025	GW-18235-0519-DD-018	GW-18235-0520-DD-024	GW-18235-0521-DD-009**	GW-18235-0717-DD-014	GW-18235-071218-DD-013	GW-18235-0519-DD-008	GW-18235-0520-DD-012	GW-18235-0521-DD-003
Sample Date:		6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021
Parameters	**Units**																
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20
1,2-Dichlorobenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	46	< 20	< 30	< 30	< 30	< 30	< 20
Benzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Bromoform	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	< 1.0	-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-	-	-	< 1.0
Carbon tetrachloride	ug/L	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
Chlorobenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Dibromochloromethane	ug/L	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Dichlorodifluoromethane (CFC-12)	ug/L	< 1.0	-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-	-	-	< 1.0
Ethylbenzene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	< 0.50	-	-	-	-	< 0.50	-	-	-	-	< 0.50	-	-	-	-	< 0.50
m&p-Xylenes	ug/L	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40
Methyl tert butyl ether (MTBE)	ug/L	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50
Methylene chloride	ug/L	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0
o-Xylene	ug/L	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Styrene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40
trans-1,2-Dichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Trichloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0
Trihalomethanes	ug/L	-	-	-	< 3.2	-	-	-	-	< 3.2	-	-	-	-	< 3.2	-	-
Vinyl chloride	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	< 0.50	-	-	< 1.1	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 0.50

Table 5.4b

Summary of Groundwater Analytical Results – Shallow Overburden (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:		OW3B-13	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06	OW9B-06
Sample ID:		GW-18235-0521-DD-018**	GW-18235-0717-DD-019	GW-18235-071218-DD-018	GW-18235-0519-DD-034	GW-18235-0520-DD-017	GW-18235-0521-DD-004	GW-18235-0717-DD-026	GW-18235-071218-DD-025	GW-18235-0519-DD-018	GW-18235-0520-DD-024	GW-18235-0521-DD-009**	GW-18235-0717-DD-014	GW-18235-071218-DD-013	GW-18235-0519-DD-008	GW-18235-0520-DD-012	GW-18235-0521-DD-003
Sample Date:		6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021
Parameters	**Units**																
Semi-volatile Organic Compounds																	
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.023	< 0.020	< 0.020	< 0.020	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	0.021	< 0.020	0.035	0.020	< 0.020	< 0.020	0.056	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	< 0.010	< 0.010	< 0.010	< 0.010	0.020[ab]	< 0.010	0.029[ab]	0.019[ab]	< 0.010	< 0.010	0.057[ab]	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020	< 0.020	0.033	-	0.052	0.036	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	< 0.020	-	-	-	-	< 0.020	-	-	-	-	0.079	-	-	-	-	< 0.020
Benzo(g,h,i)perylene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.037	< 0.020	< 0.020	< 0.020	0.044	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.039	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.041	0.021	< 0.020	< 0.020	0.053	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	0.046	< 0.020	0.065	0.036	< 0.020	< 0.020	0.123	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.040	0.022	< 0.020	< 0.020	0.053	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.032	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	0.022	< 0.020	< 0.020	< 0.020	0.040	< 0.020	0.058	0.033	< 0.020	< 0.020	0.110	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.
-	No Value/Not Analyzed.
J	The result is an estimated value.
0.054	Does not meet the applicable criteria.
< 0.10	Method detection limit does not meet criteria.
< 0.20	Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01
Sample ID:				GW-18235-0517-DD-006	GW-18235-0717-DD-009	GW-18235-1117-DD-004	GW-18235-0518-DD-007	GW-18235-071218-DD-007	GW-18235-110818-DD-006	GW-18235-0519-DD-005	GW-18235-1119-DD-007	GW-18235-0520-DD-007	GW-18235-1120-HM-019	GW-18235-0521-DD-012	GW-18235-1121-BK-010	GW-18235-1121-BK-011	GW-18235-0517-DD-012	GW-18235-0717-DD-017	GW-18235-1117-DD-011	GW-18235-0518-DD-013	GW-18235-071218-DD-016	GW-18235-110818-DD-013	GW-18235-0519-DD-023
Sample Date:				5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	11/23/2020	6/2/2021	11/9/2021	11/9/2021 Duplicate	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019
Parameters	**Units**	**ODWS[1]**	**ODWS Source**																				
Field Parameters																							
Conductivity, field	uS/cm	-		5720	9440	6030	-	6060	6310	6300	5880	4700	5240	4920	4810	4810	3930	6650	4060	4260	4440	4370	4670
Dissolved oxygen (DO), field	mg/L	-		-	-	-	-	2.34	0.80	3.53	3.53	1.18	3.48	1.26	1.14	1.14	-	-	-	-	3.69	2.42	-
Not sampled	none	-		-	-	-	NM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	-	-	-	-	-	-	45	-7	-7	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	7.50	7.22	6.85	-	7.27	7.05	7.27	6.51	6.55	6.95	6.77	6.90	6.90	6.97	7.23	6.77	6.36	6.64	7.13	7.18
Temperature, field	Deg C	15	AO	9.6	11.9	8.4	-	12.06	8.05	16.98	8.17	15.5	10.93	12.39	12.25	12.25	9.7	10.9	9.9	11.4	11.13	9.56	10.49
Turbidity, field	NTU	5.0	MAC	-	-	-	-	>999	>999	>999	>999	>1000	>1000	870	>1000	>1000	-	-	-	-	33.1	7.50	-
Volume purged	L	-		-	-	-	-	-	-	-	-	-	-	-	6	6	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	612	636	589	550	548	573	571	540	485	489	461	504	500	450	390	406	396	368	315	392
Ammonia-N	mg/L	-		1.35	1.47	1.37	1.22	0.973	< 0.977	0.947	0.784	0.329	0.285	0.411	0.614	0.582	0.093	< 0.068	< 0.109	< 0.243	0.070	< 0.153	0.095
Biochemical oxygen demand (BOD)	mg/L	-		-	< 2.0	-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	-	-	-	< 2.0	-	-	< 2.0	-	< 3.0
Chemical oxygen demand (COD)	mg/L	-		19	13	22	46	78	80	99	65	60	11	12	40	35	12	< 10	14	< 10	14	12	< 10
Chloride	mg/L	250	AO	24	20.9	25.0	26.3	24.8	24.8	23.0	32	20.4	23.0	22.4	18.9	19.1	13.5	13.7	12.1	11.8	14.1	14.5	13.9
Conductivity	uS/cm	-		6250	6140	5850	5370	5600	6040	6070	5040	4910	5090	5160	4970	4970	4200	4190	3910	3610	3920	4230	4230
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	3.1	3.8	5.7	3.9	5.78	6.08	3.72	3.31	< 2.44	3.78	4.87	3.69	3.06	1.7	1.9	2.1	2.1	< 2.01	2.02	2.15
Hardness	mg/L	80-100	OG	-	4080	-	-	4020	-	4430	-	3540	-	3840	-	-	-	2630	-	-	2680	-	2930
Nitrate (as N)	mg/L	10.0	MAC	< 0.40	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.020	< 0.40	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	0.096
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	-	< 0.10	-	< 0.010	-	< 0.10	-	< 0.10	-	-	-	< 0.10	-	-	< 0.10	-	< 0.010
pH, lab	s.u.	6.5-8.5	OG	7.77	7.64	7.92	7.71	7.62	7.02	7.26	7.41	7.56	7.37	7.83	7.67	7.65	7.54	7.40	7.88	7.67	7.67	7.19	7.19
Phenolics (total)	mg/L	-		-	< 0.0089	-	-	< 0.0022	-	0.0188	-	< 0.0019	-	0.0042	-	-	-	< 0.0042	-	-	< 0.0040	-	0.0077
Phosphorus	mg/L	-		-	0.0419	-	-	0.828	-	2.08	-	1.33	-	0.275	-	-	-	0.0065	-	-	0.0042	-	0.0071
Sulfate	mg/L	500	AO	4730	3770	4850	4700	4610	4830	3900	5460	3580	3830	3520	3430	3450	2940	2920	2580	2410	2880	3130	2550
Total dissolved solids (TDS)	mg/L	500	AO	6620	6920	6640	6660	6820	6530 J	6880 J	6110	5470	5290	5550	5110	5080	4210	4450	4110	4050	4390	4250	4460 J
Total kjeldahl nitrogen (TKN)	mg/L	-		-	1.68	-	-	1.85	-	2.0	-	2.1	-	0.690	-	-	-	0.22	-	-	< 0.15	-	< 0.15
Total suspended solids (TSS)	mg/L	-		-	2360	-	-	4980	-	6290	-	2460	-	594	-	-	-	20.5	-	-	9.6	-	10.9
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	-	-	-	< 0.0032	-	-	< 0.0032	-	-
Turbidity	NTU	5.0	MAC	258	>4000	225	>4000	3620	2980 J	-	-	-	-	-	-	-	7.40	11.4	2.62	3.62	6.52	5.55 J	-
Xylenes (total)	mg/L	0.09	MAC	-	< 0.0011	-	-	< 0.0011	-	-	-	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	0.075	-	-	< 0.050	-	0.110	-	< 0.050	-	< 0.050	-	-	-	< 0.050	-	-	< 0.050	-	< 0.050
Arsenic (dissolved)	mg/L	0.010	IMAC	-	0.0058	-	-	0.0199	-	0.0146	-	0.0014	-	0.0028	-	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	0.0114	0.0078	0.0067	0.0385	< 0.0086	0.0163	0.0071	0.0231	< 0.0044	0.0034	0.0042	0.0035	0.0035	0.0045	0.0038	0.0051	0.0042	< 0.0040	0.0038	0.0040
Beryllium (dissolved)	mg/L	-		-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.63	0.69	0.58	0.28	0.65	0.67	0.69	0.66	0.64	0.65	0.68	0.65	0.66	0.48	0.44	0.41	0.49	0.41	0.49	0.46
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	-	-	< 0.00010	-	-	< 0.000050	-	< 0.000050
Calcium (dissolved)	mg/L	-		413	465	436	219	396	420	458	473	478	477	479	473	473	523	472	483	486	460	505	510
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Cobalt (dissolved)	mg/L	-		-	0.0032	-	-	0.0026	-	0.0024	-	0.0037	-	0.0037	-	-	-	< 0.0010	-	-	0.0014	-	0.0013
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	-	-	< 0.0020	-	-	< 0.0029	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	< 0.10	0.26	0.60	< 0.10	1.58	1.47	2.29	2.74	0.33	0.28	0.33	0.43	0.42	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050
Magnesium (dissolved)	mg/L	-		714	709	756	257	736	788	798	703	570	623	642	586	580	386	351	346	375	373	448	403
Manganese (dissolved)	mg/L	0.05	AO	-	0.212	-	-	0.171	-	0.155	-	0.245	-	0.257	-	-	-	< 0.0050	-	-	0.0740	-	0.0765
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010
Molybdenum (dissolved)	mg/L	-		-	0.0121	-	-	0.00705	-	0.00627	-	0.00454	-	0.00450	-	-	-	0.00835	-	-	0.00858	-	0.00774
Nickel (dissolved)	mg/L	-		-	0.0081	-	-	< 0.0050	-	< 0.0050	-	0.0050	-	< 0.0050	-	-	-	0.0076	-	-	0.0078	-	0.0063
Potassium (dissolved)	mg/L	-		-	8.07	-	-	6.35	-	6.24	-	5.17	-	5.45	-	-	-	5.96	-	-	6.44	-	6.47
Silver (dissolved)	mg/L	-		-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	239	231	225	114	222	226	226	206	168	185	197	179	177	122	112	106	124	130	134	138
Thallium (dissolved)	mg/L	-		-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	-	< 0.00010	-	-	< 0.00010	-	< 0.00010
Vanadium (dissolved)	mg/L	-		-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010	-	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable ODWS/O. Reg 153/04 criteria.

< 0.10 Method detection limit does not meet ODWS/O. Reg 153/04 criteria.

< 0.20 Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW4A-09	MW4A-09	MW4A-09	MW4A-09	MW4A-09	MW4A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09
Sample ID:				GW-18235-1119-DD-025	GW-18235-1119-DD-026	GW-18235-0520-DD-015	GW-18235-1120-HM-023	GW-18235-0521-DD-024	GW-18235-1121-BK-015	GW-18235-0517-DD-020	GW-18235-0717-DD-027	GW-18235-1117-DD-018	MW4A-09~20180530~N	GW-18235-071218-DD-026	GW-18235-110818-DD-023	GW-18235-0517-DD-001	GW-18235-0517-DD-002	GW-18235-0717-DD-001	GW-18235-0717-DD-002	GW-018235-122717-DD-001	GW-18235-0518-DD-001	GW-18235-0518-DD-002	GW-18235-071218-DD-001
Sample Date:				11/28/2019	11/28/2019	5/22/2020	11/25/2020	6/2/2021	11/10/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/17/2017	5/17/2017	7/26/2017	7/26/2017	12/27/2017	5/30/2018	5/30/2018	7/12/2018
Parameters	**Units**	**ODWS[1]**	**ODWS Source**		Duplicate												Duplicate		Duplicate			Duplicate	
Field Parameters																							
Conductivity, field	uS/cm	-		3840	3840	3980	4200	3820	4130	3700	5870	4690	-	4020	3890	3970	3970	642	642	4190	4320	4320	4250
Dissolved oxygen (DO), field	mg/L	-		-	-	0.18	0.11	10.21	1.94	-	-	-	-	5.21	2.95	-	-	-	-	-	-	-	3.69
Not sampled	none	-		-	-	-	-	-	-	-	-	-	D	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	163	163	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	6.91	6.91	6.81	**5.86**	6.63	6.93	7.27	7.29	6.91	-	7.75	7.08	7.01	7.01	7.24	7.24	7.99	**6.49**	**6.49**	7.69
Temperature, field	Deg C	15	AO	6.71	6.71	13.13	9.02	12.74	10.11	10.0	11.8	10.8	-	**15.31**	9.15	9.3	9.3	10.4	10.4	4.8	11.8	11.8	10.70
Turbidity, field	NTU	5.0	MAC	-	-	**7.1**	**17**	**8.6**	**12.2**	-	-	-	-	**>999**	**851**	-	-	-	-	-	-	-	**37.0**
Volume purged	L	-		-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	364	355	401	392	381	371	332	324	318	-	301	326	437	427	400	402	401	384	391	389
Ammonia-N	mg/L	-		0.051	0.061	0.159	0.099	0.084	0.160	< 0.020	< 0.020	< 0.020	-	0.024	< 0.020	0.492	0.483	0.489	0.475	0.593	< 0.680	< 0.663	0.598
Biochemical oxygen demand (BOD)	mg/L	-		-	-	< 2.0	-	< 3.0	-	-	< 2.0	-	-	< 2.0	-	-	-	< 2.0	< 2.0	-	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-		< 10	< 10	< 10	< 10	< 10	< 10	23	26	20	-	78	31	15	13	< 10	< 10	< 10	< 10	< 10	< 10
Chloride	mg/L	250	AO	14.6	14.7	13.7	13.6	12.2	11.4	19.7	15.8	15.8	-	21.1	10.1	14.5	12.9	13.9	13.6	12.5	16.0	15.4	15.8
Conductivity	uS/cm	-		4010	4050	4070	4010	4150	4100	3950	3720	3700	-	3510	3660	4240	4260	4130	4140	3500	3700	3660	3840
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	2.14	2.10	< 2.10	**5.43**	**11.5**	3.39	2.2	2.4	2.2	-	< 2.60	3.11	1.6	1.6	2.1	2.3	2.5	2.2	1.9	< 2.32
Hardness	mg/L	80-100	OG	-	-	**2890**	-	**2890**	-	-	**2190**	-	-	**2550**	-	-	-	**2660**	**2610**	-	-	-	**2670**
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.23	< 0.20	< 0.10	-	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.10	-	< 0.10	-	-	< 0.10	-	-	< 0.10	-	-	-	< 0.10	< 0.10	-	-	-	< 0.10
pH, lab	s.u.	6.5-8.5	OG	7.77	7.64	7.68	7.57	7.34	7.83	7.71	7.65	7.96	-	7.80	7.22	7.50	7.49	7.29	7.31	7.52	7.59	7.56	7.50
Phenolics (total)	mg/L	-		-	-	< 0.0040	-	0.0181	-	-	< 0.0046	-	-	< 0.0015	-	-	-	< 0.0040	< 0.0066	-	-	-	< 0.0010
Phosphorus	mg/L	-		-	-	0.0073	-	0.0086	-	-	0.277	-	-	1.51	-	-	-	0.0363	0.0361	-	-	-	0.0168
Sulfate	mg/L	500	AO	**3000**	**2980**	**2730**	**2770**	**2600**	**2610**	**2160**	**2490**	**2600**	-	**2600**	**2460**	**2820**	**2500**	**2720**	**2590**	**2500**	**3050**	**2920**	**3080**
Total dissolved solids (TDS)	mg/L	500	AO	**4060**	**4040**	**4140**	**3890**	**4060**	**4200**	**3870**	**3960**	**3870**	-	**3820**	**3790**	**4190**	**4100**	**4320**	**4350**	**4220**	**4130**	**4210**	**4200**
Total kjeldahl nitrogen (TKN)	mg/L	-		-	-	< 0.15	-	0.160	-	-	0.39	-	-	< 1.5	-	-	-	0.55	0.53	-	-	-	0.52 J
Total suspended solids (TSS)	mg/L	-		-	-	9.2	-	13.7	-	-	1630	-	-	4340	-	-	-	169	164	-	-	-	31.8
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	< 0.0032	-	-	-	< 0.0032
Turbidity	NTU	5.0	MAC	-	-	-	-	-	-	**790**	**990**	**248**	-	**1880**	**451 J**	**315**	**335**	**91.5**	**93.6**	**118**	**50.3**	**52.9**	**36.6**
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-	-	< 0.0011	< 0.0011	-	-	-	< 0.0011
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	< 0.050	-	-	< 0.050	-	-	< 0.050	-	-	-	< 0.050	< 0.050	-	-	-	< 0.050
Arsenic (dissolved)	mg/L	0.010	IMAC	-	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	-	0.0011	0.0012	-	-	-	**0.0126**
Barium (dissolved)	mg/L	1.0	MAC	0.0043	0.0044	< 0.0046	0.0056	0.0041	0.0041	0.0127	0.0098	0.0123	-	< 0.0090	0.0061	0.0059	0.0061	0.0058	0.0055	0.0058	0.0052	0.0054	< 0.0053
Beryllium (dissolved)	mg/L	-		-	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-	-	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.43	0.42	0.49	0.53	0.51	0.50	0.43	0.39	0.35	-	0.44	0.46	0.67	0.69	0.64	0.64	0.65	0.65	0.66	0.61
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.000050	-	< 0.000050	-	-	< 0.00010	-	-	< 0.000050	-	-	-	< 0.00010	< 0.00010	-	-	-	< 0.000050
Calcium (dissolved)	mg/L	-		489	480	501	501	522	500	524	480	465	-	513	531	491	526	475	468	502	478	472	476
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-	-	< 0.0050
Cobalt (dissolved)	mg/L	-		-	-	0.0017	-	0.0011	-	-	< 0.0010	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-	-	-	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	< 0.0020	-	-	< 0.0020	-	-	< 0.0020	-	-	-	< 0.0020	< 0.0020	-	-	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	0.16	0.16	0.20	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.10	< 0.10	**1.80**	**1.79**	**1.48**	**1.46**	**3.15**	**3.09**	**3.20**	**3.14**
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	-	-	< 0.00050	< 0.00050	-	-	-	< 0.00050
Magnesium (dissolved)	mg/L	-		398	392	399	380	385	392	289	240	274	-	309	312	397	386	359	350	368	386	389	360
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.0989**	-	**0.0659**	-	-	**0.0674**	-	-	**0.260**	-	-	-	0.0370	0.0373	-	-	-	0.0349
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.0000050	-	< 0.0000050	-	-	< 0.000010	-	-	< 0.000010	-	-	-	< 0.000010	< 0.000010	-	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-		-	-	0.00625	-	0.00672	-	-	0.0146	-	-	0.0176	-	-	-	0.00459	0.00449	-	-	-	0.00489
Nickel (dissolved)	mg/L	-		-	-	0.0058	-	< 0.0050	-	-	< 0.0050	-	-	0.0066	-	-	-	< 0.0050	< 0.0050	-	-	-	< 0.0050
Potassium (dissolved)	mg/L	-		-	-	6.38	-	6.23	-	-	5.67	-	-	7.31	-	-	-	4.95	4.78	-	-	-	5.09
Silver (dissolved)	mg/L	-		-	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	-	-	< 0.00050	< 0.00050	-	-	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**129**	**127**	**128**	**122**	**126**	**128**	**153**	**106**	**109**	-	**155**	**106**	**139**	**131**	**124**	**123**	**132**	**141**	**141**	**128**
Thallium (dissolved)	mg/L	-		-	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	-	< 0.00010	< 0.00010	-	-	-	< 0.00010
Vanadium (dissolved)	mg/L	-		-	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	< 0.010	-	-	-	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07
Sample ID:				GW-18235-071218-DD-002	GW-18235-110818-DD-001	GW-18235-110818-DD-002	GW-18235-0519-DD-007	GW-18235-1119-DD-023	GW-18235-0520-DD-001	GW-18235-1120-HM-010	GW-18235-0521-DD-030**	GW-18235-0517-DD-003	GW-18235-0717-DD-003	GW-18235-0717-DD-004	GW-18235-1117-DD-001	GW-18235-0518-DD-003	GW-18235-0518-DD-004	GW-18235-071218-DD-003	GW-18235-071218-DD-004	GW-18235-110818-DD-003	GW-18235-110818-DD-004	GW-18235-0519-DD-010	GW-18235-0519-DD-013
Sample Date:				7/12/2018	11/8/2018	11/8/2018	5/30/2019	11/28/2019	5/22/2020	11/25/2020	6/1/2021	5/17/2017	7/26/2017	7/26/2017	12/1/2017	5/30/2018	5/30/2018	7/12/2018	7/12/2018	11/8/2018	11/8/2018	5/30/2019	5/30/2019
Parameters	**Units**	**ODWS[1]**	**ODWS Source**	**Duplicate**		**Duplicate**								**Duplicate**			**Duplicate**		**Duplicate**				**Duplicate**
Field Parameters																							
Conductivity, field	uS/cm	-		4250	4240	4240	3670	3900	3360	4400	NA	3640	600	600	3800	39990	39990	3940	3940	3750	3750	3800	3800
Dissolved oxygen (DO), field	mg/L	-		3.69	1.04	1.04	-	-	2.62	0.22	NA	-	-	-	-	-	-	3.62	3.62	1.99	1.99	2.15	2.15
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-	-	-	-105	-105
pH, field	s.u.	6.5-8.5	OG	7.69	6.63	6.63	7.14	6.41	6.88	5.84	NA	7.00	7.06	7.06	6.76	6.85	6.85	7.48	7.48	6.90	6.90	6.85	6.85
Temperature, field	Deg C	15	AO	10.70	8.63	8.63	11.29	7.63	13.09	8.68	NA	9.9	10.7	10.7	9.6	12.4	12.4	11.47	11.47	9.18	9.18	-	-
Turbidity, field	NTU	5.0	MAC	37.0	>999	>999	-	-	0	>1000	NA	-	-	-	-	-	-	54.0	54.0	583	583	603	603
Volume purged	L	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	399	397	392	399	407	409	387	382	497	444	442	433	424	420	428	424	473	473	443	454
Ammonia-N	mg/L	-		0.567	< 0.637	< 0.637	0.505	0.603	0.491	0.574	0.663	0.352	0.400	0.432	< 0.466	< 0.683	< 0.365	0.344	0.341	< 0.524	< 0.518	0.411	0.429
Biochemical oxygen demand (BOD)	mg/L	-		< 2.0	-	-	< 3.0	-	< 3.0	-	< 3.0	-	< 2.0	< 2.0	-	-	-	< 2.0	< 2.0	-	-	< 3.0	< 3.0
Chemical oxygen demand (COD)	mg/L	-		13	27	33	< 10	10	51	22	21	< 100	31	27	23	15	15	17	18	27	25	30	36
Chloride	mg/L	250	AO	15.4	14.7	15.5	7.16	14.7	13.8	14.5	14.8	8.4	9.6	10.7	9.8	11.7	11.2	10.7	10.3	9.7	9.7	9.64	9.39
Conductivity	uS/cm	-		3860	4120	4130	3380	4070	4090	4090	4210	3730	3620	3750	3690	3450	3420	3560	3600	3720	3660	3750	3690
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	< 2.39	2.69	2.74	3.93	9.23	< 3.33	3.28	5.62	2.4	2.8	2.7	3.5	2.5	2.5	< 2.96	9.63	3.87	4.08	2.94	2.65
Hardness	mg/L	80-100	OG	2650	-	-	2230	-	2900	-	3070	-	2440	2480	-	-	-	2470	2440	-	-	2540	2680
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.020	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	< 0.10	< 0.020	< 0.020
Nitrite (as N)	mg/L	1.0	MAC	< 0.10	-	-	< 0.010	-	< 0.10	-	< 0.10	-	< 0.10	< 0.10	-	-	-	< 0.10	< 0.10	-	-	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	OG	7.51	7.12	7.07	7.15	7.40	7.57	7.47	7.18	7.45	7.27	7.25	7.79	7.60	7.63	7.53	7.49	7.02	7.05	7.07	7.05
Phenolics (total)	mg/L	-		< 0.0017	-	-	0.0065	-	< 0.0020	-	0.0030	-	< 0.0044 J	< 0.0083 J	-	-	-	< 0.0016	< 0.0042	-	-	0.0081	0.0117
Phosphorus	mg/L	-		0.0145	-	-	0.0142	-	0.859	-	0.494	-	0.224	0.233	-	-	-	0.0535	0.0477	-	-	0.254	0.311
Sulfate	mg/L	500	AO	2990	3050	3220	1910	2920	2810	2980	2950	2300	2460	2580	2490	2710	2540	2560	2480	2540	2500	2150	2090
Total dissolved solids (TDS)	mg/L	500	AO	4210	4210	4100	3260	4230	4230	4410	4340	3570	3660	3690	3800	3850	3910	3890	3860	3590	3400	3870 J	3850 J
Total kjeldahl nitrogen (TKN)	mg/L	-		0.79 J	-	-	1.08	-	< 1.5	-	0.900	-	0.82	0.73	-	-	-	0.41	0.38	-	-	< 1.5	< 1.5
Total suspended solids (TSS)	mg/L	-		35.3	-	-	22.9	-	2000	-	1040	-	587	585	-	-	-	104	90.4	-	-	345 J	757 J
Trihalomethanes	mg/L	0.100	MAC	< 0.0032	-	-	-	-	< 0.0032	-	< 0.002	-	< 0.0032	< 0.0032	-	-	-	< 0.0032	< 0.0032	-	-	-	-
Turbidity	NTU	5.0	MAC	35.7	607 J	583 J	-	-	-	-	-	969	565	539	227	156	158	99.1	97.5	135 J	235 J	-	-
Xylenes (total)	mg/L	0.09	MAC	< 0.0011	-	-	-	-	-	-	-	-	< 0.0011	< 0.0011	-	-	-	< 0.0011	< 0.0011	-	-	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	< 0.050	-	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	< 0.050	-	-	-	< 0.050	0.065	-	-	< 0.050 J	0.120 J
Arsenic (dissolved)	mg/L	0.010	IMAC	0.0126	-	-	0.0133	-	0.0130	-	0.0138	-	< 0.0010	< 0.0010	-	-	-	< 0.0010	< 0.0010	-	-	< 0.0010	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	< 0.0053	0.0055	0.0054	0.0051	0.0055	< 0.0054	0.0055	0.0065	0.0055	0.0053	0.0053	0.0067	0.0048	0.0046	< 0.0055	< 0.0053	0.0050	0.0051	0.0049	0.0057
Beryllium (dissolved)	mg/L	-		< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	< 0.0010	-	-	-	< 0.0010	< 0.0010	-	-	< 0.0010	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.62	0.72	0.69	0.45	0.72	0.67	0.69	0.70	0.53	0.48	0.56	0.44	0.50	0.52	0.47	0.46	0.54	0.55	0.50	0.54
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.000050	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.00010	< 0.00010	-	-	-	< 0.000050	< 0.000050	-	-	0.000135 J	< 0.000050 J
Calcium (dissolved)	mg/L	-		466	485	489	522	502	503	500	525	499	492	509	491	492	506	496	484	507	512	497	507
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	< 0.0050
Cobalt (dissolved)	mg/L	-		< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	< 0.0010	-	-	-	< 0.0010	< 0.0010	-	-	< 0.0010	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	< 0.0020	< 0.0020	-	-	-	< 0.0020	< 0.0020	-	-	< 0.0020	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	3.11	3.32	3.23	4.28	3.08	3.37	3.52	3.34	0.95	0.67	0.66	1.07	2.56	2.58	2.73	2.76	4.24	4.22	3.25	2.73
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	< 0.00050	-	-	-	< 0.00050	< 0.00050	-	-	< 0.00050	< 0.00050
Magnesium (dissolved)	mg/L	-		360	402	396	224	402	401	387	426	332	295	293	301	334	333	299	299	297	294	316	343
Manganese (dissolved)	mg/L	0.05	AO	0.0347	-	-	0.0396	-	0.0382	-	0.0395	-	0.152	0.150	-	-	-	0.118	0.118	-	-	0.123	0.104
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	-	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	< 0.000010	< 0.000010	-	-	-	< 0.000010	< 0.000010	-	-	< 0.000010	< 0.000010
Molybdenum (dissolved)	mg/L	-		0.00477	-	-	0.00425	-	0.00459	-	0.00570	-	0.00442	0.00447	-	-	-	0.00429	0.00439	-	-	0.00451	0.00511
Nickel (dissolved)	mg/L	-		< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	< 0.0050
Potassium (dissolved)	mg/L	-		5.23	-	-	3.59	-	5.34	-	5.60	-	4.30	4.30	-	-	-	4.62	4.62	-	-	4.31	4.88
Silver (dissolved)	mg/L	-		< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	< 0.00050	-	-	-	< 0.00050	< 0.00050	-	-	< 0.00050	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	131	142	138	84.1	142	140	133	144	115	100	102	101	116	115	104	105	113	111	110	121
Thallium (dissolved)	mg/L	-		< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	< 0.00010	-	-	-	< 0.00010	< 0.00010	-	-	0.00014	< 0.00010
Vanadium (dissolved)	mg/L	-		< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	< 0.010	-	-	-	< 0.010	< 0.010	-	-	< 0.010	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable ODWS/O. Reg 153/04 criteria.

< 0.10 Method detection limit does not meet ODWS/O. Reg 153/04 criteria.

< 0.20 Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW10A-18	MW10A-18	MW10A-18	MW10A-18	MW10A-18	MW10A-18	MW11A-19	MW11A-19	MW11A-19	MW11A-19	MW11A-19	MW12A-19	MW12A-19	MW12A-19
Sample ID:				GW-18235-1119-DD-	GW-18235-0520-DD-	GW-18235-1120-HM-	GW-18235-0521-DD-	GW-18235-1121-BK-	GW-18235-1121-BK-	GW-18235-0519-DD-	GW-18235-1119-DD-	GW-18235-0520-DD-	GW-18235-1120-HM-	GW-18235-0521-DD-	GW-18235-1121-BK-	GW-18235-1119-DD-	GW-18235-0520-DD-	GW-18235-1120-HM-	GW-18235-0521-DD-	GW-18235-1121-BK-	GW-18235-1119-DD-	GW-18235-0520-DD-	GW-18235-1120-HM-
Sample Date:				003	003	001	031**	020	021	024	002	025	011	006**	009	013	027	016	029**	007	031	029	024
Parameters	Units	ODWS[1]	ODWS Source	11/29/2019	5/22/2020	11/23/2020	6/1/2021	11/10/2021	11/10/2021 Duplicate	5/30/2019	11/29/2019	5/22/2020	11/26/2020	6/3/2021	11/9/2021	11/29/2019	5/22/2020	11/26/2020	6/1/2021	11/8/2021	11/29/2019	5/22/2020	11/25/2020
Field Parameters																							
Conductivity, field	uS/cm	-		3790	3610	3730	NA	3700	3700	4260	4020	3700	4030	NA	3780	4170	3930	4390	NA	4110	4200	3920	4240
Dissolved oxygen (DO), field	mg/L	-		3.72	5.11	3.93	NA	1.70	1.70	-	0.61	0.83	1.47	NA	3.54	0.98	5.77	0.52	NA	1.81	2.44	1.53	1.17
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	NA	-19	-19	-	-	-	-	NA	58	-	-	-	NA	-22	-	-	-
pH, field	s.u.	6.5-8.5	OG	6.67	6.99	6.75	NA	6.90	6.90	7.08	6.84	6.85	5.24	NA	7.03	6.82	6.87	5.57	NA	7.17	6.88	6.86	5.64
Temperature, field	Deg C	15	AO	9.77	13.3	11.98	NA	12.21	12.21	11.25	7.91	13.43	9.92	NA	12.90	8.13	18.36	9.45	NA	12.03	6.30	11.59	8.72
Turbidity, field	NTU	5.0	MAC	>999	0	919	NA	855	855	-	>999	>500	>1000	NA	>1000	>999	681	>1000	NA	915	>999	>500	>1000
Volume purged	L	-		-	-	-	-	6	6	-	-	-	-	-	5	-	-	-	-	7	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	476	493	446	420	527	480	439	446	467	441	440	547	432	415	659	386	415	516	523	474
Ammonia-N	mg/L	-		0.298	0.375	0.305	0.390	0.569	0.553	0.058	0.069	0.066	0.059	0.052	0.089	0.327	0.389	1.66	0.591	0.762	0.168	0.265	0.209
Biochemical oxygen demand (BOD)	mg/L	-		-	< 3.0	-	< 3.0	-	-	< 3.0	-	< 3.0	-	< 3.0	-	-	< 3.0	-	< 3.0	-	-	< 3.0	-
Chemical oxygen demand (COD)	mg/L	-		72	47	18	14	28	34	229	186	120	40	< 10	111	90	40	111	13	40	58	39	48
Chloride	mg/L	250	AO	10.9	10.9	10.2	11.2	8.7	9.1	7.80	14.4	10.9	12.2	12.3	9.7	15.1	14.7	16.9	14.5	12.6	16.1	15.5	12.3
Conductivity	uS/cm	-		3750	3730	3820	3910	3690	3820	3690	3950	4040	3890	4080	3940	4070	4170	4010	4220	4420	4020	4050	4070
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	2.92	< 3.99	9.56	3.47	6.79	7.54	7.11	3.52	< 2.54	4.23	2.69	3.27	7.23	12.4	42.8	4.35	4.32	3.02	7.05 J+	3.36
Hardness	mg/L	80-100	OG	-	2690	-	2830	-	-	2430	-	2790	-	2820	-	-	2850	-	3060	-	-	2790	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.020	< 0.20	< 0.10	< 0.10	0.181	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	< 0.10	-	-	< 0.010	-	< 0.10	-	< 0.10	-	-	< 0.10	-	< 0.10	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.10	7.51	7.26	7.18	7.72	7.49	7.22	7.35	7.58	7.54	7.26	7.64	7.31	7.33	7.04	7.21	7.62	7.14	7.41	7.30
Phenolics (total)	mg/L	-		-	< 0.0014	-	0.0063	-	-	0.0224	-	< 0.0010	-	0.0051	-	-	< 0.0013	-	0.0068	-	-	< 0.0032	-
Phosphorus	mg/L	-		-	0.732	-	0.119	-	-	2.61	-	1.99	-	1.32	-	-	0.503	-	0.0430	-	-	0.541	-
Sulfate	mg/L	500	AO	2570	2510	2250	2550	2160	2340	2110	2930	2560	2900	2820	2540	2680	2990	2590	2910	2820	2870	2660	2430
Total dissolved solids (TDS)	mg/L	500	AO	3860	3810	3620	3900	3610	3720	3910	3980	4230	4070	4440	3930	4130	4340	4060	4250	4380	4040	4190	3910
Total kjeldahl nitrogen (TKN)	mg/L	-		-	2.7	-	0.570	-	-	0.46	-	0.50	-	0.450	-	-	1.19	-	0.700	-	-	0.63	-
Total suspended solids (TSS)	mg/L	-		-	930	-	155	-	-	15100	-	7470	-	2130	-	-	986	-	80.0	-	-	1600	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	< 0.002	-	-	-	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	< 0.050	-	-	< 0.050	-	< 0.050	-	< 0.050	-	-	< 0.050	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.010	IMAC	-	< 0.0010	-	0.0013	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	0.0067	-	0.0068	-	-	0.0076	-
Barium (dissolved)	mg/L	1.0	MAC	0.0074	< 0.0051	0.0052	0.0050	0.0049	0.0051	0.0120	0.0121	< 0.0069	0.0086	0.0114	0.0108	0.0143	< 0.0087	0.0250	0.0157	0.0160	0.0108	< 0.0098	0.0075
Beryllium (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.49	0.53	0.51	0.57	0.53	0.55	0.42	0.56	0.55	0.52	0.58	0.53	0.53	0.56	0.46	0.61	0.60	0.46	0.44	0.51
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.000050	-	< 0.000050	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	-	< 0.000050	-	< 0.000050	-	-	< 0.000050	-
Calcium (dissolved)	mg/L	-		488	537	527	570	508	507	554	533	558	530	541	535	509	533	564	556	498	510	530	500
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	-	-	0.0020	-	0.0015	-	0.0012	-	-	< 0.0010	-	< 0.0010	-	-	0.0016	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	3.02	3.58	3.06	3.44	4.14	4.17	0.49	0.58	< 0.10	0.14	< 0.10	0.23	3.98	3.29	3.86	3.53	4.32	2.15	2.49	1.78
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-		321	327	338	341	320	314	254	339	341	338	357	340	361	369	337	405	441	368	356	383
Manganese (dissolved)	mg/L	0.05	AO	-	0.119	-	0.127	-	-	0.422	-	0.413	-	0.317	-	-	0.192	-	0.329	-	-	0.222	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.0000050	-	< 0.0000050	-	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	-	< 0.0000050	-	< 0.0000050	-	-	< 0.0000050	-
Molybdenum (dissolved)	mg/L	-		-	0.00420	-	0.00460	-	-	0.0137	-	0.00536	-	0.00478	-	-	0.00700	-	0.00645	-	-	0.00661	-
Nickel (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	-	-	0.0114	-	0.0084	-	0.0068	-	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-		-	4.43	-	4.90	-	-	9.97	-	6.69	-	6.23	-	-	5.85	-	6.12	-	-	5.89	-
Silver (dissolved)	mg/L	-		-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	112	113	113	115	119	117	98.7	114	112	113	118	116	136	127	128	146	169	115	124	119
Thallium (dissolved)	mg/L	-		-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	< 0.010	-	-	0.014	-	< 0.010	-	< 0.010	-	-	< 0.010	-	< 0.010	-	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				MW12A-19	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW3A-13
Sample ID:				GW-18235-1121-BK-016	GW-18235-0517-DD-016	GW-18235-0717-DD-021	GW-18235-1117-DD-014	GW-18235-0518-DD-017	GW-18235-071218-DD-020	GW-18235-110818-DD-016	GW-18235-0519-DD-025	GW-18235-1119-DD-019	GW-18235-0520-DD-019	GW-18235-1120-HM-017	GW-18235-0521-DD-020	GW-18235-1121-BK-006	GW-18235-0517-DD-008	GW-18235-0717-DD-011	GW-18235-1117-DD-007	GW-18235-0518-DD-009	GW-18235-071218-DD-009	GW-18235-110818-DD-008	GW-18235-0519-DD-003
Sample Date:		ODWS[1]	ODWS Source	11/10/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	11/26/2020	6/2/2021	11/8/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019
Parameters	**Units**																					
Field Parameters																						
Conductivity, field	uS/cm	-		4070	3870	6360	4030	4190	4180	4040	4010	3860	3710	4220	4010	3840	2930	6010	3780	3690	3860	3490	3900
Dissolved oxygen (DO), field	mg/L	-		4.07	-	-	-	-	4.79	2.80	1.68	3.60	0.2	0.13	0.53	1.38	-	-	-	-	3.35	2.91	-
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		11	-	-	-	-	-	-	-121	-	-	-	-2	-38	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	6.90	7.05	7.12	6.83	6.50	7.19	7.00	6.93	6.98	6.93	**5.47**	7.09	7.26	7.21	7.53	6.89	6.81	**6.48**	7.17	7.21
Temperature, field	Deg C	15	AO	9.40	9.5	10.4	9.7	11.1	11.04	8.81	-	9.15	13.67	9.29	10.90	11.77	9.9	11.4	9.3	12.90	13.03	9.32	12.64
Turbidity, field	NTU	5.0	MAC	**>1000**	-	-	-	-	**47.9**	**>999**	**50.4**	**>999**	**76.6**	**187**	**1000**	**128**	-	-	-	-	**>999**	**99.1**	-
Volume purged	L	-		6	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	490	459	431	432	424	434	472	439	**541**	418	431	416	**525**	414	434	451	413	441	460	421
Ammonia-N	mg/L	-		0.374	0.430	0.424	< 0.519	< 0.515	0.451	< 0.513	0.527	0.436	0.451	0.366	0.495	0.717	< 0.020	< 0.020	< 0.048	< 0.196	0.103	< 0.093	0.057
Biochemical oxygen demand (BOD)	mg/L	-		-	-	< 2.0	-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	-	-	< 2.0	-	-	< 2.0	-	< 3.0
Chemical oxygen demand (COD)	mg/L	-		31	< 10	< 10	21	12	17	77	< 10	60	< 10	< 10	19	34	< 10	37	15	84	75	57	91
Chloride	mg/L	250	AO	13.4	11.6	13.6	13.5	12.1	12.4	12.9	11.6	12.3	13.0	11.6	14.0	10.2	7.1	11.0	10.5	11.8	10.0	11.2	8.85
Conductivity	uS/cm	-		4100	4130	4050	3890	3580	3760	3920	4000	3890	4020	3990	4140	3940	3190	3710	3800	3430	3570	3560	3580
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	3.18	2.0	2.7	4.6	3.6	< 2.15	3.16	2.16	2.79	< 2.29	1.87	2.96	3.04	2.1	2.5	3.0	2.9	3.21	3.49	2.92
Hardness	mg/L	80-100	OG	-	-	**2440**	-	-	**2480**	-	**2650**	-	**2800**	-	**2850**	-	-	**2330**	-	-	**2320**	-	**2350**
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	< 0.020	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.10	< 0.020
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.10	-	-	< 0.10	-	< 0.010	-	< 0.10	-	< 0.10	-	-	< 0.10	-	-	< 0.10	-	< 0.010
pH, lab	s.u.	6.5-8.5	OG	7.65	7.62	7.55	7.90	7.63	7.63	7.24	7.24	7.56	7.47	7.62	7.28	7.71	7.59	7.49	7.83	7.64	7.45	7.19	7.23
Phenolics (total)	mg/L	-		-	-	< 0.0112	-	-	< 0.0047	-	0.0076	-	< 0.0026	-	0.0049	-	-	< 0.0032	-	-	< 0.0020	-	0.0128
Phosphorus	mg/L	-		-	-	0.0430	-	-	0.0391	-	0.0271	-	0.0648	-	0.544	-	-	0.674	-	-	1.28	-	1.45
Sulfate	mg/L	500	AO	**2790**	**2540**	**2890**	**2660**	**2670**	**2670**	**2860**	**2360**	**2570**	**2820**	**2500**	**2640**	**2250**	**1910**	**2370**	**2370**	**2720**	**2290**	**2280**	**2020**
Total dissolved solids (TDS)	mg/L	500	AO	**4090**	**4090**	**3940**	**4090**	**3980**	**4050**	**3700**	**3840**	**3970**	**4140**	**4010**	**4020**	**3720**	**3100**	**3810**	**3910**	**3770**	**3870**	**3340**	**3800 J**
Total kjeldahl nitrogen (TKN)	mg/L	-		-	-	0.46	-	-	0.39	-	0.64	-	0.69	-	1.00	-	-	0.54	-	-	0.96	-	< 1.5
Total suspended solids (TSS)	mg/L	-		-	-	1170	-	-	88.3	-	31.0	-	100	-	992	-	-	1690	-	-	2310	-	3060
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-	-	< 0.0032	-	-
Turbidity	NTU	5.0	MAC	-	**56.5**	**411**	**226**	**54.5**	**56.7**	**1210 J**	-	-	-	-	-	-	**185**	**3360**	**148**	**>4000**	**>4000**	**1910 J**	-
Xylenes (total)	mg/L	0.09	MAC	-	-	< 0.0011	-	-	< 0.0011	-	-	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-	-	< 0.050	-	-	< 0.050	-	< 0.050
Arsenic (dissolved)	mg/L	0.010	IMAC	-	-	< 0.0010	-	-	0.0056	-	0.0059	-	0.0058	-	0.0065	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	0.0174	0.0064	0.0056	0.0078	0.0058	< 0.0057	0.0058	0.0057	0.0067	< 0.0053	0.0057	0.0055	0.0064	0.0624	0.0323	0.0303	0.0226	0.0208	0.0606	0.0335
Beryllium (dissolved)	mg/L	-		-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.50	0.62	0.53	0.49	0.59	0.52	0.59	0.56	0.60	0.60	0.60	0.61	0.58	0.25	0.41	0.45	0.49	0.46	0.35	0.44
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	-	< 0.00010	-	-	0.000062	-	< 0.000050
Calcium (dissolved)	mg/L	-		511	487	423	426	457	418	369	457	357	498	462	482	345	510	519	480	533	492	417	518
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Cobalt (dissolved)	mg/L	-		-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	0.0021	-	0.0017
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	-	< 0.0020	-	-	< 0.0020	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	**2.70**	**1.02**	**0.64**	**0.48**	**2.74**	**2.60**	**1.44**	**2.58**	**1.15**	**2.72**	**2.70**	**2.68**	**2.10**	< 0.10	< 0.10	< 0.10	**0.58**	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050
Magnesium (dissolved)	mg/L	-		378	393	336	358	372	349	418	366	426	379	391	400	433	181	252	304	276	265	251	257
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.108**	-	-	**0.107**	-	**0.105**	-	**0.110**	-	**0.108**	-	-	0.0421	-	-	**0.308**	-	**0.296**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010
Molybdenum (dissolved)	mg/L	-		-	-	0.00383	-	-	0.00413	-	0.00438	-	0.00439	-	0.00410	-	-	0.00515	-	-	0.00597	-	0.00576
Nickel (dissolved)	mg/L	-		-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	0.0092	-	-	0.0093	-	0.0083
Potassium (dissolved)	mg/L	-		-	-	4.42	-	-	4.66	-	4.56	-	4.75	-	4.79	-	-	4.92	-	-	5.15	-	4.44
Silver (dissolved)	mg/L	-		-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**120**	**132**	**119**	**122**	**140**	**129**	**157**	**128**	**159**	**136**	**138**	**144**	**166**	**89.1**	**117**	**130**	**118**	**121**	**184**	**111**
Thallium (dissolved)	mg/L	-		-	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	< 0.00010
Vanadium (dissolved)	mg/L	-		-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable ODWS/O. Reg 153/04 criteria.

< 0.10 Method detection limit does not meet ODWS/O. Reg 153/04 criteria.

< 0.20 Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW8A-06	OW8A-06
Sample ID:				GW-18235-1119-DD-021	GW-18235-0520-DD-009	GW-18235-1120-HM-027	GW-18235-0521-DD-017**	GW-18235-1121-BK-013	GW-18235-0517-DD-015	GW-18235-0717-DD-020	GW-18235-1117-DD-013	GW-18235-0518-DD-016	GW-18235-071218-DD-019	GW-18235-110818-DD-015	GW-18235-0519-DD-020	GW-18235-1119-DD-018	GW-18235-0520-DD-018	GW-18235-1120-HM-013	GW-18235-1120-HM-014	GW-18235-0521-DD-007	GW-18235-1121-BK-004	GW-18235-0517-DD-018	GW-18235-0717-DD-025
Sample Date:				12/2/2019	5/22/2020	11/24/2020	6/2/2021	11/9/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	11/26/2020	11/26/2020 Duplicate	6/2/2021	11/8/2021	5/17/2017	7/26/2017
Parameters	**Units**	**ODWS[1]**	**ODWS Source**																				
Field Parameters																							
Conductivity, field	uS/cm	-		3330	3470	4000	NA	3230	3080	5370	3360	2510	3500	3620	4570	3660	3250	3490	3490	3150	3190	3700	6080
Dissolved oxygen (DO), field	mg/L	-		5.28	7.39	0.17	NA	3.65	-	-	-	-	4.73	2.04	-	5.99	1.34	0.29	0.29	4.30	0.71	-	-
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	NA	15	-	-	-	-	-	-	-	-	-	-	-	24	-47	-	-
pH, field	s.u.	6.5-8.5	OG	6.52	6.57	**5.93**	NA	7.22	7.05	7.09	6.84	6.58	7.24	6.57	7.17	6.88	6.91	**5.5**	**5.5**	6.89	7.11	6.94	7.06
Temperature, field	Deg C	15	AO	5.73	**18.13**	7.11	NA	11.61	9.5	10.2	9.7	11.7	11.27	9.37	9.78	4.76	12.02	9.23	9.23	14.15	11.54	9.8	10.8
Turbidity, field	NTU	5.0	MAC	**289**	**>1000**	**775**	NA	**>1000**	-	-	-	-	**49.5**	**11.7**	-	**>999**	**160**	**113**	**113**	**203**	**>1000**	-	-
Volume purged	L	-		-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	486	458	459	408	433	484	408	417	386	406	407	390	452	398	394	398	371	**507**	477	444
Ammonia-N	mg/L	-		0.037	0.067	0.030	0.033	0.139	0.457	0.411	< 0.426	< 0.484	0.453	< 0.481	0.481	0.492	0.485	0.423	0.430	0.589	0.620	0.381	0.365
Biochemical oxygen demand (BOD)	mg/L	-		-	< 3.0	-	< 3.0	-	-	< 2.0	-	-	< 2.0	-	< 3.0	-	< 3.0	-	-	< 3.0	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-		111	43	15	< 10	41	15	26	21	12	21	17	< 10	38	24	< 10	< 10	< 10	58	13	11
Chloride	mg/L	250	AO	5.0	8.8	10.7	11.4	7.5	5.7	7.2	6.3	8.0	7.0	7.1	13.7	7.1	7.2	7.2	7.2	7.2	6.3	13.8	13.0
Conductivity	uS/cm	-		2080	3550	3750	3810	3370	3320	3380	3260	3070	3190	3350	4080	3190	3380	3320	3310	3340	3260	3890	3810
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	2.21	< 3.32	3.90	2.53	4.40	3.0	3.7	3.7	3.8	3.29	3.87	2.53	**6.89**	< 4.28	4.77	**5.42**	4.08	**5.53**	1.9	2.5
Hardness	mg/L	80-100	OG	-	**2220**	-	**2640**	-	-	**2060**	-	-	**2090**	-	**2860**	-	**2300**	-	-	**2260**	-	-	**2360**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.10	< 0.20	< 0.10	< 0.10	< 0.020	< 0.10	< 0.20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	< 0.10	-	-	< 0.10	-	-	< 0.050	-	< 0.010	-	< 0.10	-	-	< 0.050	-	-	< 0.10
pH, lab	s.u.	6.5-8.5	OG	7.40	7.41	7.56	7.73	7.67	7.59	7.41	7.88	7.55	7.56	7.10	7.12	7.41	7.42	7.49	7.40	7.85	7.58	7.59	7.38
Phenolics (total)	mg/L	-		-	< 0.0010	-	0.0068	-	-	< 0.0052	-	-	< 0.0014	-	0.0062	-	< 0.0052	-	-	0.0028	-	-	< 0.0095
Phosphorus	mg/L	-		-	0.877	-	0.572	-	-	0.155	-	-	0.0387	-	0.0133	-	0.0446	-	-	0.0483	-	-	0.0247
Sulfate	mg/L	500	AO	**982**	**2250**	**2510**	**2240**	**2030**	**1890**	**2050**	**2020**	**2290**	**2010**	**2160**	**2440**	**1910**	**2060**	**2090**	**2150**	**1880**	**1870**	**2320**	**2760**
Total dissolved solids (TDS)	mg/L	500	AO	**1770**	**3570**	**3840**	**3720**	**3160**	**3170**	**3260**	**3340**	**3310**	**3370**	**3170**	**4130**	**3150**	**3400**	**3350**	**3380**	**3100**	**3030**	**3820**	**3670**
Total kjeldahl nitrogen (TKN)	mg/L	-		-	< 1.5	-	0.460	-	-	0.65	-	-	0.68	-	0.69	-	0.81	-	-	0.610	-	-	0.61
Total suspended solids (TSS)	mg/L	-		-	1350	-	1450	-	-	319	-	-	108	-	25.3	-	78.3	-	-	71.1	-	-	388
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	< 0.002	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	-	-	< 0.002	-	-	< 0.0032
Turbidity	NTU	5.0	MAC	-	-	-	-	-	**160**	**187**	**65.8**	**71.9**	**71.8**	**88.5 J**	-	-	-	-	-	-	-	**215**	**147**
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	-	-	-	-	-	-	-	-	-	< 0.0011
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	**0.544**	-	**1.20**	-	-	< 0.050	-	-	< 0.050	-	< 0.050	-	< 0.050	-	-	< 0.050	-	-	< 0.050
Arsenic (dissolved)	mg/L	0.010	IMAC	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	**0.0135**	-	**0.0125**	-	**0.0138**	-	-	**0.0149**	-	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	0.0588	0.102	0.0702	0.0331	0.0432	0.0072	0.0055	0.0057	0.0050	< 0.0047	0.0058	0.0050	0.0064	< 0.0066	0.0052	0.0051	0.0052	0.0063	0.0057	0.0062
Beryllium (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.13	0.43	0.52	0.50	0.41	0.44	0.42	0.39	0.47	0.42	0.47	0.63	0.47	0.49	0.48	0.48	0.49	0.42	0.55	0.50
Cadmium (dissolved)	mg/L	0.005	MAC	-	0.000068	-	0.000121	-	-	< 0.00010	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	-	< 0.000050	-	-	< 0.00010
Calcium (dissolved)	mg/L	-		351	479	514	554	508	556	494	506	511	492	558	492	511	552	526	525	528	513	523	476
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	0.0063
Cobalt (dissolved)	mg/L	-		-	0.0021	-	0.0019	-	-	< 0.0010	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0035	-	0.0030	-	-	< 0.0020	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	-	< 0.0020	-	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	< 0.10	**0.76**	**0.35**	**0.97**	< 0.10	**1.16**	**1.32**	**1.46**	**4.39**	**4.18**	**4.25**	**3.36**	**4.08**	**4.34**	**4.56**	**4.59**	**4.46**	**4.10**	**1.84**	**0.97**
Lead (dissolved)	mg/L	0.01	MAC	-	0.00103	-	0.00072	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050
Magnesium (dissolved)	mg/L	-		101	250	299	305	232	190	200	203	224	209	230	395	219	224	220	218	229	189	336	284
Manganese (dissolved)	mg/L	0.05	AO	-	**0.299**	-	**0.213**	-	-	0.0416	-	-	0.0415	-	0.0380	-	0.0405	-	-	0.0379	-	-	**0.0874**
Mercury (dissolved)	mg/L	0.001	MAC	-	0.0000323	-	0.0000209	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	-	< 0.0000050	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-		-	0.00720	-	0.00461	-	-	0.00423	-	-	0.00437	-	0.00518	-	0.00473	-	-	0.00444	-	-	0.00456
Nickel (dissolved)	mg/L	-		-	0.0078	-	0.0072	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050
Potassium (dissolved)	mg/L	-		-	4.61	-	5.44	-	-	3.49	-	-	3.64	-	5.06	-	3.72 J+	-	-	3.60	-	-	4.62
Silver (dissolved)	mg/L	-		-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**36.8**	**98.4**	**125**	**132**	**94.7**	**91.0**	**78.5**	**79.6**	**90.4**	**85.3**	**89.6**	**140**	**89.5**	**89.5**	**89.0**	**90.7**	**93.2**	**85.2**	**113**	**100**
Thallium (dissolved)	mg/L	-		-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010
Vanadium (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	0.012	-	-	< 0.010	-	-	< 0.010	-	< 0.010	-	< 0.010	-	-	< 0.010	-	-	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06
Sample ID:				GW-18235-1117-DD-016	GW-18235-0518-DD-019	GW-18235-071218-DD-024	GW-18235-110818-DD-021	GW-18235-0519-DD-015	GW-18235-1119-DD-015	GW-18235-0520-DD-023	GW-18235-1120-HM-006	GW-18235-0521-DD-005	GW-18235-0521-DD-010	GW-18235-1121-BK-017	GW-18235-0517-DD-010	GW-18235-0717-DD-013	GW-18235-1117-DD-009	GW-18235-0518-DD-011	GW-18235-071218-DD-011	GW-18235-071218-DD-012	GW-18235-110818-DD-010	GW-18235-110818-DD-011	GW-18235-0519-DD-009
Sample Date:				12/1/2017	5/30/2018	7/12/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	11/26/2020	6/2/2021	6/2/2021 Duplicate	11/10/2021	5/17/2017	7/26/2017	12/1/2017	5/30/2018	7/12/2018	7/12/2018 Duplicate	11/8/2018	11/8/2018 Duplicate	5/30/2019
Parameters	**Units**	**ODWS[1]**	**ODWS Source**																				
Field Parameters																							
Conductivity, field	uS/cm	-		3820	4010	4050	4160	3730	3880	3810	4640	3760	3760	3680	3780	6250	3940	4150	4040	4040	3960	3960	4030
Dissolved oxygen (DO), field	mg/L	-		-	-	2.73	1.49	9.65	1.30	0.88	5.51	3.07	3.07	1.25	-	-	-	-	3.65	3.65	1.50	1.50	-
Not sampled	none	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	-85	-	-	-	-18	-18	-14	-	-	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	6.86	6.54	7.94	6.92	6.81	6.79	6.52	6.93	7.18	7.18	6.87	6.95	7.01	6.79	6.58	6.80	6.80	6.87	6.87	7.20
Temperature, field	Deg C	15	AO	9.8	11.9	11.57	9.74	-	8.16	14.49	10.41	12.21	12.21	11.88	9.7	10.5	10.0	11.8	11.69	11.69	9.48	9.48	10.79
Turbidity, field	NTU	5.0	MAC	-	-	**39.1**	**131**	**41.9**	**>999**	**285**	**120**	**87**	**87**	**147**	-	-	-	-	**44.9**	**44.9**	**27.9**	**27.9**	-
Volume purged	L	-		-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	426	470	437	428	447	476	419	410	429	423	434	482	**513**	467	437	438	435	478	483	461
Ammonia-N	mg/L	-		< 0.426	< 0.431	0.424	< 0.482	0.418	0.301	0.370	0.345	0.498	0.395	0.484	0.202	< 0.169	< 0.196	< 0.253	0.290	0.224	< 0.683	< 0.459	0.190
Biochemical oxygen demand (BOD)	mg/L	-		-	-	< 2.0	-	< 3.0	-	< 3.0	-	< 3.0	< 3.0	-	-	< 2.0	-	-	< 2.0	< 2.0	-	-	< 3.0
Chemical oxygen demand (COD)	mg/L	-		14	15	16	15	< 10	74	10	< 10	< 10	< 10	< 10	< 10	12	< 10	< 10	13	14	14	14	41
Chloride	mg/L	250	AO	10.1	10.1	10.0	10.3	10.8	12.3	12.4	11.2	11.3	12.4	11.0	10.9	10.1	11.0	12.4	12.3	12.4	10.5	12.9	11.1
Conductivity	uS/cm	-		3730	3400	3600	3880	3800	3780	3850	3840	3860	3870	3800	4030	3810	3800	3530	3700	3690	3950	3970	3860
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	2.3	4.6	< 2.23	3.18	2.25	3.50	< 2.31	2.33	4.62	**7.86**	3.54	1.5	1.7	1.9	2.3	< 2.05	< 1.91	2.52	2.30	2.42
Hardness	mg/L	80-100	OG	-	-	**2570**	-	**2630**	-	**2690**	-	**2630**	**2640**	-	-	**2500**	-	-	**2530**	**2480**	-	-	**2660**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.20	< 0.20	< 0.10	0.026	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.020
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.10	-	< 0.010	-	< 0.10	-	< 0.050	< 0.10	-	-	< 0.10	-	-	< 0.10	< 0.10	-	-	< 0.010
pH, lab	s.u.	6.5-8.5	OG	7.76	7.61	7.58	7.02	7.20	7.20	7.66	7.43	7.41	7.15	7.73	7.52	7.39	7.89	7.47	7.39	7.43	6.97	7.02	7.10
Phenolics (total)	mg/L	-		-	-	< 0.0014	-	0.0060	-	< 0.0025	-	0.0031	0.0015	-	-	< 0.0047	-	-	< 0.0015	< 0.0018	-	-	0.0097
Phosphorus	mg/L	-		-	-	0.0198	-	0.0132	-	0.0674	-	0.0353	0.0198	-	-	0.0328	-	-	0.0044	0.0061	-	-	0.181
Sulfate	mg/L	500	AO	**2240**	**2150**	**2130**	**2290**	**2140**	**2650**	**2670**	**2410**	**2310**	**2610**	**2440**	**2440**	**2400**	**2590**	**2680**	**2590**	**2600**	**2290**	**2880**	**2270**
Total dissolved solids (TDS)	mg/L	500	AO	**3820**	**3760**	**3930**	**3800**	**3540**	**3880**	**4070**	**4090**	**3720**	**3730**	**3790**	**4020**	**4090**	**3950**	**3940**	**3990**	**4040**	**3810**	**3770**	**4090 J**
Total kjeldahl nitrogen (TKN)	mg/L	-		-	-	0.31	-	0.56	-	0.46	-	0.570	0.490	-	-	0.31	-	-	0.24	0.30	-	-	< 1.5
Total suspended solids (TSS)	mg/L	-		-	-	57.6	-	29.4	-	123	-	40.0	46.1	-	-	90.6	-	-	6.6	6.7	-	-	217
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	-	-	-	< 0.0032	-	< 0.002	< 0.002	-	-	< 0.0032	-	-	< 0.0032	< 0.0032	-	-	-
Turbidity	NTU	5.0	MAC	**60.9**	**69.7**	**41.1**	**64.0 J**	-	-	-	-	-	-	-	**6.93**	**58.2**	**18.8**	**9.65**	**6.15**	**6.05**	**15.8 J**	**14.2 J**	-
Xylenes (total)	mg/L	0.09	MAC	-	-	< 0.0011	-	-	-	-	-	-	-	-	-	< 0.0011	-	-	< 0.0011	< 0.0011	-	-	-
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	< 0.050	-	**0.131**	-	0.086	0.092	-	-	**0.186**	-	-	< 0.050	< 0.050	-	-	0.078
Arsenic (dissolved)	mg/L	0.010	IMAC	-	-	0.0026	-	0.0027	-	0.0029	-	0.0034	0.0033	-	-	< 0.0010	-	-	< 0.0010	< 0.0010	-	-	0.0024
Barium (dissolved)	mg/L	1.0	MAC	0.0070	0.0065	< 0.0057	0.0054	0.0055	0.0112	< 0.0106	0.0059	0.0074	0.0074	0.0062	0.0078	0.0071	0.0055	0.0054	< 0.0049	< 0.0048	0.0058	0.0057	0.0241
Beryllium (dissolved)	mg/L	-		-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	< 0.0010	-	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.44	0.54	0.52	0.54	0.54	0.54	0.56	0.55	0.57	0.56	0.53	0.50	0.49	0.42	0.50	0.45	0.46	0.59	0.59	0.48
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	< 0.000050	-	-	< 0.00010	-	-	< 0.000050	< 0.000050	-	-	< 0.000050
Calcium (dissolved)	mg/L	-		476	484	497	525	522	476	528	523	492	487	490	505	495	498	522	487	471	542	551	513
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	0.0142 J	< 0.0050 J	-	-	< 0.0050
Cobalt (dissolved)	mg/L	-		-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	< 0.0010	-	-	0.0026	-	-	0.0025	0.0023	-	-	0.0018
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	< 0.0020	-	< 0.0020	-	< 0.0020	< 0.0020	-	-	< 0.0020	-	-	< 0.0020	< 0.0020	-	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	**1.85**	**3.75**	**3.92**	**3.04**	**3.67**	**3.76**	**3.08**	**3.36**	**3.67**	**3.67**	**4.94**	**0.31**	0.23	0.19	**0.39**	**0.69 J**	**0.38 J**	**0.69**	**0.69**	**4.04**
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	< 0.00050	-	-	< 0.00050
Magnesium (dissolved)	mg/L	-		298	340	322	346	323	337	332	346	342	346	322	349	306	327	344	319	316	353	356	335
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.0940**	-	**0.0891**	-	**0.0957**	-	**0.0938**	**0.0947**	-	-	**0.151**	-	-	**0.150**	**0.147**	-	-	**0.209**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	< 0.0000050	-	-	< 0.000010	-	-	< 0.000010	< 0.000010	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-		-	-	0.00431	-	0.00430	-	0.00397	-	0.00446	0.00452	-	-	0.00548	-	-	0.00876 J	0.00520 J	-	-	0.00567
Nickel (dissolved)	mg/L	-		-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	-	0.0072	-	-	0.0069	0.0053	-	-	< 0.0050
Potassium (dissolved)	mg/L	-		-	-	5.16	-	4.91	-	5.09	-	5.37	5.55	-	-	5.51	-	-	5.54	5.51	-	-	5.24
Silver (dissolved)	mg/L	-		-	-	< 0.00050	-	< 0.00050	-	< 0.00050	-	< 0.00050	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	< 0.00050	-	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**107**	**127**	**115**	**117**	**115**	**117**	**113**	**119**	**125**	**128**	**120**	**108**	**91.2**	**96.3**	**110**	**102**	**104**	**103**	**102**	**102**
Thallium (dissolved)	mg/L	-		-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	< 0.00010	-	-	0.00011	-	-	< 0.00010	< 0.00010	-	-	< 0.00010
Vanadium (dissolved)	mg/L	-		-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	< 0.0050	-	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	< 0.010	-	-	< 0.010	-	-	< 0.010	< 0.010	-	-	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.5a

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site

Sample Location:				OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06
Sample ID:				GW-18235-1119-DD-028	GW-18235-0520-DD-011	GW-18235-1120-HM-029	GW-18235-0521-DD-001	GW-18235-0521-DD-002	GW-18235-1121-BK-002
Sample Date:				12/2/2019	5/22/2020	11/24/2020	6/2/2021	6/2/2021 Duplicate	11/8/2021
Parameters	Units	ODWS[1]	ODWS Source						
Field Parameters									
Conductivity, field	uS/cm	-		3750	3680	4060	3690	3690	3760
Dissolved oxygen (DO), field	mg/L	-		8.76	7.95	1.49	1.87	1.87	2.32
Not sampled	none	-		-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	15	15	-9
pH, field	s.u.	6.5-8.5	OG	5.60	6.4	5.82	6.69	6.69	6.96
Temperature, field	Deg C	15	AO	5.81	17.06	9.12	14.43	14.43	12.28
Turbidity, field	NTU	5.0	MAC	539	>1000	>1000	31.8	31.8	956
Volume purged	L	-		-	-	-	-	-	7
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	511	437	459	393	394	496
Ammonia-N	mg/L	-		0.243	0.231	0.151	0.201	0.198	0.266
Biochemical oxygen demand (BOD)	mg/L	-		-	< 3.0	-	< 3.0	< 3.0	-
Chemical oxygen demand (COD)	mg/L	-		54	25	44	< 10	< 10	21
Chloride	mg/L	250	AO	12.0	12.2	13.0	11.8	12.1	11.1
Conductivity	uS/cm	-		3850	3980	3920	4040	4050	3960
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	1.67	< 2.83	3.50	3.86	3.30	2.96
Hardness	mg/L	80-100	OG	-	2840	-	2860	2820	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	< 0.10	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.39	7.29	7.20	7.91	7.92	7.54
Phenolics (total)	mg/L	-		-	< 0.0016	-	0.0071	0.0024	-
Phosphorus	mg/L	-		-	0.611	-	0.0126	0.0117	-
Sulfate	mg/L	500	AO	2610	2570	2870	2560	2590	2620
Total dissolved solids (TDS)	mg/L	500	AO	3840	4140	4040	4020	3990	3740
Total kjeldahl nitrogen (TKN)	mg/L	-		-	2.1	-	0.250	0.300	-
Total suspended solids (TSS)	mg/L	-		-	560	-	11.9	10.2	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	< 0.0032	< 0.002	-
Turbidity	NTU	5.0	MAC	-	-	-	-	-	-
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	-	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	0.288	-	< 0.050	< 0.050	-
Arsenic (dissolved)	mg/L	0.010	IMAC	-	< 0.0010	-	< 0.0010	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0156	< 0.0103	0.0085	0.0094	0.0098	0.0165
Beryllium (dissolved)	mg/L	-		-	< 0.0010	-	< 0.0010	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.47	0.52	0.50	0.55	0.54	0.51
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.000050	-	< 0.000050	< 0.000050	-
Calcium (dissolved)	mg/L	-		500	514	514	529	518	533
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	< 0.0050	< 0.0050	-
Cobalt (dissolved)	mg/L	-		-	0.0023	-	0.0020	0.0020	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	< 0.0020	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	0.12	1.05	1.53	0.72	0.72	1.27
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	< 0.00050	< 0.00050	-
Magnesium (dissolved)	mg/L	-		340	378	354	375	371	347
Manganese (dissolved)	mg/L	0.05	AO	-	0.174	-	0.160	0.161	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.0000050	-	< 0.0000050	< 0.0000050	-
Molybdenum (dissolved)	mg/L	-		-	0.00491	-	0.00507	0.00518	-
Nickel (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	< 0.0050	-
Potassium (dissolved)	mg/L	-		-	5.67	-	5.70	5.77	-
Silver (dissolved)	mg/L	-		-	< 0.00050	-	< 0.00050	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	103	116	110	120	114	101
Thallium (dissolved)	mg/L	-		-	< 0.00010	-	< 0.00010	< 0.00010	-
Vanadium (dissolved)	mg/L	-		-	< 0.0050	-	< 0.0050	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	< 0.010	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW4A-09	MW4A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09
Sample ID:					GW-18235-0717-DD-009	GW-18235-071218-DD-007	GW-18235-0519-DD-005	GW-18235-0520-DD-007	GW-18235-0521-DD-012	GW-18235-0717-DD-017	GW-18235-071218-DD-016	GW-18235-0519-DD-023	GW-18235-0520-DD-015	GW-18235-0521-DD-024	GW-18235-0717-DD-027	GW-18235-071218-DD-026	GW-18235-0717-DD-001	GW-18235-0717-DD-002	GW-18235-071218-DD-001	GW-18235-071218-DD-002	GW-18235-0519-DD-007	GW-18235-0520-DD-001	GW-18235-0521-DD-030**
Sample Date:					7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	7/26/2017	7/26/2017 Duplicate	7/12/2018	7/12/2018 Duplicate	5/30/2019	5/22/2020	6/1/2021
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																		
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	ug/L	-	1.1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2		< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700		< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 20
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16		< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Bromoform	ug/L	-	25		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-	-	-	-	-	-	-	< 1.0
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Dibromochloromethane	ug/L	-	25		< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	590		-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-	-	-	-	-	-	-	< 1.0
Ethylbenzene	ug/L	140	2.4	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	51		-	-	-	-	< 0.50	-	-	-	-	< 0.50	-	-	-	-	-	-	-	-	< 0.50
m&p-Xylenes	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0
o-Xylene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Styrene	ug/L	-	5.4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40
trans-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150		< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0
Trihalomethanes	ug/L	100	-	MAC	-	-	< 3.2	-	-	-	-	< 3.2	-	-	-	-	-	-	-	-	< 3.2	-	-
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	90	300	MAC	-	-	< 1.1	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 0.50	-	-	-	-	-	-	< 1.1	< 1.1	< 0.50

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW1A-13	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW4A-09	MW4A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09
Sample ID:					GW-18235-0717-DD-009	GW-18235-071218-DD-007	GW-18235-0519-DD-005	GW-18235-0520-DD-007	GW-18235-0521-DD-012	GW-18235-0717-DD-017	GW-18235-071218-DD-016	GW-18235-0519-DD-023	GW-18235-0520-DD-015	GW-18235-0521-DD-024	GW-18235-0717-DD-027	GW-18235-071218-DD-026	GW-18235-0717-DD-001	GW-18235-0717-DD-002	GW-18235-071218-DD-001	GW-18235-071218-DD-002	GW-18235-0519-DD-007	GW-18235-0520-DD-001	GW-18235-0521-DD-030**
Sample Date:					7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	7/26/2017	7/26/2017 Duplicate	7/12/2018	7/12/2018 Duplicate	5/30/2019	5/22/2020	6/1/2021
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																		
Semi-volatile Organic Compounds																						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2		< 0.028	< 0.028	0.107	0.056	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	0.043	< 0.028
Acenaphthene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	0.1		-	-	-	-	< 0.020	-	-	-	-	< 0.020	-	-	-	-	-	-	-	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1		< 0.020	< 0.020	0.021	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41		< 0.020	< 0.020	0.044	0.025	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1		< 0.020	< 0.020	0.042	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.022	< 0.020	< 0.020	< 0.020	< 0.020	0.031	0.032
Pyrene	ug/L	-	4.1		< 0.020	0.022	0.060	0.038	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

(2) Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.

\- No Value/Not Analyzed.

J The result is an estimated value.

0.054 Does not meet the applicable criteria.

< 0.10 Method detection limit does not meet criteria.

< 0.20 Result below method detection limit.

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW10A-18	MW10A-18	MW10A-18	MW11A-19	MW11A-19	MW12A-19	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06
Sample ID:					GW-18235-0717-DD-003	GW-18235-0717-DD-004	GW-18235-071218-DD-003	GW-18235-071218-DD-004	GW-18235-0519-DD-010	GW-18235-0519-DD-013	GW-18235-0520-DD-003	GW-18235-0521-DD-031**	GW-18235-0519-DD-024	GW-18235-0520-DD-025	GW-18235-0521-DD-006**	GW-18235-0520-DD-027	GW-18235-0521-DD-029**	GW-18235-0520-DD-029	GW-18235-0717-DD-021	GW-18235-071218-DD-020	GW-18235-0519-DD-025	GW-18235-0520-DD-019	GW-18235-0521-DD-020
Sample Date:				ODWS	7/26/2017	7/26/2017	7/12/2018	7/12/2018	5/30/2019	5/30/2019	5/22/2020	6/1/2021	5/30/2019	5/22/2020	6/3/2021	5/22/2020	6/1/2021	5/22/2020	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**Source**		**Duplicate**		**Duplicate**		**Duplicate**													
Volatile Organic Compounds																							
1,1,1,2-Tetrachloroethane	ug/L	-	1.1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2		< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 20	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700		< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 20	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 20
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Bromoform	ug/L	-	25		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		-	-	-	-	-	-	-	< 1.0	-	-	< 1.0	-	< 1.0	-	-	-	-	-	< 1.0
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.20	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.30	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Dibromochloromethane	ug/L	-	25		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	590		-	-	-	-	-	-	-	< 1.0	-	-	< 1.0	-	< 1.0	-	-	-	-	-	< 1.0
Ethylbenzene	ug/L	140	2.4	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	51		-	-	-	-	-	-	-	< 0.50	-	-	0.57	-	< 0.50	-	-	-	-	-	< 0.50
m&p-Xylenes	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 0.40	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 0.50	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 2.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0
o-Xylene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.30	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Styrene	ug/L	-	5.4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.40	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40
trans-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.30	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 1.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0
Trihalomethanes	ug/L	100	-	MAC	-	-	-	-	< 3.2	< 3.2	-	-	< 3.2	-	-	-	-	-	-	-	< 3.2	-	-
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	90	300	MAC	-	-	-	-	< 1.1	< 1.1	< 1.1	< 0.50	< 1.1	< 1.1	< 0.50	< 1.1	< 0.50	< 1.1	-	-	< 1.1	< 1.1	< 0.50

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW10A-18	MW10A-18	MW10A-18	MW11A-19	MW11A-19	MW12A-19	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06
Sample ID:					GW-18235-0717-DD-003	GW-18235-0717-DD-004	GW-18235-071218-DD-003	GW-18235-071218-DD-004	GW-18235-0519-DD-010	GW-18235-0519-DD-013	GW-18235-0520-DD-003	GW-18235-0521-DD-031**	GW-18235-0519-DD-024	GW-18235-0520-DD-025	GW-18235-0521-DD-006**	GW-18235-0520-DD-027	GW-18235-0521-DD-029**	GW-18235-0520-DD-029	GW-18235-0717-DD-021	GW-18235-071218-DD-020	GW-18235-0519-DD-025	GW-18235-0520-DD-019	GW-18235-0521-DD-020
Sample Date:				ODWS	7/26/2017	7/26/2017	7/12/2018	7/12/2018	5/30/2019	5/30/2019	5/22/2020	6/1/2021	5/30/2019	5/22/2020	6/3/2021	5/22/2020	6/1/2021	5/22/2020	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**Source**		**Duplicate**		**Duplicate**		**Duplicate**													
Semi-volatile Organic Compounds																							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2		< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	0.928	0.279	0.109	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.11	< 0.040	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020
Benzo(b)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	-	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	0.1		-	-	-	-	-	-	-	< 0.020	-	-	< 0.020	-	< 0.020	-	-	-	-	-	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.031	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.280	0.092	0.035	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.114	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	0.023	< 0.020	0.035	< 0.020	0.252	0.077	0.031	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.057	0.032	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

(2) Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.

\- No Value/Not Analyzed.

J The result is an estimated value.

0.054 Does not meet the applicable criteria.

< 0.10 Method detection limit does not meet criteria.

< 0.20 Result below method detection limit.

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW9A-06	OW9A-06	OW9A-06
Sample ID:					GW-18235-0717-DD-011	GW-18235-071218-DD-009	GW-18235-0519-DD-003	GW-18235-0520-DD-009	GW-18235-0521-DD-017**	GW-18235-0717-DD-020	GW-18235-071218-DD-019	GW-18235-0519-DD-020	GW-18235-0520-DD-018	GW-18235-0521-DD-007	GW-18235-0717-DD-025	GW-18235-071218-DD-024	GW-18235-0519-DD-015	GW-18235-0520-DD-023	GW-18235-0521-DD-005	GW-18235-0521-DD-010	GW-18235-0717-DD-013	GW-18235-071218-DD-011	GW-18235-071218-DD-012
Sample Date:					7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	6/3/2021 Duplicate	7/26/2017	7/12/2018	7/12/2018 Duplicate
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																			
Volatile Organic Compounds																							
1,1,1,2-Tetrachloroethane	ug/L	-	1.1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2		< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 20	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700		< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 20	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16		< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-	-	-	< 1.0	< 1.0	-	-	-
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.20	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.30	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25		< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	590		-	-	-	-	< 1.0	-	-	-	-	< 1.0	-	-	-	-	< 1.0	< 1.0	-	-	-
Ethylbenzene	ug/L	140	2.4	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	51		-	-	-	-	< 0.50	-	-	-	-	< 0.50	-	-	-	-	< 0.50	< 0.50	-	-	-
m&p-Xylenes	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 0.40	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.30	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.40	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.30	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150		< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	100	-	MAC	-	-	< 3.2	-	-	-	-	< 3.2	-	-	-	-	< 3.2	-	-	-	-	-	-
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	90	300	MAC	-	-	< 1.1	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 0.50	< 0.50	-	-	-

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW3A-13	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW9A-06	OW9A-06	OW9A-06
Sample ID:					GW-18235-0717-DD-011	GW-18235-071218-DD-009	GW-18235-0519-DD-003	GW-18235-0520-DD-009	GW-18235-0521-DD-017**	GW-18235-0717-DD-020	GW-18235-071218-DD-019	GW-18235-0519-DD-020	GW-18235-0520-DD-018	GW-18235-0521-DD-007	GW-18235-0717-DD-025	GW-18235-071218-DD-024	GW-18235-0519-DD-015	GW-18235-0520-DD-023	GW-18235-0521-DD-005	GW-18235-0521-DD-010	GW-18235-0717-DD-013	GW-18235-071218-DD-011	GW-18235-071218-DD-012
Sample Date:					7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	6/3/2021 Duplicate	7/26/2017	7/12/2018	7/12/2018 Duplicate
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																			
Semi-volatile Organic Compounds																							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2		< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	-	-	< 0.020	< 0.020	< 0.020
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	0.1		-	-	-	-	< 0.020	-	-	-	-	< 0.020	-	-	-	-	< 0.020	< 0.020	-	-	-
Benzo(g,h,i)perylene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

(2) Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.

\- No Value/Not Analyzed.

J The result is an estimated value.

0.054 Does not meet the applicable criteria.

< 0.10 Method detection limit does not meet criteria.

< 0.20 Result below method detection limit.

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					OW9A-06	OW9A-06	OW9A-06	OW9A-06
Sample ID:					GW-18235-0519-DD-009	GW-18235-0520-DD-011	GW-18235-0521-DD-001	GW-18235-0521-DD-002
Sample Date:					5/30/2019	5/22/2020	6/2/2021	6/2/2021
Parameters	Units	ODWS[1] a	Table 2[2] b	ODWS Source				Duplicate
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	ug/L	-	1.1		< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1		< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7		< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2		< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59		< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800		< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 30	< 30	< 30	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640		< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700		< 30	< 30	< 30	< 20
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16		< 2.0	< 2.0	< 2.0	< 1.0
Bromoform	ug/L	-	25		< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89		< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		-	-	-	< 1.0
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.20
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4		< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.30
Dibromochloromethane	ug/L	-	25		< 2.0	< 2.0	< 2.0	< 1.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	590		-	-	-	< 1.0
Ethylbenzene	ug/L	140	2.4	MAC	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	51		-	-	-	< 0.50
m&p-Xylenes	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 0.40
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 0.50
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 2.0
o-Xylene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.30
Styrene	ug/L	-	5.4		< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.40
trans-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.30
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150		< 5.0	< 5.0	< 5.0	< 1.0
Trihalomethanes	ug/L	100	-	MAC	< 3.2	-	-	-
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	90	300	MAC	< 1.1	< 1.1	< 1.1	< 0.50

Table 5.5b

Summary of Groundwater Analytical Results – Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					OW9A-06	OW9A-06	OW9A-06	OW9A-06
Sample ID:					GW-18235-0519-DD-009	GW-18235-0520-DD-011	GW-18235-0521-DD-001	GW-18235-0521-DD-002
Sample Date:					5/30/2019	5/22/2020	6/2/2021	6/2/2021
Parameters	Units	ODWS[1] a	Table 2[2] b	ODWS Source				Duplicate
Semi-volatile Organic Compounds								
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2		< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4		< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	0.1		-	-	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1		< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41		< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120		< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11		< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1		0.030	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.
-	No Value/Not Analyzed.
J	The result is an estimated value.
0.054	Does not meet the applicable criteria.
< 0.10	Method detection limit does not meet criteria.
< 0.20	Result below method detection limit.

Table 5.6a

Summary of Groundwater Analytical Results – Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1S-07	MW1S-07	MW1S-07	MW1S-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2S-07	MW2S-07
Sample ID:				GW-18235-0717-DD-007	GW-18235-071218-DD-006	GW-18235-0519-DD-036	GW-18235-0520-DD-005	GW-18235-0520-DD-031	GW-18235-1120-HM-020	GW-18235-0521-DD-013**	GW-18235-0717-DD-008	GW-18235-0520-DD-006	GW-18235-1120-HM-021	GW-18235-0521-DD-014**	GW-18235-0717-DD-015	GW-18235-071218-DD-014	GW-18235-0519-DD-037	GW-18235-0520-DD-013	GW-18235-1120-HM-009	GW-18235-0521-DD-022	GW-18235-0521-DD-027	GW-18235-0717-DD-016	GW-18235-071218-DD-015
Sample Date:				7/26/2017	7/12/2018	5/30/2019	5/22/2020	5/22/2020 Duplicate	11/23/2020	6/2/2021	7/26/2017	5/22/2020	11/23/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	11/25/2020	6/2/2021	6/2/2021 Duplicate	7/26/2017	7/12/2018
Parameters	**Units**	**ODWS[1]**	**ODWS Source**																				
Field Parameters																							
Conductivity, field	uS/cm	-		563	3080	3280	2970	2970	3280	NA	5910	3560	3670	NA	6450	4180	4360	3780	4210	3870	3870	6380	4180
Dissolved oxygen (DO), field	mg/L	-		-	3.86	-		-	10.25	NA	-	0.84	9.95	NA	-	4.09	-	0.46	0.01	2.61	2.61	-	2.99
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	-	-	-	NA	-	-	-	NA	-	-	-	-	-	42	42	-	-
pH, field	s.u.	6.5-8.5	OG	7.13	7.33	7.70	6.86	6.86	6.77	NA	7.06	6.54	6.79	NA	7.14	6.57	7.24	6.82	5.76	6.80	6.80	7.04	6.78
Temperature, field	Deg C	15	AO	12.2	11.24	11.07	18.98	18.98	10.08	NA	10.8	18.77	11.37	NA	10.5	11.49	11.03	13.23	3.99	11.47	11.47	10.4	11.13
Turbidity, field	NTU	5.0	MAC	-	>999	-	404	404	>1000	NA	-	>1000	>1000	NA	-	38.2	-	49.6	31	56	56	-	31.6
General Chemistry																							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	345	265	150	918	1170	336	383	393	474	413	377	410	404	412	185	381	20.0	411	423	403
Ammonia-N	mg/L	-		0.755	0.191	0.156	0.471	0.460	0.225	0.838	0.367	0.358	0.318	0.390	< 0.170	0.240	0.174	0.150	0.080	0.186	0.055	< 0.208	0.206
Biochemical oxygen demand (BOD)	mg/L	-		< 2.0	< 2.0	< 3.0	< 3.0	< 3.0	-	4.3	< 2.0	< 3.0	-	< 3.0	< 2.0	< 2.0	< 3.0	< 3.0	-	< 3.0	< 3.0	< 2.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-		220	63	177	95	125	38	31	150	39	23	< 10	< 10	17	< 10	< 10	< 10	< 10	< 10	< 10	14
Chloride	mg/L	250	AO	12.3	8.7	4.72	10.1	10.3	11.2	14.0	13.5	13.1	17.5	18.2	12.9	13.3	12.8	13.5	12.8	13.3	11.1	16.4	14.2
Conductivity	uS/cm	-		3670	2780	2150	3040	2990	3240	3830	3670	3740	3760	3820	4040	3790	4030	4020	3940	4080	3990	4010	3760
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	2.3	< 2.77	4.50	< 2.91	< 3.76	3.52	2.93	1.7	< 2.33	4.45	2.84	1.7	< 2.02	2.17	14.4	4.29	2.98	2.51	2.0	< 1.91
Hardness	mg/L	80-100	OG	2410	1840	935	2060	2070	-	2740	2390	2650	-	2650	2530	2530	2740	3050	-	2640	2960	2500	2550
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.10	0.087	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.020	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	< 0.10	< 0.050	< 0.010	< 0.10	< 0.10	-	< 0.10	< 0.10	< 0.10	-	< 0.10	< 0.10	< 0.10	< 0.010	< 0.10	-	< 0.10	< 0.050	< 0.10	< 0.10
pH, lab	s.u.	6.5-8.5	OG	7.48	7.69	7.54	7.64	7.64	7.62	7.81	7.42	7.45	7.52	7.83	7.35	7.61	7.14	7.54	7.55	7.34	7.72	7.38	7.61
Phenolics (total)	mg/L	-		< 0.0102	< 0.0026	0.0141	< 0.0018	< 0.0011	-	0.0050	< 0.0107	< 0.0016	-	0.0072	< 0.0039	< 0.0018	0.0064	< 0.0054	-	0.0017	0.0037	< 0.0053	< 0.0060
Phosphorus	mg/L	-		3.88	1.05	5.16	3.51	3.61	-	2.09	1.30	0.410	-	0.204	0.0146	0.0278	0.0174	0.0174	-	0.0575	1.09	0.0112	0.0038
Sulfate	mg/L	500	AO	2330	1860	1230	1910	1990	2100	2180	2440	2490	3270	2250	2740	2690	2410	2650	2630	2530	2560	2690	2930
Total dissolved solids (TDS)	mg/L	500	AO	3710	2830	2940 J	2970	2930	3000	3850	3780	3770	3750	3840	4260	4150	4220 J	4180	4010	4090	4510	4230	4160
Total kjeldahl nitrogen (TKN)	mg/L	-		4.0	1.20	< 15	7.3 J	1.35 J	-	9.00	1.56	< 1.5	-	0.690	0.27	0.29	< 0.15	< 1.5	-	0.280	0.60	0.32	0.27
Total suspended solids (TSS)	mg/L	-		7230	1190	5560	5960	5030	-	4420	3000	358	-	362	52.6	71.2	34.7	79.7	-	57.8	20100	197	8.4
Trihalomethanes	mg/L	0.100	MAC	< 0.0032	< 0.0032	-	< 0.0032	< 0.0032	-	< 0.002	< 0.0032	< 0.0032	-	< 0.002	< 0.0032	< 0.0032	-	< 0.0032	-	< 0.002	< 0.002	< 0.0032	< 0.0032
Turbidity	NTU	5.0	MAC	>4000	3960	-	-	-	-	-	>4000	-	-	-	23.8	21.4	-	-	-	-	-	54.4	4.71
Xylenes (total)	mg/L	0.09	MAC	< 0.0011	< 0.0011	-	-	-	-	-	< 0.0011	-	-	-	< 0.0011	< 0.0011	-	-	-	-	-	< 0.0011	< 0.0011
Metals																							
Aluminum (dissolved)	mg/L	0.10	OG	< 0.050	< 0.050	0.220	< 0.050	< 0.050	-	< 0.050	< 0.050	< 0.050	-	0.099	< 0.050	< 0.050	< 0.050	< 0.050	-	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (dissolved)	mg/L	0.010	IMAC	< 0.0010	< 0.0010	< 0.0010	0.0015	0.0016	-	0.0022	< 0.0010	0.0020	-	0.0042	< 0.0010	< 0.0010	< 0.0010	0.0011	-	< 0.0010	< 0.0010	< 0.0010	0.0011
Barium (dissolved)	mg/L	1.0	MAC	0.0212	0.0821	0.0787	0.0687	0.0659	0.0323	0.0275	0.0249	0.0243 J+	0.0286	0.0181	0.0058	< 0.0050	0.0055	< 0.0114	0.0042	0.0057	0.0128	0.0037	< 0.0037
Beryllium (dissolved)	mg/L	-		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	< 0.0010	< 0.0010	< 0.0010	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.83	0.32	0.14	0.34	0.33	0.39	0.92	0.50	0.51	0.53	0.52	0.51	0.46	0.52	0.53	0.54	0.46	0.58	0.49	0.46
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00010	< 0.000050	< 0.000050	< 0.000050	< 0.000050	-	< 0.000050	< 0.00010	< 0.000050	-	< 0.000050	< 0.00010	< 0.000050	< 0.000050	< 0.000050	-	< 0.000050	< 0.000050	< 0.00010	< 0.000050
Calcium (dissolved)	mg/L	-		483	452	295	531	540	495	540	473	522	506	517	473	467	492	520	522	483	589	469	464
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.0050	0.0058
Cobalt (dissolved)	mg/L	-		< 0.0010	0.0046	< 0.0010	0.0021	0.0020	-	0.0021	0.0021	0.0026	-	0.0014	0.0025	0.0024	0.0022	0.0025	-	0.0024	0.0012	0.0014	0.0015
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	-	< 0.0020	< 0.0020	< 0.0020	-	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0038	-	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	0.18	< 0.10	0.21	1.09	1.18	0.74	1.92	< 0.10	1.46	1.87	2.04	< 0.10	0.17	0.18	0.17	< 0.10	0.25	< 0.10	0.11	0.59
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Magnesium (dissolved)	mg/L	-		292	174	48.1	178	175	212	337	292	326	337	330	328	332	368	425	376	348	361	323	338
Manganese (dissolved)	mg/L	0.05	AO	0.141	0.493	0.239	0.251	0.248	-	0.161	0.147	0.120	-	0.0764	0.163	0.161	0.146	0.169	-	0.167	0.322	0.158	0.159
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	< 0.000010	< 0.000010	< 0.0000050	< 0.0000050	-	< 0.0000050	< 0.000010	< 0.0000050	-	< 0.0000050	< 0.000010	< 0.000010	< 0.000010	< 0.0000050	-	< 0.0000050	< 0.0000050	< 0.000010	< 0.000010
Molybdenum (dissolved)	mg/L	-		0.00405	0.00387	0.00270	0.00713	0.00703	-	0.00321	0.00441	0.00426	-	0.00434	0.00573	0.00529	0.00611	0.00587	-	0.00526	0.00476	0.00544	0.00665
Nickel (dissolved)	mg/L	-		< 0.0050	0.0076	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	0.0055	-	< 0.0050	0.0056	0.0056	0.0051	0.0054	-	< 0.0050	0.0080	< 0.0050	< 0.0050
Potassium (dissolved)	mg/L	-		5.98	4.34	4.06	5.22	5.15	-	6.57	4.80	5.28	-	5.50	5.69	6.05	6.12	6.86	-	5.77	6.45	5.45	5.73
Silver (dissolved)	mg/L	-		< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	106	57.2	14.8	66.2	65.0	79.5	114	96.7	106	109	108	105	112	116	134	119	107	117	101	111
Thallium (dissolved)	mg/L	-		< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Vanadium (dissolved)	mg/L	-		< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
< 0.10	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
< 0.20	Result below method detection limit.

Table 5.6a

Summary of Groundwater Analytical Results – Bedrock (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2S-07	MW2S-07	MW2S-07	MW2S-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07
Sample ID:				GW-18235-0519-DD-019	GW-18235-0520-DD-014	GW-18235-1120-HM-026	GW-18235-0521-DD-021**	GW-18235-0717-DD-023	GW-18235-071218-DD-022	GW-18235-0519-DD-033	GW-18235-1120-HM-007	GW-18235-0521-DD-025**	GW-18235-0717-DD-024	GW-18235-071218-DD-023	GW-18235-0519-DD-014	GW-18235-0519-DD-035	GW-18235-0520-DD-022	GW-18235-1120-HM-003	GW-18235-0521-DD-026**
Sample Date:				5/30/2019	5/22/2020	11/25/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	11/26/2020	6/3/2021	7/26/2017	7/12/2018	5/30/2019	5/30/2019 Duplicate	5/22/2020	11/26/2020	6/3/2021
Parameters	**Units**	**ODWS[1]**	**ODWS Source**																
Field Parameters																			
Conductivity, field	uS/cm	-		4280	3960	4230	NA	4980	3360	3010	3810	NA	6380	4240	37770	3770	3840	4550	NA
Dissolved oxygen (DO), field	mg/L	-		-	0	0.24	NA	-	2.45	3.73	5.42	NA	-	2.63	5.09	5.09	0.7	2.59	NA
Oxidation reduction potential (ORP), field	millivolts	-		-	-	-	NA	-	-	-295	-	NA	-	-	-129	-129	-	-	NA
pH, field	s.u.	6.5-8.5	OG	7.28	6.88	**5.88**	NA	7.17	8.46	**6.35**	6.77	NA	7.17	8.35	6.93	6.93	**6.47**	6.58	NA
Temperature, field	Deg C	15	AO	11.21	12.55	8.94	NA	11.5	11.94	-	10.35	NA	10.5	11.43	-	-	13.55	10.26	NA
Turbidity, field	NTU	5.0	MAC	-	1.8	**18.4**	NA	-	**36.3**	**65.2**	**>1000**	NA	-	**30.9**	**14.3**	**14.3**	**6.1**	**53.5**	NA
General Chemistry																			
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	412	391	395	396	109	39	132	220	124	436	416	418	415	401	399	381
Ammonia-N	mg/L	-		0.188	0.198	0.161	0.192	2.85	3.19	3.35	3.33	3.39	0.302	0.336	0.297	0.304	0.311	0.289	0.324
Biochemical oxygen demand (BOD)	mg/L	-		< 3.0	< 2.0	-	< 3.0	12.0	11.0	25.5	-	48	< 2.0	< 2.0	< 3.0	< 3.0	< 3.0	-	< 3.0
Chemical oxygen demand (COD)	mg/L	-		< 10	< 10	< 10	< 10	42	44	59	182	88	< 10	12	< 10	< 10	< 10	< 10	< 10
Chloride	mg/L	250	AO	12.5	14.6	14.9	12.5	26.5	24.4	23.7	24.5	25.8	18.3	12.9	12.4	12.4	13.6	15.1	16.9
Conductivity	uS/cm	-		4010	4020	3980	4080	3180	3000	3170	3140	3240	4010	3760	3970	3980	3960	3970	4050
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	1.78	< 2.63	3.44	**5.31**	1.4	< 2.15	< 2.5	2.81	**6.18**	2.5	< 2.03	2.05	1.93	< 2.05	2.96	2.69
Hardness	mg/L	80-100	OG	**2720**	**2800**	-	**2720**	**1950**	**2290**	**2220**	-	**2310**	**2430**	**2710**	**2770**	**2850**	**2800**	-	**3000**
Nitrate (as N)	mg/L	10.0	MAC	< 0.020	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	< 0.020	< 0.10	< 0.10	< 0.20	< 0.20	< 0.020	< 0.020	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	< 0.010	< 0.10	-	< 0.10	< 0.10	< 0.050	< 0.010	-	< 0.050	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	-	< 0.10
pH, lab	s.u.	6.5-8.5	OG	7.15	7.65	7.41	7.42	7.20	**6.48**	7.33	8.30	7.57	7.35	7.58	7.19	7.19	7.50	7.49	7.23
Phenolics (total)	mg/L	-		0.0110	0.0081 J+	-	0.0046	< 0.0086	< 0.0036	0.0480	-	< 0.010	< 0.0024	< 0.0020	0.0080	0.0061	< 0.0025	-	0.0021
Phosphorus	mg/L	-		0.0088	< 0.0030	-	0.0105	0.0259	0.0420	0.660	-	0.166	0.0053	0.0097	0.0410 J	0.0090 J	0.0064	-	0.0068
Sulfate	mg/L	500	AO	**2390**	**2980**	**3020**	**2460**	**2380**	**2220**	**1960**	**2060**	**2270**	**2640**	**2680**	**2350**	**2340**	**2790**	70.3	**3170**
Total dissolved solids (TDS)	mg/L	500	AO	**4090 J**	**4270**	**4120**	**4000**	**3280**	**3330**	**3050**	**3320**	**3220**	**4160**	**4090**	**5630**	**3990**	**4040**	**3900**	**4010**
Total kjeldahl nitrogen (TKN)	mg/L	-		0.19	0.46	-	0.250	3.18	3.14	3.27	-	3.35	0.48	0.61	0.44	0.40	0.46	-	0.380
Total suspended solids (TSS)	mg/L	-		25.7	9.2	-	28.8	50.6	152	425	-	480	98.8	19.8	12.0	12.3	12.4	-	10.8
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	< 0.002	< 0.0032	< 0.0032	-	-	< 0.002	< 0.0032	< 0.0032	-	-	< 0.0032	-	< 0.002
Turbidity	NTU	5.0	MAC	-	-	-	-	**68.5**	**61.2**	-	-	-	**81.2**	**14.6**	-	-	-	-	-
Xylenes (total)	mg/L	0.09	MAC	-	-	-	-	< 0.0011	< 0.0011	-	-	-	< 0.0011	< 0.0011	-	-	-	-	-
Metals																			
Aluminum (dissolved)	mg/L	0.10	OG	< 0.050	< 0.050	-	< 0.050	< 0.050	**< 0.50**	**0.50**	-	**0.104**	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	-	0.058
Arsenic (dissolved)	mg/L	0.010	IMAC	< 0.0010	< 0.0010	-	0.0012	0.0019	< 0.010	< 0.010	-	0.0033	< 0.0010	0.0040	0.0038	0.0038	0.0044	-	0.0044
Barium (dissolved)	mg/L	1.0	MAC	0.0037	< 0.0035	0.0035	0.0037	0.0106	< 0.011	< 0.010	0.0026	0.0064	0.0052	< 0.0049	0.0045	0.0046	< 0.0043	0.0050	0.0060
Beryllium (dissolved)	mg/L	-		< 0.0010	< 0.0010	-	< 0.0010	< 0.0010	< 0.010	< 0.010	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.47	0.50	0.52	0.46	**8.49**	**10.1**	**10.7**	**10.1**	**11.2**	0.52	0.55	0.57	0.59	0.57	0.57	0.61
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.000050	< 0.000050	-	< 0.000050	< 0.00010	< 0.00050	< 0.00050	-	< 0.000050	< 0.00010	< 0.000050	< 0.000050	< 0.000050	< 0.000050	-	< 0.000050
Calcium (dissolved)	mg/L	-		501	498	496	496	483	552	535	527	566	461	507	519	533	532	523	561
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.050	< 0.050	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050
Cobalt (dissolved)	mg/L	-		0.0016	0.0017	-	0.0016	< 0.0010	< 0.010	< 0.010	-	< 0.0010	0.0032	0.0016	0.0019	0.0020	< 0.0010	-	0.0013
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	< 0.0020	-	< 0.0020	< 0.0020	< 0.020	< 0.020	-	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	**0.43**	**0.42**	**0.46**	**0.47**	< 0.10	**< 1.0**	**< 1.0**	< 0.10	0.29	**0.80**	**1.95**	**1.86**	**1.75**	**3.50**	**2.12**	**2.30**
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.0050	< 0.0050	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050
Magnesium (dissolved)	mg/L	-		357	377	379	359	181	221	215	213	218	311	350	358	370	357	368	388
Manganese (dissolved)	mg/L	0.05	AO	**0.153**	**0.154**	-	**0.164**	0.0067	< 0.050	< 0.050	-	0.0215	**0.352**	**0.193**	**0.203**	**0.208**	**0.144**	-	**0.170**
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	< 0.0000050	-	< 0.0000050	< 0.00010	< 0.000010	< 0.000010	-	< 0.000050	< 0.000010	< 0.000010	< 0.000010	< 0.000010	< 0.0000050	-	< 0.0000050
Molybdenum (dissolved)	mg/L	-		0.00552	0.00529	-	0.00528	< 0.00050	< 0.0050	< 0.0050	-	< 0.00050	0.00572	0.00499	0.00481	0.00504	0.00433	-	0.00462
Nickel (dissolved)	mg/L	-		< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.050	< 0.050	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050
Potassium (dissolved)	mg/L	-		5.63	5.78	-	5.98	24.8	29.1	26.1	-	29.3	5.10	5.64	5.32	5.42	5.52	-	5.66
Silver (dissolved)	mg/L	-		< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.0050	< 0.0050	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**112**	**121**	**120**	**112**	**27.6**	**32.9**	**32.8**	**30.1**	**34.2**	**101**	**118**	**116**	**119**	**119**	**120**	**125**
Thallium (dissolved)	mg/L	-		< 0.00010	< 0.00010	-	< 0.00010	< 0.00010	< 0.0010	< 0.0010	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010
Vanadium (dissolved)	mg/L	-		< 0.0050	< 0.0050	-	< 0.0050	< 0.0050	< 0.050	< 0.050	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	< 0.010	-	< 0.010	< 0.010	< 0.10	< 0.10	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.059	-	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable ODWS/O. Reg 153/04 criteria.

< 0.10 Method detection limit does not meet ODWS/O. Reg 153/04 criteria.

< 0.20 Result below method detection limit.

Table 5.6b

Summary of Groundwater Analytical Results – Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1S-07	MW1S-07	MW1S-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2S-07	MW2S-07	MW2S-07	MW2S-07
Sample ID:					GW-18235-0717-DD-007	GW-18235-071218-DD-006	GW-18235-0519-DD-036	GW-18235-0520-DD-005	GW-18235-0520-DD-031	GW-18235-0521-DD-013**	GW-18235-0717-DD-008	GW-18235-0520-DD-006	GW-18235-0521-DD-014**	GW-18235-0717-DD-015	GW-18235-071218-DD-014	GW-18235-0519-DD-037	GW-18235-0520-DD-013	GW-18235-0521-DD-022	GW-18235-0521-DD-027	GW-18235-0717-DD-016	GW-18235-071218-DD-015	GW-18235-0519-DD-019	GW-18235-0520-DD-014
Sample Date:					7/26/2017	7/12/2018	5/30/2019	5/22/2020	5/22/2020 Duplicate	6/2/2021	7/26/2017	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	6/2/2021 Duplicate	7/26/2017	7/12/2018	5/30/2019	5/22/2020
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																			
Volatile Organic Compounds																							
1,1,1,2-Tetrachloroethane	ug/L	-	1.1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2		< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 20	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700		< 30	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 20	< 20	< 30	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		-	-	-	-	-	< 1.0	-	-	< 1.0	-	-	-	< 1.0	< 1.0	-	-	-	-	-
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	590		-	-	-	-	-	< 1.0	-	-	< 1.0	-	-	-	-	< 1.0	< 1.0	-	-	-	-
Ethylbenzene	ug/L	140	2.4	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	51		-	-	-	-	-	< 0.50	-	-	< 0.50	-	-	-	-	< 0.50	< 0.50	-	-	-	-
m&p-Xylenes	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	100	-	MAC	-	-	< 3.2	-	-	-	-	-	-	-	-	< 3.2	-	-	-	-	-	< 3.2	-
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	90	300	MAC	-	-	< 1.1	< 1.1	< 1.1	< 0.50	-	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 0.50	< 0.50	-	-	< 1.1	< 1.1

Table 5.6b

Summary of Groundwater Analytical Results – Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1S-07	MW1S-07	MW1S-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2S-07	MW2S-07	MW2S-07	MW2S-07
Sample ID:					GW-18235-0717-DD-007	GW-18235-071218-DD-006	GW-18235-0519-DD-036	GW-18235-0520-DD-005	GW-18235-0520-DD-031	GW-18235-0521-DD-013**	GW-18235-0717-DD-008	GW-18235-0520-DD-006	GW-18235-0521-DD-014**	GW-18235-0717-DD-015	GW-18235-071218-DD-014	GW-18235-0519-DD-037	GW-18235-0520-DD-013	GW-18235-0521-DD-022	GW-18235-0521-DD-027	GW-18235-0717-DD-016	GW-18235-071218-DD-015	GW-18235-0519-DD-019	GW-18235-0520-DD-014
Sample Date:					7/26/2017	7/12/2018	5/30/2019	5/22/2020	5/22/2020 Duplicate	6/2/2021	7/26/2017	5/22/2020	6/2/2021	7/26/2017	7/12/2018	5/30/2019	5/22/2020	6/2/2021	6/2/2021 Duplicate	7/26/2017	7/12/2018	5/30/2019	5/22/2020
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**																			
Semi-volatile Organic Compounds																							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2		0.126	< 0.028	< 0.028	0.045 J	0.083 J	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	0.122	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4		0.028	< 0.020	0.053	0.038	0.053	0.022	0.034	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1		0.081	0.043	0.136	0.137	0.159	< 0.070	0.093	0.021	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	0.055[ab]	0.026[ab]	0.065[ab]	0.087[ab]	0.079[ab]	0.041[ab]	0.074[ab]	0.014[ab]	0.016[ab]	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1		< 0.14[b]	0.040	0.101[b]	0.123[b]	0.131[b]	-	0.125[b]	0.022	-	< 0.020	< 0.020	< 0.020	< 0.020	-	-	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	0.1		-	-	-	-	-	0.053	-	-	0.021	-	-	-	-	< 0.020	< 0.020	-	-	-	-
Benzo(g,h,i)perylene	ug/L	-	0.2		0.039	< 0.020	0.051	0.056	0.053	0.030	0.047	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1		< 0.020	< 0.020	0.044	0.043	0.042	0.025	0.038	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1		0.117[b]	0.047	0.153[b]	0.132[b]	0.155[b]	0.099	0.107[b]	< 0.020	0.026	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41		0.231	0.113	0.442[b]	0.386	0.548[b]	0.195	0.219	0.043	0.041	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120		0.026	< 0.020	0.021	0.024 J	0.048 J	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.039	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2		0.042	0.025	0.072	0.075	0.069	0.037	0.051	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11		0.081	< 0.050	< 0.050	< 0.050	0.068	< 0.050	0.114	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1		0.178	0.065	0.195	0.189	0.299	0.102	0.135	0.020	0.021	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.037	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1		0.187	0.090	0.363	0.314	0.435	0.147	0.168	0.036	0.034	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.023	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

(2) Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.

\- No Value/Not Analyzed.

0.054 Does not meet the applicable criteria.

< 0.10 Method detection limit does not meet criteria.

< 0.20 Result below method detection limit.

Table 5.6b

Summary of Groundwater Analytical Results – Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW2S-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07
Sample ID:					GW-18235-0521-DD-021**	GW-18235-0717-DD-023	GW-18235-071218-DD-022	GW-18235-0519-DD-033	GW-18235-0521-DD-025**	GW-18235-0717-DD-024	GW-18235-071218-DD-023	GW-18235-0519-DD-014	GW-18235-0519-DD-035	GW-18235-0520-DD-022	GW-18235-0521-DD-026**
Sample Date:					6/2/2021	7/26/2017	7/12/2018	5/30/2019	6/3/2021	7/26/2017	7/12/2018	5/30/2019	5/30/2019 Duplicate	5/22/2020	6/3/2021
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**											
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane	ug/L	-	1.1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2		< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.50[b]	< 0.20
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-		< 20	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700		< 20	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30	< 30	< 20
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16		< 1.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Bromoform	ug/L	-	25		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon disulfide	ug/L	-	-		< 1.0	-	-	-	4.1	-	-	-	-	-	< 1.0
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.20	< 0.50	< 0.50	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-		< 0.30	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Dibromochloromethane	ug/L	-	25		< 1.0	< 2.0	< 2.0	< 2.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Dichlorodifluoromethane (CFC-12)	ug/L	-	590		< 1.0	-	-	-	< 1.0	-	-	-	-	-	< 1.0
Ethylbenzene	ug/L	140	2.4	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexane	ug/L	-	51		< 0.50	-	-	-	< 0.50	-	-	-	-	-	< 0.50
m&p-Xylenes	ug/L	-	-		< 0.40	< 1.0	< 1.0	< 1.0	< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.40
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 0.50	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50
Methylene chloride	ug/L	50	50	MAC	< 2.0	< 5.0	< 5.0	< 5.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0
o-Xylene	ug/L	-	-		< 0.30	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Styrene	ug/L	-	5.4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.40	< 0.50	< 0.50	< 0.50	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.40
trans-1,2-Dichloroethene	ug/L	-	1.6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-		< 0.30	< 0.50	< 0.50	< 0.50	< 0.30	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.30
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150		< 1.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0
Trihalomethanes	ug/L	100	-	MAC	-	-	-	< 3.2	-	-	-	< 3.2	< 3.2	-	-
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	90	300	MAC	< 0.50	-	-	< 1.1	< 0.50	-	-	< 1.1	< 1.1	< 1.1	< 0.50

Table 5.6b

Summary of Groundwater Analytical Results – Bedrock (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW2S-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07
Sample ID:					GW-18235-0521-DD-021**	GW-18235-0717-DD-023	GW-18235-071218-DD-022	GW-18235-0519-DD-033	GW-18235-0521-DD-025**	GW-18235-0717-DD-024	GW-18235-071218-DD-023	GW-18235-0519-DD-014	GW-18235-0519-DD-035	GW-18235-0520-DD-022	GW-18235-0521-DD-026**
Sample Date:					6/2/2021	7/26/2017	7/12/2018	5/30/2019	6/3/2021	7/26/2017	7/12/2018	5/30/2019	5/30/2019 Duplicate	5/22/2020	6/3/2021
Parameters	**Units**	**ODWS[1] a**	**Table 2[2] b**	**ODWS Source**											
Semi-volatile Organic Compounds															
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2		< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1		< 0.020	< 0.030	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1		< 0.020	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.050[ab]	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1		-	< 0.10	< 0.020	< 0.020	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	0.1		< 0.020	-	-	-	< 0.020	-	-	-	-	-	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1		< 0.020	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1		< 0.020	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11		< 0.050	< 0.050	0.050	0.056	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

(2) Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011.

\- No Value/Not Analyzed.

0.054 Does not meet the applicable criteria.

< 0.10 Method detection limit does not meet criteria.

< 0.20 Result below method detection limit.

Sample Key - Surface Water Monitoring
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location	Date	Sample ID	Parameters Analyzed/Comments
SW1	3/26/2021	SW-18235-0321-DD-001/002	Indicator Parameters
	6/1/2021	--	Dry
	8/31/2021	SW-18235-0821-DD-003	Indicator Parameters
	11/12/2021	SW-18235-1121-BK-01	Inorganic Chemistry, Metals, PAHs, VOCs
SW2	3/26/2021	SW-18235-0321-DD-004	Indicator Parameters
	6/1/2021	--	Dry
	8/31/2021	SW-18235-0821-DD-002	Indicator Parameters
	11/12/2021	SW-18235-1121-BK-02	Inorganic Chemistry, Metals, PAHs, VOCs
SW3	3/26/2021	SW-18235-0321-DD-006	Indicator Parameters
	6/1/2021	SW-18235-0521-DD-002	Inorganic Chemistry, Metals, PAHs, VOCs
	8/31/2021	--	Dry
	11/12/2021	--	Dry
SW4	3/26/2021	SW-18235-0321-DD-009	Indicator Parameters
	6/1/2021	--	Dry
	8/31/2021	SW-18235-0821-DD-004	Indicator Parameters
	11/12/2021	SW-18235-1121-BK-04/011	Inorganic Chemistry, Metals, PAHs, VOCs
SW5	3/26/2021	SW-18235-0321-DD-010	Indicator Parameters
	6/1/2021	--	Dry
	8/31/2021	SW-18235-0821-DD-005	Indicator Parameters
	11/12/2021	SW-18235-1121-BK-05	Inorganic Chemistry, Metals, PAHs, VOCs
SW6	3/26/2021	SW-18235-0321-DD-005	Indicator Parameters
	6/1/2021	SW-18235-0521-DD-008	Inorganic Chemistry, Metals, PAHs, VOCs
	8/31/2021	SW-18235-0821-DD-006	Indicator Parameters
	11/12/2021	SW-18235-1121-BK-06	Inorganic Chemistry, Metals, PAHs, VOCs
SW7	3/26/2021	SW-18235-0321-DD-007	Indicator Parameters
	6/1/2021	SW-18235-0521-DD-004/005	Inorganic Chemistry, Metals, PAHs, VOCs
	8/31/2021	SW-18235-0821-DD-007	Indicator Parameters
	11/12/2021	SW-18235-1121-BK-07	Inorganic Chemistry, Metals, PAHs, VOCs
SW8	3/26/2021	SW-18235-0321-DD-008	Indicator Parameters
	6/1/2021	--	Dry
	8/31/2021	--	Dry
	11/12/2021	--	Dry
SW9	3/26/2021	SW-18235-0321-DD-003	Indicator Parameters
	6/1/2021	SW-18235-0521-DD-001	Inorganic Chemistry, Metals, PAHs, VOCs
	8/31/2021	SW-18235-0821-DD-009/010	Indicator Parameters
	11/12/2021	SW-18235-1121-BK-09	Inorganic Chemistry, Metals, PAHs, VOCs
SWMS Pond [(1)]	3/26/2021	POND-18235-0321-DD-001	ISWMS Pond Parameter List
	6/1/2021	POND-18235-0521-DD-011	ISWMS Pond Parameter List
	8/31/2021	POND-18235-0821-DD-001	ISWMS Pond Parameter List
	11/12/2021	POND-18235-1121-BK-SWMS	ISWMS Pond Parameter List

Sample Key - Surface Water Monitoring
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Notes:

[1]	- Beginning on May 9, 2005, SW-1 was sampled from a new location because the approved SW-1 was historically dry.
[1]	Confirmatory sampling occurs following a SWMS Pond sample result detected above the relative trigger level.
NS	Not Sampled
Dry	Location was dry at time of sampling
Indicator Parameters	Alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, total phosphorus, TDS, pH, suspended solids, sulphate, BOD_5, COD, phenols, temperature, and dissolved oxygen.
Inorganic Chemistry	Alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulphate, DOC, TDS, suspended solids, phenol, BOD_5, COD, pH, total phosphorus, potassium, conductivity, and calcium.
Metals	Arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, and nickel.
VOCs	Volatile Organic Compounds
PAHs	Polycyclic Aromatic Hydrocarbons
SWMS Pond Parameter List	Alkalinity, conductivity, hardness, pH, chloride, sulphates, nitrate, nitrite, ammonia, TSS, TDS, COD, total phosphorus, TKN, BOD_5, phenolics, dissolved oxygen, temperature, arsenic, barium, boron, cadmium, calcium chromium, copper, iron, lead, magnesium, mercury, zinc, ethylbenzene, benzo(a)pyrene, fluorene, and napthalene.
Leachate Monitoring (LCS Industrial Sewage Works ECA)	Alkalinity, conductivity, hardness, pH, chloride, sulphates, nitrate, nitrite, ammonia, TSS, TDS, COD, total phosphorus, TKN, BOD_5, DOC, phenols, dissolved oxygen, temperature, arsenic, barium, boron, cadmium, chromium, copper, iron, lead, mercury, zinc, benzo(a)pyrene, ethylbenzene, napthalene, benzene, toluene, 1,4-dichlorobenzene, dichloromethane, and vinyl chloride
Quarterly Parameters	Alkalinity, conductivity, hardness, pH, chloride, sulphates, nitrate, nitrite, ammonia, TSS, TDS, COD, total phosphorus, TKN, BOD_5, phenols, dissolved oxygen, temperature, arsenic, barium, boron, cadmium, chromium, copper, iron, lead, mercury, zinc, ethylbenzene, napthalene, and benzo(a)pyrene.
Trigger Parameters	pH, TSS, un-ionized ammonia, iron, total phosphorus, zinc, boron, ethylbenzene, benzo(a)pyrene, and napthalene.
Indicator Parameters	Alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, total phosphorus, TDS, pH, suspended solids, sulphate, BOD_5, COD, phenols, temperature, and dissolved oxygen.
Comprehensive List	Alkalinity, ammonia, arsenic, barium, benzo(a)pyrene, boron, cadmium, chloride, chromium, conductivity, copper, ethylbenzene, iron, lead, mercury, napthalene, nitrate, nitrite, TKN, total phosphorus, TDS, pH, suspended solids, sulphate, BOD_5, COD, phenol, temperature, and dissolved oxygen.

Table 5.8a

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1
Sample ID:			SW-18235-0317-DD-007	SW-18235-0317-DD-008	SW-18235-0517-DD-006	SW-18235-0817-AM-001	SW-18235-0817-AM-002	SW-18235-1117-DD-004	SW-18235-1117-DD-005	SW-18235-0318-DD-001	SW-18235-0518-DD-004	SW-18235-110818-DD-002	SW-18235-0319-DD-008	SW-18235-0519-DD-003	SW-18235-0819-DD-001	SW-18235-1119-DD-006	SW-18235-1119-DD-007	SW-18235-0320-DD-006	SW-18235-0320-DD-007	SW-18235-0520-DD-002	SW-18235-1120-HM-001	SW-18235-1120-HM-002
Sample Date:			3/23/2017	3/23/2017 Duplicate	5/17/2017	8/29/2017	8/29/2017 Duplicate	12/1/2017	12/1/2017 Duplicate	3/27/2018	5/30/2018	11/8/2018	3/27/2019	5/30/2019	8/19/2019	11/29/2019	11/29/2019 Duplicate	3/20/2020	3/20/2020 Duplicate	5/22/2020	11/24/2020	11/24/2020 Duplicate
Parameters	**Units**	**PWQO[1]**																				
Field Parameters																						
Conductivity, field	uS/cm	-	116	116	156	1370	1370	297	297	257	721	318	160	367	175	290	290	132	132	145	1120	1120
Dissolved oxygen (DO), field	mg/L	>4	**4.98**	**4.98**	2.98	**4.05**	**4.05**	3.50	3.50	1.49	**4.33**	**4.32**	0.08	1.01	2.03			**4.62**	**4.62**	2.52	1.16	1.16
Flow	L/sec	-	NF	NF	NF	-	-	NF	NF	NF	NF	NF	-	-	-	-	-	-	-	-	-	-
Not sampled	none	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-	-	-	-	+3	-	-	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	7.30	7.30	7.86	**6.17**	**6.17**	6.73	6.73	6.64	6.98	7.85	8.01	7.48	6.84	**8.52**	**8.52**	**6.07**	**6.07**	7.32	**5.96**	**5.96**
Temperature, field	Deg C	-	1.5	1.5	13.6	18.8	18.8	8.82	8.82	3.55	23.4	5.05	2.31	14.39	22.31	6.81	6.81	12.95	12.95	28.55	6.65	6.65
Turbidity, field	NTU	-	-	-	-	-	-	-	-	37.8	251	82.1	26.8	42.1	13.5	31.0	31.0	34.3	34.3	0	13.4	13.4
General Chemistry																						
Alkalinity, total (as CaCO3)	mg/L	-	33	30	40	321	311	52	63	39	110	35	23	47	48	51	44	30	30	76	166	181
Ammonia-N	mg/L	-	< 0.020	< 0.020	0.080	0.46	0.337	0.024	< 0.020	< 0.037	< 0.151	< 0.020	0.012	0.027	0.059	< 0.010	< 0.010	0.036	< 0.010	0.039	0.012	< 0.010
Biochemical oxygen demand (BOD)	mg/L	-	< 2.0	< 2.0	< 2.0	5.7	5.9	< 2.0	< 2.0	< 2.0	10.4	< 3.0	< 3.0	< 3.0	2.6	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	3.1
Chemical oxygen demand (COD)	mg/L	-	54	55	123	110	99	92	93	48	178	111	45	75	53	58	61	62	59	54	49	49
Chloride	mg/L	-	16.9	24.2	13.9	259	225	17.8	21.7	52.6	90.4	24.0	22.2	39.0	27.8	23.1	18.0	22.1	23.3	0.65	151	152
Conductivity	uS/cm	-	145	169	134	1360	1360	183	213	269	493	195	131	226	192	181	150	136	140	193	955	950
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	22.3	-	-	37.9	34.6	-	36.4	29.3	-	22.4 J	-	21.9	18.6	-	-	21.7	17.6	19.5
Hardness	mg/L	-	-	-	55 J	-	-	64 J	65 J	-	116 J	62 J	-	60.1 J	-	54.8 J	53.0 J	-	-	96.0 J+	238 J+	239 J+
Nitrate (as N)	mg/L	-	< 0.020	< 0.020	< 0.020	< 0.10	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.045	< 0.020	0.022	< 0.020	< 0.020	0.048	0.037	0.029	< 0.020	< 0.020
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	< 0.050	< 0.050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	6.68	6.68	7.14	7.45	7.46	7.41	7.36	6.60	6.93	6.60	6.58	6.79	6.98	6.80	6.75	6.79	6.71	7.61	7.39	7.52
Phenolics (total)	mg/L	0.001	**< 0.0015**	**< 0.0014**	**0.0045**	**0.0019**	**0.0019**	< 0.0010	**0.0020**	< 0.0010	**< 0.0077**	**0.0014**	**< 0.0051**	**< 0.0056**	**0.061**	**0.0122 J**	**0.0206 J**	**< 0.0034**	**< 0.0021**	< 0.0010	**0.0016**	**0.0013**
Phosphorus	mg/L	0.01	**0.135**	**0.137**	**0.699**	**0.327**	**0.296**	**0.295**	**0.292**	**0.129**	**0.840**	**0.317**	**0.0906**	**0.162**	**0.301**	**0.201**	**0.213**	**0.143**	**0.139**	**0.0842**	**0.150**	**0.148**
Sulfate	mg/L	-	7.70	9.63	5.61	24.5	22.1	9.52	9.93	5.46	3.32	14.2	4.61	4.83	3.13	7.18	6.51	3.01	3.13	18.3	85.9	86.9
Total dissolved solids (TDS)	mg/L	-	166	183	122	894	970	202	219	199	322	179	118	177	125	135	142	183	178	174	610	530
Total kjeldahl nitrogen (TKN)	mg/L	-	0.95	1.02	7.22	2.80	2.74	1.61	1.55	0.84	9.9	1.62	0.81	1.51	0.95	0.51	0.60	1.13	0.87	1.03	0.780	0.800
Total suspended solids (TSS)	mg/L	-	3.8	< 2.0	5.1	84.2	81.1	5.4 J	7.8 J	2.7	36.8	7.0	5.7	4.6	53.6	3.0 J	12.0 J	5.6	5.6	7.3	5.1	3.7
Turbidity	NTU	-	51.2	50.2	21.2	91.3	83.0	54.3	58.3	44.4	18.5	38.9 J	-	-	-	-	-	-	-	-	-	-
Metals																						
Aluminum	mg/L	0.075	-	-	**1.06**	-	-	**2.88**	**2.87**	-	**0.170**	**2.19**	-	**0.353**	-	**2.26**	**2.00**	-	-	**0.718**	0.0134	0.0143
Arsenic	mg/L	0.005	-	-	0.00093	-	-	0.00095	0.00101	-	0.00131	0.00098	-	0.00075	-	0.00063	0.00061	-	-	0.00083	0.00054	0.00051
Barium	mg/L	-	-	-	0.0190	-	-	0.0361	0.0357	-	0.0392	0.0327	-	0.0181	-	0.0263	0.0255	-	-	0.0136	0.0549 J+	0.0569 J+
Beryllium	mg/L	0.011	-	-	< 0.00010	-	-	0.00010	0.00010	-	< 0.00010	< 0.00010	-	< 0.00010	-	< 0.00010	< 0.00010	-	-	-	< 0.00010	< 0.00010
Boron	mg/L	0.2	-	-	0.019	-	-	0.021	0.021	-	0.070	0.041	-	0.012	-	0.016	0.015	-	-	0.018	< 0.027	< 0.027
Cadmium	mg/L	0.0002	-	-	0.000061	-	-	0.000056	0.000060	-	0.000039	0.000082	-	0.0000253	-	0.0000432	0.0000392	-	-	0.0000217	0.0000138	0.0000139
Calcium	mg/L	-	-	-	15.7	-	-	17.7	18.4	-	31.5	17.1	-	17.1	-	15.5	15.0	-	-	25.8	67.3	67.4
Chromium	mg/L	0.001	-	-	**0.00153**	-	-	**0.00320**	**0.00312**	-	< 0.00085	**0.00265**	-	0.00096	-	**0.00263**	**0.00233**	-	-	**0.00123**	< 0.00050	< 0.00050
Cobalt	mg/L	0.0009	-	-	**0.00095**	-	-	**0.00096**	**0.00098**	-	**0.00141**	**0.00094**	-	0.00082	-	0.00071	0.00066	-	-	0.00029	0.00015	0.00016
Copper	mg/L	0.005	-	-	0.0026	-	-	0.0029	0.0030	-	0.0012	0.0038	-	< 0.0010	-	0.0031	0.0027	-	-	0.0017	0.0010	0.0014
Iron	mg/L	0.3	**3.45**	**3.42**	**2.27**	**12.2**	**12.1**	**3.40**	**3.42**	**3.12**	**6.74**	**3.19**	**1.83**	**2.78**	**3.29**	**3.53**	**3.30**	**0.561**	**0.410**	**1.27**	0.195	0.188
Lead	mg/L	0.005	-	-	0.00083	-	-	0.00161	0.00161	-	0.00044	0.00144	-	0.000314	-	0.00145	0.00141	-	-	0.000556	0.000058	0.000053
Magnesium	mg/L	-	-	-	3.77	-	-	4.72	4.73	-	9.05	4.80	-	4.22	-	3.89	3.79	-	-	7.69	17.1	17.1
Manganese	mg/L	-	-	-	0.174	-	-	0.136	0.142	-	0.472	0.147	-	0.166	-	0.0641	0.0619	-	-	-	0.0808	0.0827
Mercury	mg/L	0.0002	-	-	-	-	-	< 0.000010	< 0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	mg/L	0.0002	-	-	< 0.000010	-	-	-	-	-	< 0.000010	< 0.000010	-	< 0.000010	-	0.0000054	0.0000053	-	-	< 0.0000050	< 0.0000050	< 0.0000050
Molybdenum	mg/L	0.04	-	-	0.000253	-	-	0.000132	0.000144	-	0.000280	0.000179	-	0.000144	-	0.000251	0.000224	-	-	0.000168	0.00163	0.00170
Nickel	mg/L	0.025	-	-	0.00217	-	-	0.00277	0.00286	-	0.00201	0.00252	-	0.00141	-	0.00228	0.00212	-	-	0.00158	0.00088	0.00121
Potassium	mg/L	-	-	-	1.16	-	-	4.29	4.40	-	2.82	5.54	-	0.780	-	2.76	2.65	-	-	1.42	6.10	5.96
Silver	mg/L	0.0001	-	-	< 0.000050	-	-	< 0.000050	< 0.000050	-	< 0.000050	< 0.000050	-	< 0.000050	-	< 0.000050	< 0.000050	-	-	< 0.000050	< 0.000050	< 0.000050
Sodium	mg/L	-	-	-	9.25	-	-	7.75	8.15	-	50.9	12.7	-	21.7	-	10.7	10.4	-	-	2.47	101	99.2
Thallium	mg/L	0.0003	-	-	0.000014	-	-	0.000027	0.000026	-	0.000013	-	-	< 0.000010	-	0.000022	0.000020	-	-	< 0.000010	< 0.000010	< 0.000010
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	0.0311	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	-	-	0.00218	-	-	0.00400	0.00396	-	0.00088	0.00351	-	0.00104	-	0.00316	0.00282	-	-	0.00147	< 0.00050	< 0.00050
Zinc	mg/L	0.03	-	-	0.0166	-	-	0.0167	0.0174	-	**0.0488**	**0.0386**	-	0.0217	-	**0.0845**	**0.0869**	-	-	0.0046	0.0058	0.0062

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives,July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 5.8a

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW1	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	Adjacent to SW2	SW3	SW3	SW3	SW3	SW3	SW3
Sample ID:			SW-18235-0321-DD-001	SW-18235-0321-DD-002	SW-18235-0821-DD-003	SW-18235-1121-BK-01	SW-18235-0819-DD-002	SW-18235-0819-DD-009	SW-18235-122419-JL-01	SW-18235-0320-DD-009	SW-18235-0520-DD-003	SW-18235-1120-HM-008	SW-18235-0321-DD-004	SW-18235-0821-DD-002	SW-18235-1121-BK-02	SW-18235-1119-DD-008	SW-18235-0317-DD-005	SW-18235-1117-DD-002	SW-18235-0318-DD-003	SW-18235-0518-DD-003	SW-18235-110818-DD-008	SW-18235-0319-DD-005
Sample Date:			3/26/2021	3/26/2021 Duplicate	8/31/2021	11/12/2021	8/19/2019	8/19/2019 Duplicate	12/24/2019	3/20/2020	5/22/2020	11/24/2020	3/26/2021	8/31/2021	11/12/2021	11/29/2019	3/23/2017	12/1/2017	3/27/2018	5/30/2018	11/8/2018	3/27/2019
Parameters	**Units**	**PWQO[1]**																				
Field Parameters																						
Conductivity, field	uS/cm	-	652	652	1920	799	461	461	570	768	614	941	914	707	608	1890	716	1290	691	849	876	2440
Dissolved oxygen (DO), field	mg/L	>4	2.06	2.06	3.51	0.0	4.26	4.26	-	5.17	5.73	6.95	2.78	3.74	4.80		4.89	4.10	4.24	4.69	7.10	0.10
Flow	L/sec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.3	0.042	NF	1.26	0.06	-
Not sampled	none	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	145	145	70	-142	-	-	-	-	-	-	128	81	180	-	-	-	-	-	-	+85
pH, field	s.u.	6.5-8.5	5.24	5.24	7.13	6.55	7.23	7.23	7.67	9.06	8.38	6.08	6.80	7.50	7.02	9.72	6.90	6.61	7.27	7.28	7.58	7.33
Temperature, field	Deg C	-	13.12	13.12	24.61	9.07	26.32	26.32	1.55	16.59	21.33	3.32	10.45	21.05	9.62	4.31	0.1	10.21	2.52	24.9	6.23	1.18
Turbidity, field	NTU	-	18.3	18.3	36.1	11.6	91.6	91.6	49.3	543	644	433	0	555	1000	130	-	-	33.9	157	11.5	16.4
General Chemistry																						
Alkalinity, total (as CaCO3)	mg/L	-	37	39	340	140	100	-	94	104	120	169	136	157	149	578	182	314	214	102	109	256
Ammonia-N	mg/L	-	0.027	0.030	0.019	0.067	0.043	-	< 0.010	0.280	0.077	0.023	0.139	0.050	0.034	1.27	< 0.020	0.240	< 0.037	< 0.064	< 0.120	0.149
Biochemical oxygen demand (BOD)	mg/L	-	< 3.0	< 3.0	9.7	< 3.0	4.2	-	< 3.0	3.5	3.1	< 3.0	< 3.0	3.5	< 3.0	9.1	< 2.0	3.4	< 2.0	2.3	< 3.0	< 3.0
Chemical oxygen demand (COD)	mg/L	-	58	54	99	84	22	-	13	59	27	31	37	30	15	139	36	344	25	16	< 35	62
Chloride	mg/L	-	51.3	51.6	362	30.6	21.7	-	19.6	37.7	17.6	38.9	21.5	29.3	15.1	58.6	147	100	142	12.8	38.9	267
Conductivity	uS/cm	-	272	271	1980	-	623	-	571	812	618	875	691	747	-	1880	1120	1260	1160	761	799	1930
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	-	28.7	-	-	4.80	-	9.85	9.78	-	-	6.00	40.7	-	12.1	-	5.8	8.11	-
Hardness	mg/L	-	-	-	-	-	-	-	242 J	-	275 J+	360 J+	-	-	-	50.0 J	-	538 J	-	386 J	348 J	-
Nitrate (as N)	mg/L	-	< 0.020	0.042	< 0.10	< 0.020	< 0.020	-	0.021	1.33	0.097	0.099	0.627	0.049	0.370	0.22	0.98	< 0.10	0.061	0.080	2.35	21.5
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.050	< 0.010	0.013	-	< 0.010	0.230	< 0.010	< 0.010	0.019	< 0.010	< 0.010	0.305	< 0.050	< 0.050	< 0.010	< 0.010	< 0.010	0.038
pH, lab	s.u.	6.5-8.5	7.20	7.13	7.78	7.92	8.30	-	8.03	8.92	8.20	8.01	7.96	7.94	8.17	10.01	7.82	8.14	7.91	8.05	7.70	7.73
Phenolics (total)	mg/L	0.001	0.0037	0.0073	0.0040	< 0.010	0.0369	-	0.0026	< 0.0066	0.0016	0.0019	0.0028	0.0022	< 0.0010	0.0115	< 0.0013	0.0030	< 0.0010	< 0.0047	< 0.0010	< 0.0048
Phosphorus	mg/L	0.01	0.125	0.123	0.191	0.166	0.0291	-	0.0094	0.173	0.100	0.0686	0.205	0.107	0.0341	0.191	0.0940	2.28	0.0373	0.0494	0.0957	0.0565
Sulfate	mg/L	-	11.2	11.3	141	6.87	189	-	171	243	193	267	214	199	172	298	140	312	181	300	243	297
Total dissolved solids (TDS)	mg/L	-	193	205	1140	248	456	-	353	600	437	535	556	510	394	1220	678	903	696	579	510	1220
Total kjeldahl nitrogen (TKN)	mg/L	-	1.11	1.04	< 0.50	1.28	0.63	-	0.40	1.60	0.88	0.950	1.08	0.864	0.410	3.28	0.83	6.3	0.47	0.48	0.86	14.1
Total suspended solids (TSS)	mg/L	-	3.0	4.7	36.5	12.7	6.2	-	4.0	71.7	69.7	37.7	72.8	28.3	21.3	46.2	59.7	1740	12.2	27.9	105	27.1
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55.6	2100	11.5	46.6	93.8 J	-
Metals																						
Aluminum	mg/L	0.075	-	-	-	0.0543	-	-	0.186	-	1.81	< 0.0050	-	-	0.672	2.06	-	1.13	-	0.898	0.959	-
Arsenic	mg/L	0.005	-	-	-	0.00070	-	-	0.00043	-	0.00215	0.00096	-	-	0.00082	0.0121	-	0.00091	-	0.00093	0.00095	-
Barium	mg/L	-	-	-	-	0.0302	-	-	0.0292	-	0.0335	0.0368 J+	-	-	0.0300	0.0191	-	0.0738	-	0.0415	0.0453	-
Beryllium	mg/L	0.011	-	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	< 0.00010	-	< 0.00010	-	< 0.00010	< 0.00010	-
Boron	mg/L	0.2	-	-	-	0.017	-	-	0.218	-	0.183	0.345	-	-	0.137	0.22	-	0.144	-	0.131	0.294	-
Cadmium	mg/L	0.0002	-	-	-	0.0000079	-	-	0.0000143	-	0.0000315	0.0000058	-	-	0.0000129	< 0.000060	-	0.000042	-	0.000015	0.000041	-
Calcium	mg/L	-	-	-	-	41.0	-	-	47.4	-	47.7	66.7	-	-	60.1	10.1	-	151	-	83.7	83.1	-
Chromium	mg/L	0.001	-	-	-	0.00060	-	-	0.00073	-	0.00577	0.00115	-	-	0.00113	0.0484	-	0.00180	-	< 0.00140	0.00193	-
Cobalt	mg/L	0.0009	-	-	-	0.00023	-	-	0.00019	-	0.00127	0.00013	-	-	0.00043	0.0041	-	0.00091	-	0.00078	0.00092	-
Copper	mg/L	0.005	-	-	-	< 0.0010	-	-	0.0025	-	0.0070	0.0018	-	-	0.0021	0.112	-	0.0059	-	0.0025	0.0045	-
Iron	mg/L	0.3	2.11	2.13	1.69	1.29	0.333	-	0.256	0.162	2.44	< 0.010	7.52	1.68	0.775	2.31	1.78	1.44	0.796	1.29	1.39	0.69
Lead	mg/L	0.005	-	-	-	0.000114	-	-	0.000229	-	0.00373	< 0.000050	-	-	0.000895	0.0111	-	0.00300	-	0.00102	0.00212	-
Magnesium	mg/L	-	-	-	-	7.83	-	-	30.1	-	37.9	46.9	-	-	27.3	6.00	-	39.0	-	42.9	34.1	-
Manganese	mg/L	-	-	-	-	0.125	-	-	0.00670	-	-	0.00672	-	-	0.0617	0.0572	-	0.225	-	0.0568	0.0852	-
Mercury	mg/L	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.000010	-	-	-	-
Mercury (dissolved)	mg/L	0.0002	-	-	-	< 0.0000050	-	-	< 0.0000050	-	< 0.0000050	< 0.0000050	-	-	< 0.0000050	0.0000525	-	-	-	< 0.000010	< 0.000010	-
Molybdenum	mg/L	0.04	-	-	-	0.000166	-	-	0.00180	-	0.00308	0.00393	-	-	0.00201	0.0720	-	0.00172	-	0.00218	0.00208	-
Nickel	mg/L	0.025	-	-	-	0.00092	-	-	0.00171	-	0.00421	0.00203	-	-	0.00182	0.0151	-	0.00438	-	0.00329	0.00471	-
Potassium	mg/L	-	-	-	-	2.34	-	-	3.53	-	6.32	7.99	-	-	3.82	151	-	4.99	-	2.94	5.44	-
Silver	mg/L	0.0001	-	-	-	< 0.000050	-	-	< 0.000050	-	< 0.000050	< 0.000050	-	-	< 0.000050	< 0.00050	-	< 0.000050	-	< 0.000050	< 0.000050	-
Sodium	mg/L	-	-	-	-	25.2	-	-	20.3	-	26.3	46.6	-	-	15.6	328	-	58.7	-	19.5	35.0	-
Thallium	mg/L	0.0003	-	-	-	< 0.000010	-	-	-	-	0.000028	< 0.000010	-	-	0.000010	< 0.00010	-	0.000020	-	0.000014	-	-
Titanium	mg/L	-	-	-	-	-	-	-	0.00498	-	-	-	-	-	-	-	-	-	-	-	0.0264	-
Vanadium	mg/L	0.006	-	-	-	< 0.00050	-	-	0.00063	-	0.00438	0.00068	-	-	0.00147	0.0185	-	0.00250	-	0.00202	0.00224	-
Zinc	mg/L	0.03	-	-	-	< 0.0030	-	-	0.0035	-	0.0147	< 0.0030	-	-	0.0039	< 0.030	-	0.0187	-	0.0070	0.0177	-

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives,July 1994 (reprinted February 1999), prepared by MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable PWQO criteria.

< 0.10 Method detection limit does not meet PWQO criteria.

< 0.20 Result below method detection limit.

Table 5.8a

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW3	SW3	SW3	SW3	SW3	SW3	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4
Sample ID:			SW-18235-0519-DD-005	SW-18235-0819-DD-003	SW-18235-1119-DD-002	SW-18235-0320-DD-010	SW-18235-0321-DD-006	SW-18235-0521-DD-002**	SW-18235-0317-DD-001	SW-18235-0517-DD-001	SW-18235-1117-DD-001	SW-18235-0318-DD-009	SW-18235-0318-DD-004	SW-18235-0518-DD-002	SW-18235-110818-DD-001	SW-18235-0319-DD-001	SW-18235-0319-DD-002	SW-18235-0519-DD-008	SW-18235-0819-DD-004	SW-18235-1119-DD-005	SW-18235-0320-DD-008	SW-18235-0520-DD-006
Sample Date:			5/30/2019	8/19/2019	11/29/2019	3/20/2020	3/26/2021	6/1/2021	3/23/2017	5/17/2017	12/1/2017	3/27/2018	3/27/2018 Duplicate	5/30/2018	11/8/2018	3/27/2019	3/27/2019 Duplicate	5/30/2019	8/19/2019	11/29/2019	3/20/2020	5/22/2020
Parameters	**Units**	**PWQO[1]**																				
Field Parameters																						
Conductivity, field	uS/cm	-	1430	587	1140	1460	1060	NA	461	387	520	488	488	970	591	697	697	514	452	980	351	393
Dissolved oxygen (DO), field	mg/L	>4	0.92	8.26		5.48	1.79	NA	4.68	6.10	10.57	8.32	8.32	5.65	6.14	0.09	0.09	2.19	7.08		6.43	5.86
Flow	L/sec	-	-	-	-	-	-	-	33.8	0.008	0.117	3.09	3.09	0.03	1.16	-	-	-	-	-	-	-
Not sampled	none	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	81	NA	-	-	-	-	-	-	-	+111	+111	-	-	-	-	-
pH, field	s.u.	6.5-8.5	7.01	7.14	7.54	7.49	7.08	NA	7.70	7.94	6.61	8.13	8.13	7.76	7.82	7.78	7.78	7.76	7.01	7.23	6.97	8.91
Temperature, field	Deg C	-	14.01	23.58	5.81	14.25	8.75	NA	0.1	14.1	3.5	4.64	4.64	25.4	3.37	1.97	1.97	13.27	26.98	6.12	17.08	26.9
Turbidity, field	NTU	-	54.4	134	386	488	307	NA	-	-	-	36.2	36.2	101	49.6	23.0	23.0	48.0	42.2	89.0	881	265
General Chemistry																						
Alkalinity, total (as CaCO3)	mg/L	-	268	165	362	290	191	189	91	160	164	152	156	276	88	129	128	210	145	165	129	155
Ammonia-N	mg/L	-	0.110	0.215	0.180	0.083	0.082	0.047	< 0.020	0.108	0.021	< 0.101	0.124	< 0.216	< 0.037	0.022	0.028	0.026	0.049	0.012	0.057	0.099
Biochemical oxygen demand (BOD)	mg/L	-	< 2.0	4.6	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	2.7	< 2.0	< 2.0	< 2.0	5.2	< 3.0	< 3.0	< 3.0	< 2.0	2.0	< 3.0	3.6	5.9
Chemical oxygen demand (COD)	mg/L	-	52	50	286	80	46	65	40	60	51	37	40	88	< 63	61	43	57	54	45	108	91
Chloride	mg/L	-	104	49.7	111	178	124	302	34.4	13.0	21.6	40.7	40.7	46.3	27.7	75.3	75.2	29.5	33.8	24.7	15.5	22.3
Conductivity	uS/cm	-	1100	827	1150	1480	1060	1430	456	430	545	568	570	870	464	707	720	535	459	427	323	414
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	13.5 J	-	11.0	-	-	23.3	-	17.2	16.4	-	-	24.2	18.2	-	-	19.5 J	-	16.5	-	23.1
Hardness	mg/L	-	452 J	-	1260 J	-	-	336	-	196 J	246 J	-	-	417 J	195 J	-	-	235 J	-	181 J	-	180 J+
Nitrate (as N)	mg/L	-	0.283	0.191	0.35	17.4	0.45	< 0.10	0.730	< 0.020	< 0.020	< 0.020	< 0.020	0.024	3.56	4.54	4.54	< 0.020	< 0.020	< 0.020	0.842	< 0.020
Nitrite (as N)	mg/L	-	< 0.010	0.150	< 0.050	0.144	< 0.050	< 0.050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.013	0.015	0.014	< 0.010	< 0.010	< 0.010	0.011	< 0.010
pH, lab	s.u.	6.5-8.5	7.46	8.45	7.98	7.97	7.98	7.75	7.95	8.03	8.20	8.12	8.12	8.32	7.62	7.95	7.95	8.17	8.39	8.19	7.93	8.37
Phenolics (total)	mg/L	0.001	< 0.0046	0.0386	0.0080	< 0.0033	0.0018	0.0037	< 0.0016	0.0025	< 0.0010	0.0025	0.0015	< 0.0064	0.0025	< 0.0065	< 0.0052	< 0.0014	0.0034	0.0015	< 0.0016	0.0017
Phosphorus	mg/L	0.01	0.139	0.133	2.09	0.130	0.167	0.0753	0.0904	0.273	0.0651	0.0736	0.0652	0.250	0.235	0.0686	0.0696	0.141	0.181	0.132	0.730	0.360
Sulfate	mg/L	-	188	184	162	225	201	37.2	75.2	44.2	90.8	77.2	78.1	156	86.2	103	103	45.4	43.5	32.0	20.9	27.9
Total dissolved solids (TDS)	mg/L	-	694	569	764	1000	719	894	313	309	375	336	340	624	340	427	431	357	319	270	350	294
Total kjeldahl nitrogen (TKN)	mg/L	-	1.48	1.56	0.86	2.48	1.03	1.18	0.98	1.78	1.03	2.66 J	0.98 J	2.11	1.50	1.43	1.42	3.86	1.25	0.86	3.46	2.24
Total suspended solids (TSS)	mg/L	-	219	30.0	1050	99.3	99.6	13.0	3.8	30.0	7.5	11.4 J	8.6 J	36.9	9.0	8.7	9.4	13.8	18.8	3.5	375	95.5
Turbidity	NTU	-	-	-	-	-	-	-	49.4	115	11.7	16.7	15.3	40.1	105 J	-	-	-	-	-	-	-
Metals																						
Aluminum	mg/L	0.075	2.99	-	25.3	-	-	0.0100	-	3.76	0.379	-	-	2.53	3.64	-	-	0.818	-	0.859	-	8.20
Arsenic	mg/L	0.005	0.00450	-	0.0205	-	-	0.00066	-	0.00144	0.00072	-	-	0.00292	0.00111	-	-	0.00179	-	0.00074	-	0.00270
Barium	mg/L	-	0.0733	-	0.406	-	-	0.0608	-	0.0356	0.0244	-	-	0.0467	0.0441	-	-	0.0198	-	0.0234	-	0.0666
Beryllium	mg/L	0.011	0.00015	-	0.0014	-	-	-	-	0.00013	< 0.00010	-	-	0.00012	0.00015	-	-	< 0.00010	-	< 0.00010	-	-
Boron	mg/L	0.2	0.328	-	0.16	-	-	0.024	-	0.048	0.050	-	-	0.133	0.104	-	-	0.106	-	0.042	-	0.120
Cadmium	mg/L	0.0002	0.0000537	-	0.000986	-	-	< 0.0000050	-	0.000074	0.000018	-	-	0.000102	0.000057	-	-	0.0000417	-	0.0000194	-	0.000173
Calcium	mg/L	-	112	-	345	-	-	98.3	-	53.9	71.3	-	-	107	54.5	-	-	64.2	-	52.2	-	46.6
Chromium	mg/L	0.001	0.00524	-	0.0730	-	-	< 0.00050	-	0.00431	0.00075	-	-	< 0.00337	0.00401	-	-	0.00127	-	0.00122	-	0.0102
Cobalt	mg/L	0.0009	0.00312	-	0.0210	-	-	0.00050	-	0.00204	0.00036	-	-	0.00262	0.00151	-	-	0.00091	-	0.00039	-	0.00542
Copper	mg/L	0.005	0.0062	-	0.093	-	-	0.0026	-	0.0048	0.0022	-	-	0.0053	0.0055	-	-	0.0020	-	0.0024	-	0.0097
Iron	mg/L	0.3	4.56	0.843	48.8	0.12	4.35	0.642	1.93	3.82	0.359	0.676	0.647	3.18	3.70	1.15	1.25	1.59	0.836	1.10	0.168	10.1
Lead	mg/L	0.005	0.00867	-	0.148	-	-	0.000144	-	0.00205	< 0.00019	-	-	0.00187	0.00233	-	-	0.000629	-	0.000473	-	0.00491
Magnesium	mg/L	-	41.6	-	95.6	-	-	22.1	-	15.0	16.5	-	-	36.1	14.2	-	-	18.3	-	12.4	-	15.4
Manganese	mg/L	-	0.813	-	3.28	-	-	-	-	0.163	0.0308	-	-	1.52	0.0772	-	-	0.481	-	0.0250	-	-
Mercury	mg/L	0.0002	-	-	-	-	-	-	-	-	< 0.000010	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	mg/L	0.0002	< 0.000010	-	0.0000054	-	-	< 0.0000050	-	< 0.000010	-	-	-	< 0.000010	< 0.000010	-	-	< 0.000010	-	0.0000069	-	< 0.0000050
Molybdenum	mg/L	0.04	0.00281	-	0.00841	-	-	0.00105	-	0.00166	0.00116	-	-	0.00467	0.000634	-	-	0.00185	-	0.000854	-	0.00130
Nickel	mg/L	0.025	0.00821	-	0.0542	-	-	0.00131	-	0.00537	0.00225	-	-	0.00595	0.00449	-	-	0.00290	-	0.00164	-	0.0108
Potassium	mg/L	-	6.87	-	20.1	-	-	1.15	-	2.84	4.70	-	-	4.67	5.63	-	-	2.47	-	5.76	-	6.07
Silver	mg/L	0.0001	< 0.000050	-	0.00087	-	-	< 0.000050	-	< 0.000050	< 0.000050	-	-	< 0.000050	< 0.000050	-	-	< 0.000050	-	< 0.000050	-	< 0.000050
Sodium	mg/L	-	79.6	-	98.8	-	-	174	-	13.8	14.7	-	-	40.5	17.5	-	-	24.3	-	16.3	-	20.2
Thallium	mg/L	0.0003	0.000055	-	< 0.00050	-	-	< 0.000010	-	0.000042	< 0.000010	-	-	0.000030	-	-	-	0.000012	-	< 0.000010	-	0.000078
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0542	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	0.00658	-	0.0568	-	-	< 0.00050	-	0.00608	0.00100	-	-	0.00855	0.00627	-	-	0.00279	-	0.00185	-	0.0160
Zinc	mg/L	0.03	0.0392	-	0.606	-	-	0.0091	-	0.0175	< 0.0030	-	-	0.0135	0.0132	-	-	0.0041	-	0.0036	-	0.0407

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives,July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 5.8a

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW4	SW4	SW4	SW4	SW4	SW4	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5
Sample ID:			SW-18235-0520-DD-007	SW-18235-1120-HM-003	SW-18235-0321-DD-009	SW-18235-0821-DD-004	SW-18235-1121-BK-04	SW-18235-1121-BK-011	SW-18235-0317-DD-006	SW-18235-0517-DD-007	SW-18235-1117-DD-003	SW-18235-0318-DD-005	SW-5-20180530-N	SW-18235-110818-DD-004	SW-18235-0319-DD-007	SW-18235-0519-DD-002	SW-18235-0819-DD-005	SW-18235-1119-DD-009	SW-18235-0320-DD-002	SW-18235-0520-DD-004	SW-18235-1120-HM-004	SW-18235-0321-DD-010
Sample Date:			5/22/2020	11/24/2020	3/26/2021	8/31/2021	11/12/2021	11/12/2021	3/23/2017	5/17/2017	12/1/2017	3/27/2018	5/30/2018	11/8/2018	3/27/2019	5/30/2019	8/19/2019	11/29/2019	3/20/2020	5/22/2020	11/24/2020	3/26/2021
Parameters	**Units**	**PWQO[1]**	**Duplicate**					**Duplicate**														
Field Parameters																						
Conductivity, field	uS/cm	-	393	1670	455	2070	490	490	867	1680	1320	264	-	1270	851	1120	360	693	398	962	1230	552
Dissolved oxygen (DO), field	mg/L	>4	**5.86**	**4.3**	**4.34**	3.88	**6.01**	**6.01**	**4.92**	**8.28**	2.90	2.16	-	3.01	0.09	3.28	**5.16**		**5.34**	3.92	3.09	1.13
Flow	L/sec	-	-	-	-	-	-	-	NF	NF	NF	NF	-	NF	-	-	-	-	-	-	-	-
Not sampled	none	-	-	-	-	-	-	-	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	64	91	19	19	-	-	-	-	-	-	-18	-	-	-	-	-	-	39
pH, field	s.u.	6.5-8.5	**8.91**	**5.42**	7.11	7.42	7.92	7.92	7.66	7.75	6.72	**6.40**	-	7.26	6.98	7.37	7.38	7.24	7.09	7.38	**6.13**	6.65
Temperature, field	Deg C	-	26.9	3.48	11.11	22.11	11.07	11.07	0.7	16.3	10.69	3.24	-	6.22	0.87	16.48	23.08	6.72	14.67	23.93		10.71
Turbidity, field	NTU	-	265	>1000	429	22.1	105	105	-	-	-	9.9	-	110	26.3	25.1	116	11.5	50.9	>1000	>1000	322
General Chemistry																						
Alkalinity, total (as CaCO3)	mg/L	-	154	247	95	288	166	162	128	162	191	99	-	132	207	243	156	229	135	273	220	59
Ammonia-N	mg/L	-	0.097	0.012	0.088	0.229	0.081	0.079	0.094	< 0.020	0.095	0.121	-	< 0.030	0.214	0.036	0.037	0.028	0.015	0.020	0.024	0.058
Biochemical oxygen demand (BOD)	mg/L	-	6.0	< 3.0	< 3.0	3.2	< 3.0	< 3.0	3.4	< 2.0	3.7	< 2.0	-	< 3.0	< 3.0	< 3.0	< 2.0	< 3.0	< 3.0	< 3.0	5.9	< 3.0
Chemical oxygen demand (COD)	mg/L	-	85	27	74	62	35	43	48	61	69	27	-	81	44	54	37	56	84	50	79	65
Chloride	mg/L	-	22.4	246	61.3	473	20.8	20.9	87.5	71.3	45.2	20.9	-	23.5	26.4	15.2	9.38	19.9	8.64 J+	25.3	60.2	17.9
Conductivity	uS/cm	-	412	1380	503	2140	-	-	1610	1660	1280	598	-	945	855	577	532	747	403	996	1280	396
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	23.0	13.2	-	-	12.5	12.5	-	19.6	24.4	-	-	27.1	-	22.0 J	-	19.1	-	17.8	25.4	-
Hardness	mg/L	-	180 J+	157 J+	-	-	-	-	-	760 J	503 J	-	-	405 J	-	297 J	-	365 J	-	486 J+	612 J+	-
Nitrate (as N)	mg/L	-	0.021	0.16	5.52	0.14	0.045	0.043	0.108	< 0.10	< 0.10	< 0.020	-	0.028	0.041	< 0.020	0.031	< 0.020	< 0.020	< 0.020	< 0.10	0.080
Nitrite (as N)	mg/L	-	< 0.010	< 0.050	0.021	< 0.050	0.011	< 0.010	< 0.010	< 0.050	< 0.050	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.010
pH, lab	s.u.	6.5-8.5	8.29	7.94	7.88	7.84	8.42	8.42	7.23	8.18	7.90	7.51	-	7.05	7.32	7.92	7.65	7.40	7.59	8.12	7.32	7.20
Phenolics (total)	mg/L	0.001	**0.0027**	< 0.0010	**0.0012**	< 0.0010	**0.0036**	< 0.0010	**< 0.0019**	**0.0026**	**0.0013**	< 0.0010	-	**0.0022**	**< 0.0067**	**< 0.0019**	**0.0252**	**0.0180**	**< 0.0012**	**0.0014**	**0.0020**	**0.0014**
Phosphorus	mg/L	0.01	**0.324**	**0.0741**	**0.414**	**0.249**	**0.119**	**0.127**	**0.0762**	**0.0776**	**0.144**	**0.0791**	-	**0.122**	**0.255**	**0.0289**	**0.0931**	**0.166**	**0.129**	**0.0521**	**0.173**	**0.0662**
Sulfate	mg/L	-	27.9	85.4	42.6	150	33.0	31.0	493	703	502	173	-	341	226	84.1	118	159	67.7	269	435	106
Total dissolved solids (TDS)	mg/L	-	301	764	431	1160	255	262	1190	1280	973	372	-	683	565	386	397	463	305	622	905	294
Total kjeldahl nitrogen (TKN)	mg/L	-	2.26	0.620	3.30	2.01	0.900	1.00	1.20	1.66	1.88	0.49	-	1.08	1.68	1.15	0.66	0.65	1.63	0.90	1.30	1.13
Total suspended solids (TSS)	mg/L	-	160	8.9	137	12.5	14.1	14.7	76.2	8.2	17.8	11.8	-	3.3	46.3	24.4	9.6	18.3	36.8	10.4	71	9.4
Turbidity	NTU	-	-	-	-	-	-	-	28.9	3.10	20.2	16.2	-	12.5 J	-	-	-	-	-	-	-	-
Metals																						
Aluminum	mg/L	0.075	**8.71**	0.0060	-	-	**0.942**	**0.883**	-	0.063	**0.418**	-	-	**0.780**	-	**0.154**	-	**0.463**	-	**0.281**	0.0478	-
Arsenic	mg/L	0.005	0.00274	0.00045	-	-	0.00076	0.00080	-	0.00092	0.00097	-	-	0.00131	-	0.00153	-	0.00119	-	0.00146	0.00110	-
Barium	mg/L	-	0.0689	0.0285 J+	-	-	0.0200	0.0216	-	0.0429	0.0383	-	-	0.0372	-	0.0304	-	0.0380	-	0.0510	0.0593 J+	-
Beryllium	mg/L	0.011	-	< 0.00010	-	-	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-
Boron	mg/L	0.2	0.120	< 0.015	-	-	0.046	0.047	-	**0.251**	0.117	-	-	0.126	-	0.137	-	0.148	-	**0.256**	0.199	-
Cadmium	mg/L	0.0002	0.000179	0.0000145	-	-	0.0000216	0.0000441	-	0.000023	0.000025	-	-	0.000036	-	0.0000126	-	0.0000113	-	0.0000089	0.0000126	-
Calcium	mg/L	-	46.8	50.1	-	-	48.5	50.9	-	212	145	-	-	115	-	85.2	-	103	-	131	183	-
Chromium	mg/L	0.001	**0.0112**	< 0.00050	-	-	**0.00118**	**0.00115**	-	0.00084	0.00083	-	-	**0.00138**	-	0.00054	-	**0.00113**	-	0.00090	0.00059	-
Cobalt	mg/L	0.0009	**0.00596**	0.00011	-	-	0.00053	0.00085	-	0.00047	0.00083	-	-	**0.00102**	-	0.00042	-	0.00051	-	0.00035	**0.00141**	-
Copper	mg/L	0.005	**0.0104**	0.0048	-	-	0.0019	0.0027	-	**0.0079**	0.0024	-	-	0.0018	-	< 0.0010	-	0.0013	-	0.0014	0.0034	-
Iron	mg/L	0.3	**10.9**	0.013	**8.67**	**0.32**	**1.10**	**1.22**	**3.76**	0.097	**0.947**	**0.552**	-	**1.78**	**4.69**	**0.343**	**0.852**	**0.966**	**0.359**	**0.529**	**1.15**	**1.05**
Lead	mg/L	0.005	**0.00534**	0.000079	-	-	0.000461	0.000626	-	0.00022	< 0.00062	-	-	0.000855	-	0.000275	-	0.000798	-	0.000729	0.000237	-
Magnesium	mg/L	-	15.2	7.81	-	-	13.9	13.4	-	55.8	34.4	-	-	28.8	-	20.3	-	26.4	-	38.9	38.1	-
Manganese	mg/L	-	-	0.0143	-	-	0.0431	0.171	-	0.0133	0.292	-	-	0.246	-	0.0751	-	0.266	-	-	1.20	-
Mercury	mg/L	0.0002	-	-	-	-	-	-	-	-	< 0.000010	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	mg/L	0.0002	< 0.0000050	< 0.0000050	-	-	< 0.0000050	< 0.0000050	-	< 0.000010	-	-	-	< 0.000010	-	< 0.000010	-	0.0000291	-	< 0.0000050	< 0.0000050	-
Molybdenum	mg/L	0.04	0.00135	0.00354	-	-	0.000776	0.000701	-	0.00206	0.000250	-	-	0.000387	-	0.000428	-	0.000780	-	0.00104	0.000277	-
Nickel	mg/L	0.025	0.0117	0.00101	-	-	0.00179	0.00205	-	0.00513	0.00270	-	-	0.00313	-	0.00191	-	0.00199	-	0.00249	0.00263	-
Potassium	mg/L	-	6.23	1.82	-	-	4.14	4.14	-	11.3	9.02	-	-	7.02	-	3.30	-	8.73	-	8.68	10.5	-
Silver	mg/L	0.0001	< 0.000050	< 0.000050	-	-	< 0.000050	< 0.000050	-	< 0.000050	< 0.000050	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	< 0.000050	-
Sodium	mg/L	-	20.1	237	-	-	14.2	13.5	-	76.0	35.5	-	-	23.0	-	16.7	-	18.8	-	31.5	34.3	-
Thallium	mg/L	0.0003	0.000085	< 0.000010	-	-	0.000011	0.000012	-	< 0.000010	< 0.000010	-	-	-	-	< 0.000010	-	< 0.000010	-	< 0.000010	< 0.000010	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	0.0194	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	**0.0169**	0.00063	-	-	0.00244	0.00263	-	< 0.00050	0.00109	-	-	0.00173	-	0.00054	-	0.00124	-	0.00086	< 0.00050	-
Zinc	mg/L	0.03	**0.0441**	0.0064	-	-	0.0036	0.0048	-	0.0063	0.0080	-	-	0.0090	-	0.0059	-	0.0067	-	0.0032	0.0068	-

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives,July 1994 (reprinted February 1999), prepared by MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable PWQO criteria.

< 0.10 Method detection limit does not meet PWQO criteria.

< 0.20 Result below method detection limit.

Table 5.8a

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW5	SW5	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW7	SW7
Sample ID:			SW-18235-0821-DD-005	SW-18235-1121-BK-05	SW-18235-0317-DD-003	SW-18235-0517-DD-003	SW-018235-122717-DD-001	SW-18235-0318-DD-006	SW-6~20180530~N	SW-18235-110818-DD-003	SW-18235-0319-DD-004	SW-18235-0519-DD-007	SW-18235-0819-DD-006	SW-18235-1119-DD-003	SW-18235-0320-DD-004	SW-18235-1120-HM-005	SW-18235-0321-DD-005	SW-18235-0521-DD-008**	SW-18235-0821-DD-006	SW-18235-1121-BK-06	SW-18235-0317-DD-004	SW-18235-0517-DD-004
Sample Date:			8/31/2021	11/12/2021	3/23/2017	5/17/2017	12/27/2017	3/27/2018	5/30/2018	11/8/2018	3/27/2019	5/30/2019	8/19/2019	11/29/2019	3/20/2020	11/24/2020	3/26/2021	6/1/2021	8/31/2021	11/12/2021	3/23/2017	5/17/2017
Parameters	**Units**	**PWQO[1]**																				
Field Parameters																						
Conductivity, field	uS/cm	-	1070	537	1730	821	1230	577	-	1490	780	1430	537	1260	1370	1010	899	NA	544	421	337	549
Dissolved oxygen (DO), field	mg/L	>4	9.55	**4.85**	**4.62**	3.19	**10.98**	2.35	-	2.89	0.46	0.10	**4.25**		**6.11**	2.24	0.16	NA	**4.10**	0.0	**4.67**	2.47
Flow	L/sec	-	-	-	0.20	NF	-	NF	-	0.07	-	-	-	-	-	-	-	-	-	-	NF	NF
Not sampled	none	-	-	-	-	-	-	-	D	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	368	-50	-	-	-	-	-	-	+68	-	-	-	-	-	51	NA	-37	-116	-	-
pH, field	s.u.	6.5-8.5	7.04	6.88	7.25	7.25	7.95	6.68	-	7.16	7.01	7.30	7.01	7.42	7.45	**6.07**	7.15	NA	6.85	6.77	7.47	7.50
Temperature, field	Deg C	-	21.10	8.41	0.2	13.5	0.5	3.08	-	5.71	0.03	13.30	23.15	5.36	15.28	3.34	10.44	NA	23.40	8.86	2.6	14.5
Turbidity, field	NTU	-	368	1000	-	-	-	26.7	-	13.5	16.8	225	47.0	424	267	>1000	382	NA	1000	52.9	-	-
General Chemistry																						
Alkalinity, total (as CaCO3)	mg/L	-	172	224	182	219	154	180	-	163	176	266	168	245	122	220	133	182	209	130	53	99
Ammonia-N	mg/L	-	0.029	0.016	0.050	< 0.020	0.624	< 0.080	-	< 0.020	0.039	0.042	0.100	0.052	0.067	0.017	0.031	< 0.010	2.16	0.068	0.054	0.048
Biochemical oxygen demand (BOD)	mg/L	-	15.8	8.4	2.6	2.8	17.7	< 2.0	-	< 3.0	< 3.0	2.1	< 3.0	< 3.0	< 3.0	3.6	< 3.0	8.2	124	4.9	6.9	2.5
Chemical oxygen demand (COD)	mg/L	-	85	96	54	72	2310	42	-	80	46	66	37	58	49	61	41	59	1300	100	94	62 J
Chloride	mg/L	-	60.1	11.5	77.8	22.4	52.4	37.4	-	27.6	25.6	46.9	19.9	43.5	90.7	57.3	42.2	63.0	25.3	12.9	18.8	10.7
Conductivity	uS/cm	-	1110	-	1740	1100	1180	1070	-	1130	812	1060	750	1090	1400	1300	839	1360	531	-	558	666
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	26.1	-	24.9	16.6	-	-	26.9	-	24.4 J	-	23.2	-	21.6	-	21.8	-	20.1	-	20.6
Hardness	mg/L	-	-	-	-	526 J	841 J	-	-	568 J	-	497 J	-	484 J	-	623 J+	-	574	-	-	-	298 J
Nitrate (as N)	mg/L	-	< 0.020	< 0.020	< 0.10	< 0.10	< 0.020	< 0.020	-	< 0.10	< 0.020	< 0.020	0.057	< 0.10	3.27	< 0.10	0.979	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.050	< 0.050	< 0.010	< 0.010	-	< 0.050	< 0.010	< 0.010	< 0.010	< 0.050	0.667	< 0.050	0.042	< 0.050	< 0.010	< 0.010	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	7.47	7.85	7.22	7.91	7.58	7.66	-	7.37	7.37	7.51	7.90	7.88	7.74	7.66	7.97	8.11	7.06	7.88	6.74	7.45
Phenolics (total)	mg/L	0.001	**0.0044**	**< 0.010**	**< 0.0026**	**0.0055**	< 0.0010	**0.0037**	-	**0.0019**	**< 0.0068**	**< 0.0030**	**0.0348**	**0.0133**	**< 0.0030**	**0.0027**	< 0.0010	**0.0053**	**0.0024**	**< 0.010**	**< 0.0033**	**0.0048 J**
Phosphorus	mg/L	0.01	**0.106**	**0.232**	**0.0838**	**0.104**	**16.5**	**0.0651**	-	**0.0435**	**0.0456**	**0.149**	**0.111**	**0.103**	**0.0898**	**0.0998**	**0.0690**	**0.0810**	**0.43**	**0.481**	**0.241**	**0.125 J**
Sulfate	mg/L	-	321	21.1	724	305	458	346	-	451	226	274	214	321	519	461	242	451	77.5	38.1	182	220
Total dissolved solids (TDS)	mg/L	-	795	330	1350	760	893	750	-	808	541	748	564	839	1050	905	584	1020	428	233	396	448
Total kjeldahl nitrogen (TKN)	mg/L	-	1.51	1.60	1.20	1.25	26.1	0.82	-	0.70	0.76	2.11	0.79	0.69	1.40	1.32	0.920	1.20	157	2.00	1.49	1.28
Total suspended solids (TSS)	mg/L	-	20.0	23.5	28.7	16.4	4180	14.1	-	3.2	8.7	74.4	15.2	43.0	56.2	82	22.0	76.4	1880	71.4	67.6	9.7 J
Turbidity	NTU	-	-	-	10.1	6.96	3380	14.9	-	8.91 J	-	-	-	-	-	-	-	-	-	-	27.7	4.69
Metals																						
Aluminum	mg/L	0.075	-	**0.622**	-	**0.174**	**95.1**	-	-	**1.15**	-	**0.746**	-	**0.550**	-	0.0128	-	**0.0822**	-	**0.807**	-	**0.127**
Arsenic	mg/L	0.005	-	0.00160	-	0.00164	**0.0381**	-	-	0.00169	-	0.00346	-	0.00121	-	0.00099	-	0.00410	-	0.00117	-	0.00088
Barium	mg/L	-	-	0.0364	-	0.0382	0.887	-	-	0.0548	-	0.0485	-	0.0505	-	0.0542 J+	-	0.0866	-	0.0342	-	0.0288
Beryllium	mg/L	0.011	-	< 0.00010	-	< 0.00010	0.0044	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	-	< 0.00010	-	< 0.00010
Boron	mg/L	0.2	-	0.086	-	0.181	**0.21**	-	-	**0.254**	-	**0.329**	-	**0.245**	-	**0.314**	-	**0.557**	-	0.091	-	0.141
Cadmium	mg/L	0.0002	-	0.0000117	-	0.000038	**0.00208**	-	-	0.000042	-	0.0000237	-	0.0000265	-	0.0000146	-	0.0000118	-	0.0000176	-	0.000021
Calcium	mg/L	-	-	65.0	-	157	230	-	-	164	-	140	-	139	-	180	-	138	-	43.5	-	86.7
Chromium	mg/L	0.001	-	**0.00166**	-	**0.00108**	**0.126**	-	-	**0.00171**	-	**0.00177**	-	**0.00124**	-	0.00053	-	0.00066	-	**0.00159**	-	0.00066
Cobalt	mg/L	0.0009	-	0.00064	-	0.00062	**0.0761**	-	-	**0.00096**	-	**0.00125**	-	0.00084	-	0.00053	-	0.00055	-	0.00071	-	0.00039
Copper	mg/L	0.005	-	0.0031	-	0.0020	**0.086**	-	-	0.0019	-	0.0016	-	0.0020	-	**0.0055**	-	0.0017	-	0.0013	-	0.0022
Iron	mg/L	0.3	**3.00**	**1.05**	**2.08**	**0.976**	**177**	**2.31**	-	**1.52**	**0.598**	**2.51**	**0.777**	**1.08**	0.153	0.224	**1.24**	0.174	**40.5**	**1.74**	**2.78**	**0.713**
Lead	mg/L	0.005	-	0.000818	-	0.00051	**0.127**	-	-	0.00138	-	0.00139	-	0.00108	-	0.000303	-	0.000431	-	0.00138	-	0.00048 J
Magnesium	mg/L	-	-	12.6	-	32.8	65.0	-	-	38.8	-	35.8	-	33.4	-	42.0	-	55.9	-	11.0	-	19.8
Manganese	mg/L	-	-	0.235	-	0.121	13.4	-	-	0.313	-	0.746	-	0.287	-	0.278	-	-	-	0.230	-	0.0613
Mercury	mg/L	0.0002	-	-	-	-	< 0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	mg/L	0.0002	-	< 0.0000050	-	< 0.000010	-	-	-	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	-	< 0.0000050	-	< 0.0000050	-	< 0.000010
Molybdenum	mg/L	0.04	-	0.000248	-	0.00147	0.00347	-	-	0.00203	-	0.00352	-	0.00234	-	0.00270	-	0.0123	-	0.000303	-	0.000871
Nickel	mg/L	0.025	-	0.00181	-	0.00470	**0.118**	-	-	0.00392	-	0.00492	-	0.00384	-	0.00254	-	0.00351	-	0.00187	-	0.00235
Potassium	mg/L	-	-	5.37	-	7.24	18.0	-	-	8.75	-	7.87	-	8.41	-	11.4	-	20.9	-	3.89	-	3.46
Silver	mg/L	0.0001	-	< 0.000050	-	< 0.000050	**< 0.00050**	-	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050
Sodium	mg/L	-	-	9.84	-	31.3	40.4	-	-	29.8	-	38.9	-	34.9	-	43.4	-	81.8	-	11.0	-	15.5
Thallium	mg/L	0.0003	-	< 0.000010	-	< 0.000010	**0.00082**	-	-	-	-	0.000011	-	< 0.000010	-	< 0.000010	-	< 0.000010	-	< 0.000010	-	< 0.000010
Titanium	mg/L	-	-	-	-	-	-	-	-	0.0270	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	-	0.00190	-	0.00091	**0.169**	-	-	0.00248	-	0.00199	-	0.00127	-	0.00052	-	0.00092	-	0.00156	-	< 0.00050
Zinc	mg/L	0.03	-	0.0050	-	0.0072	**0.614**	-	-	0.0090	-	0.0083	-	0.0089	-	0.0053	-	< 0.0030	-	0.0087	-	0.0056

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives,July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 5.8a

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW8
Sample ID:			SW-18235-0517-DD-005	SW-018235-122717-DD-003	SW-18235-0318-DD-007	SW-18235-0518-DD-007	SW-18235-0518-DD-008	SW-18235-110818-DD-005	SW-18235-110818-DD-007	SW-18235-0319-DD-006	SW-18235-0519-DD-006	SW-18235-0819-DD-007	SW-18235-1119-DD-001	SW-18235-0320-DD-001	SW-18235-0520-DD-005	SW-18235-1120-HM-007	SW-18235-0321-DD-007	SW-18235-0521-DD-004**	SW-18235-0521-DD-005**	SW-18235-0821-DD-007	SW-18235-1121-BK-07	SW-18235-0317-DD-002
Sample Date:			5/17/2017	12/27/2017	3/27/2018	5/30/2018	5/30/2018	11/8/2018	11/8/2018	3/27/2019	5/30/2019	8/19/2019	11/29/2019	3/20/2020	5/22/2020	11/24/2020	3/26/2021	6/1/2021	6/1/2021	8/31/2021	11/12/2021	3/23/2017
Parameters	**Units**	**PWQO[1]**	**Duplicate**				**Duplicate**		**Duplicate**										**Duplicate**			
Field Parameters																						
Conductivity, field	uS/cm	-	549	585	304	854	854	767	767	316	455	239	597	1390	418	1030	213	NA	NA	293	299	45
Dissolved oxygen (DO), field	mg/L	>4	2.47	**7.28**	2.73	**4.05**	**4.05**	0.97	0.97	0.10	0.66	2.54	**8.61**	**4.65**	**5.42**	2.02	2.34	NA	NA	4.87	10.02	**6.89**
Flow	L/sec	-	-	-	NF	NF	NF	NF	NF	-	-	-	-	-	-	-	-	-	-	-	-	NF
Not sampled	none	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-	+57	-	-	-	-	-	-	-48	NA	NA	100	59	-
pH, field	s.u.	6.5-8.5	7.50	7.50	6.86	**6.47**	**6.47**	7.13	7.13	7.44	7.45	6.94	7.42	**6.06**	7.42	**6.03**	**6.33**	NA	NA	7.90	7.73	7.19
Temperature, field	Deg C	-	14.5	0.5	4.07	18.9	18.9	4.88	4.88	1.62	14.19	23.43	6.31	14.17	20.95	1.67	10.60	NA	NA	24.76	9.48	0.2
Turbidity, field	NTU	-	-	-	3.5	47.8	47.8	264	264	15.6	92.3	24.5	160	140	115	412	928	NA	NA	421	147	-
General Chemistry																						
Alkalinity, total (as CaCO3)	mg/L	-	102	81	87	135	135	90	91	45	113	69	157	68	115	80	< 10	126	127	161	132	15
Ammonia-N	mg/L	-	< 0.020	0.292	0.160	< 0.061	< 0.084	< 0.062	< 0.037	0.204	0.018	0.078	0.011	0.058	0.035	0.017	0.066	0.032	0.030	0.101	0.022	< 0.020
Biochemical oxygen demand (BOD)	mg/L	-	< 3.0	6.1	< 2.0	4.4	7.5	12.7	14.7	< 3.0	< 2.0	8.9	5.1	4.8	6.0	7.5	< 3.0	9.3	10.8	2.8	< 3.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	108 J	66	47	143	190	114	96	44	92	328	72	153	72	70	85	150	123	21	11	49
Chloride	mg/L	-	10.7	25.4	16.4	17.2	17.1	16.5	15.9	7.94	4.69	12.2	26.8	9.17 J+	11.6	41.9	4.28	17.8	17.9	2.69	2.30	1.47
Conductivity	uS/cm	-	666	612	507	535	533	674	632	244	305	278	455	244	449	909	128	513	512	290	-	58.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	20.2	29	-	39.1	38.5	31.8	29.2	-	30.5 J	-	25.3	-	22.0	21.1	-	37.2	40.8	-	4.66	-
Hardness	mg/L	-	306 J	215 J	-	258 J	278 J	292 J	290 J	-	136 J	-	250 J	-	199 J+	420 J+	-	217	219	-	-	-
Nitrate (as N)	mg/L	-	< 0.020	0.029	< 0.020	< 0.020	< 0.020	0.034	0.034	0.035	< 0.020	0.029	< 0.020	0.065	0.021	0.023	< 0.020	< 0.020	< 0.020	0.026	0.155	0.025
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	7.44	6.77	7.32	7.45	7.41	6.58	6.54	6.61	7.03	7.09	7.33	6.76	7.87	6.87	**6.10**	7.48	7.61	8.20	8.34	**6.47**
Phenolics (total)	mg/L	0.001	**0.0027 J**	**0.0020**	**0.0014**	**< 0.0071**	**< 0.0066**	**0.0055**	**0.0054**	**< 0.0038**	**< 0.0046**	**< 0.0027**	**0.0098**	**< 0.0074**	**0.0024**	**0.0013**	**0.0011**	**0.0015**	**0.0013**	**0.0022**	< 0.0010	**< 0.0022**
Phosphorus	mg/L	0.01	**0.210 J**	**0.266**	**0.0502**	**0.350 J**	**0.845 J**	**0.618**	**0.479**	**0.123**	**0.340**	**3.32**	**0.351**	**0.452**	**0.160**	**0.436**	**0.136**	**0.374**	**0.435**	**0.067**	**0.0412**	**0.138**
Sulfate	mg/L	-	220	199	137	122	120	242	224	60.8	48.5	51.3	47.5	48.1	97.5	356	37.4	84.6	82.1	2.95	5.45	9.41
Total dissolved solids (TDS)	mg/L	-	443	478	334	414	418	494	470	166	221	223	336	248	323	620	190	372	365	184	150	178
Total kjeldahl nitrogen (TKN)	mg/L	-	1.52	1.66	1.02	5.1 J	11.2 J	2.2	< 1.5	1.25	2.47	10.3	1.00	4.40	1.50	2.20	1.65	3.46	3.22	0.816	0.80	1.06
Total suspended solids (TSS)	mg/L	-	12.5 J	76.4	13.9	12.9	16.9	11.9	17.8	10.9	54.0	33.2	11.0	186	6.1	20.9	11.8	150	43.0	36.6	33.0	14.4
Turbidity	NTU	-	5.75	27.4	10.5	4.46	4.68	16.4 J	23.4 J	-	-	-	-	-	-	-	-	-	-	-	-	84.6
Metals																						
Aluminum	mg/L	0.075	**0.093**	**1.81**	-	**0.091**	0.064	**0.724**	**0.726**	-	**0.328**	-	**0.270**	-	**0.145**	0.0286	-	0.0285	0.0287	-	**1.25**	-
Arsenic	mg/L	0.005	0.00082	< 0.0010	-	0.00188	0.00184	0.00100	0.00097	-	0.00118	-	0.00082	-	0.00118	0.00052	-	0.00135	0.00140	-	0.00063	-
Barium	mg/L	-	0.0285	0.0361	-	0.0297	0.0284	0.0402	0.0396	-	0.0218	-	0.0322	-	0.0205	0.0422 J+	-	0.0269	0.0278	-	0.0285	-
Beryllium	mg/L	0.011	< 0.00010	< 0.0010	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	-	-	-	< 0.00010	-
Boron	mg/L	0.2	0.137	< 0.10	-	0.158	0.166	0.159	0.148	-	0.084	-	0.134	-	0.112	**0.276**	-	**0.224**	**0.233**	-	0.022	-
Cadmium	mg/L	0.0002	0.000017	0.000053	-	0.000028	0.000022	0.000072	0.000060	-	0.0000283	-	0.0000171	-	0.0000101	0.000133	-	0.0000059	0.0000052	-	0.0000086	-
Calcium	mg/L	-	90.6	60.6	-	74.1	82.3	82.8	82.8	-	39.0	-	70.9	-	55.4	120	-	59.5	60.1	-	36.1	-
Chromium	mg/L	0.001	0.00059	**< 0.0050**	-	**< 0.00116**	< 0.00068	**0.00119**	**0.00113**	-	0.00095	-	0.00098	-	**0.00139**	< 0.00050	-	0.00075	0.00072	-	**0.00152**	-
Cobalt	mg/L	0.0009	0.00037	**0.0013**	-	**0.00101**	**0.00095**	**0.00158**	**0.00142**	-	**0.00092**	-	0.00035	-	0.00031	0.00043	-	0.00048	0.00049	-	0.00065	-
Copper	mg/L	0.005	< 0.0010	**< 0.010**	-	0.0015	< 0.0010	0.0023	0.0019	-	0.0012	-	< 0.0010	-	< 0.0010	0.0014	-	< 0.0010	< 0.0010	-	0.0021	-
Iron	mg/L	0.3	**0.636**	**2.56**	**0.797**	**0.590**	**0.465**	**4.04**	**3.45**	**1.09**	**1.98**	**1.53**	**0.507**	**0.660**	**0.364**	0.129	**2.79**	**0.377**	**0.372**	**2.47**	**1.34**	**2.71**
Lead	mg/L	0.005	0.00020 J	0.00481	-	0.00040	0.00025	0.000902	0.000769	-	0.000764	-	0.000376	-	0.000258	0.000111	-	0.000182	0.000096	-	0.000624	-
Magnesium	mg/L	-	19.3	15.5	-	17.8	17.7	20.8	20.2	-	9.46	-	17.7	-	14.7	29.2	-	16.7	16.8	-	11.0	-
Manganese	mg/L	-	0.0553	0.279	-	0.329	0.302	0.359	0.317	-	0.215	-	0.141	-	-	0.311	-	-	-	-	0.0240	-
Mercury	mg/L	0.0002	-	< 0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	mg/L	0.0002	< 0.000010	-	-	< 0.000010	< 0.000010	< 0.000010	< 0.000010	-	< 0.000010	-	< 0.0000050	-	< 0.0000050	< 0.0000050	-	< 0.0000050	< 0.0000050	-	< 0.0000050	-
Molybdenum	mg/L	0.04	0.000792	< 0.00050	-	0.000221	0.000203	0.000700	0.000682	-	0.000287	-	0.00263	-	0.00136	0.00114	-	0.000743	0.000920	-	0.00103	-
Nickel	mg/L	0.025	0.00210	< 0.0050	-	0.00252	0.00227	0.00260	0.00244	-	0.00158	-	0.00207	-	0.00174	0.00225	-	0.00158	0.00159	-	0.00166	-
Potassium	mg/L	-	3.49	5.62	-	2.09	2.14	9.06	8.98	-	1.69	-	6.91	-	3.86	17.3	-	0.677	0.791	-	1.04	-
Silver	mg/L	0.0001	< 0.000050	**< 0.00050**	-	< 0.000050	< 0.000050	< 0.000050	< 0.000050	-	< 0.000050	-	< 0.000050	-	< 0.000050	< 0.000050	-	< 0.000050	< 0.000050	-	< 0.000050	-
Sodium	mg/L	-	15.3	13.8	-	17.6	18.1	15.0	14.7	-	7.56	-	18.9	-	14.7	28.3	-	23.8	24.4	-	2.70	-
Thallium	mg/L	0.0003	< 0.000010	< 0.00010	-	< 0.000010	< 0.000010	-	-	-	< 0.000010	-	< 0.000010	-	< 0.000010	< 0.000010	-	< 0.000010	< 0.000010	-	0.000016	-
Titanium	mg/L	-	-	-	-	-	-	0.0163	0.0158	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	< 0.00050	< 0.0050	-	0.00057	< 0.00050	0.00166	0.00157	-	0.00132	-	0.00076	-	0.00080	< 0.00050	-	< 0.00050	< 0.00050	-	0.00239	-
Zinc	mg/L	0.03	< 0.0030	< 0.030	-	0.0109	0.0044	0.0132	0.0100	-	0.0068	-	< 0.0030	-	< 0.0030	0.0157	-	< 0.0030	< 0.0030	-	0.0042	-

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives,July 1994 (reprinted February 1999), prepared by MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

R Rejected.

0.054 Does not meet the applicable PWQO criteria.

< 0.10 Method detection limit does not meet PWQO criteria.

< 0.20 Result below method detection limit.

Table 5.8a

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW9	SW9	SW9	SW9	SW9	SW9	SW9
Sample ID:			SW-18235-0517-DD-002	SW-018235-122717-DD-002	SW-18235-0318-DD-008	SW-18235-0518-DD-006	SW-18235-110818-DD-006	SW-18235-0319-DD-003	SW-18235-0519-DD-001	SW-18235-0519-DD-004	SW-18235-0819-DD-008	SW-18235-1119-DD-004	SW-18235-0320-DD-005	SW-18235-0321-DD-008	SW-18235-0520-DD-001	SW-18235-1120-HM-009	SW-18235-0321-DD-003	SW-18235-0521-DD-001**	SW-18235-0821-DD-009	SW-18235-0821-DD-010	SW-18235-1121-BK-09
Sample Date:			5/17/2017	12/27/2017	3/27/2018	5/30/2018	11/8/2018	3/27/2019	5/30/2019	5/30/2019 Duplicate	8/19/2019	11/29/2019	3/20/2020	3/26/2021	5/22/2020	11/24/2020	3/26/2021	6/1/2021	8/31/2021	8/31/2021 Duplicate	11/12/2021
Parameters	**Units**	**PWQO[1]**																			
Field Parameters																					
Conductivity, field	uS/cm	-	74	303	59	120	295	77	238	238	71	176	153	523	253		527	NA	494	494	255
Dissolved oxygen (DO), field	mg/L	>4	1.68	**14.60**	**4.55**	2.18	0.91	0.84	1.01	1.01	2.64		**4.78**	2.64	1.78		1.45	NA	1.55	1.55	2.58
Flow	L/sec	-	NF	-	NF	NF	NF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not sampled	none	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	+61	-	-	-	-	-	68	-	-	159	NA	-22	-22	33
pH, field	s.u.	6.5-8.5	7.35	7.98	7.58	**6.02**	7.09	7.96	7.47	7.47	6.72	7.03	**6.32**	7.12	**6.4**		**6.02**	NA	7.22	7.22	6.95
Temperature, field	Deg C	-	13.0	0.5	3.66	20.5	4.74	1.49	13.53	13.53	23.14	4.32	16.71	10.46	17.35		12.21	NA	21.64	21.64	8.56
Turbidity, field	NTU	-	-	-	73.0	21.3	287	28.4	150	150	96.4	37.8	117	340	>1000		93.5	NA	311	311	1.8
General Chemistry																					
Alkalinity, total (as CaCO3)	mg/L	-	22	23	16	< 100	< 10	12	25	25	23	39	54	76	105	31	109	283	315	216	97.8
Ammonia-N	mg/L	-	< 0.020	0.226	< 0.112	< 0.035	< 0.021	0.018	0.029	0.027	0.067	0.021	0.017	0.023	0.030	0.015	0.019	0.020	0.111	0.150	0.029
Biochemical oxygen demand (BOD)	mg/L	-	2.1	7.5	< 2.0	6.1	< 3.0	< 3.0	3.1	2.1	< 2.0	16.0	< 3.0	< 3.0	5.2	< 3.0	< 3.0	< 3.0	47.8	3.7	< 3.0
Chemical oxygen demand (COD)	mg/L	-	81	162	74	164	77	73	92	109	79	158	121	61	101	34	40	62	314	217	54
Chloride	mg/L	-	< 0.50	1.54	1.25	0.55	1.09	1.22	< 0.50	< 0.50	0.60	2.24	5.46 J+	27.7	< 0.50	7.2	2.64	< 0.50	1.34	1.36	1.15
Conductivity	uS/cm	-	54.9	86.4	60.9	86.3	98.2	46.8	53.8	54.8	57.8	85.9	132	523	256	1340	538	752	500	504	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	25.5	39	-	43.6	28.7	-	29.3 J	28.1 J	-	54.9	-	-	20.3	12.1	-	22.0	-	-	16.5
Hardness	mg/L	-	29 J	52 J	-	45 J	44 J	-	32.8 J	33.6 J	-	44.8 J	-	-	164 J+	755 J+	-	415	-	-	-
Nitrate (as N)	mg/L	-	< 0.020	0.046	< 0.020	0.049	0.068	0.044	< 0.020	< 0.020	0.038	< 0.020	0.031	0.351	0.022	0.75	0.248	< 0.020	< 0.020	0.022	< 0.020
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.010	< 0.050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	6.77	**6.49**	**6.49**	**6.31**	**6.01**	**6.23**	**6.29**	**6.27**	**6.46**	6.55	7.02	7.57	7.77	7.66	7.81	7.59	7.39	7.35	7.97
Phenolics (total)	mg/L	0.001	**0.0040**	**0.0030**	**0.0030**	**< 0.0115**	< 0.0010	**< 0.0027**	**< 0.0073**	**< 0.0055**	**0.0675**	**0.0367**	**< 0.0032**	**0.0026**	0.0010	**0.0021**	**0.0051**	**0.0024**	**0.0017**	**0.0031**	**< 0.010**
Phosphorus	mg/L	0.01	**0.217**	**0.868**	**0.253**	**0.789**	**0.276**	**0.305**	**0.312**	**0.459**	**0.507**	**0.512**	**0.268**	**0.0765**	**0.425**	**0.138**	**0.0952**	**0.0601**	**1.69**	**1.08**	**0.165**
Sulfate	mg/L	-	2.05	12.1	8.05	2.55	27.5	4.85	2.74	2.61	3.57	2.56	14.5	142	24.3	630	165	90.3	83.4	82.4	19.4
Total dissolved solids (TDS)	mg/L	-	128	343	203	186	219	168	174	163	178	182	217	378	231	1120	382	491	380	398	162
Total kjeldahl nitrogen (TKN)	mg/L	-	1.78	3.8	2.02	4.9	< 1.5	2.07	2.43	2.79	2.21	1.17	2.56	1.02	1.91	0.910	0.850	1.13	< 50	< 50	0.910
Total suspended solids (TSS)	mg/L	-	2.2	206	3.3	58.1	7.0	21.0	8.8	14.3	11.0	42.3	390	12.2	274	19.1	19.6	10.7	500	500	23.5
Turbidity	NTU	-	48.4	212	86.3	35.9	87.1 J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																					
Aluminum	mg/L	0.075	**3.01**	**13.6**	-	**1.77**	**5.04**	-	**5.47**	**5.58**	-	**1.03**	-	-	**7.97**	< 0.0050	-	0.0090	-	-	**1.42**
Arsenic	mg/L	0.005	0.00102	0.0018	-	0.00140	0.00110	-	0.00126	0.00121	-	0.00120	-	-	0.00279	0.00069	-	0.00129	-	-	0.00186
Barium	mg/L	-	0.0264	0.116	-	0.0261	0.0459	-	0.0431	0.0454	-	0.0187	-	-	0.0689	0.0539 J+	-	0.0324	-	-	0.0327
Beryllium	mg/L	0.011	0.00016	< 0.0010	-	0.00014	0.00021	-	0.00024	0.00026	-	< 0.00010	-	-	-	< 0.00010	-	-	-	-	< 0.00010
Boron	mg/L	0.2	0.023	< 0.10	-	0.034	0.026	-	0.025	0.026	-	0.042	-	-	0.024	< 0.031	-	0.045	-	-	0.025
Cadmium	mg/L	0.0002	0.000087	**0.000313**	-	0.000119	0.000123	-	0.000111	0.000114	-	0.0000611	-	-	0.0000921	0.0000098	-	0.0000059	-	-	0.0000391
Calcium	mg/L	-	7.77	12.9	-	13.2	11.3	-	8.44	8.75	-	10.7	-	-	44.8	224	-	114	-	-	31.7
Chromium	mg/L	0.001	**0.00383**	**0.0121**	-	**< 0.00317**	**0.00494**	-	**0.00576**	**0.00579**	-	**0.00251**	-	-	**0.0111**	< 0.00050	-	< 0.00050	-	-	**0.00209**
Cobalt	mg/L	0.0009	**0.00097**	**0.0035**	-	**0.00155**	**0.00114**	-	**0.00146**	**0.00156**	-	**0.00154**	-	-	**0.00498**	0.00024	-	0.00035	-	-	**0.00157**
Copper	mg/L	0.005	0.0045	**0.014**	-	0.0036	**0.0072**	-	**0.0057**	**0.0057**	-	0.0026	-	-	**0.0112**	0.0032	-	**0.0059**	-	-	0.0023
Iron	mg/L	0.3	**2.36**	**8.14**	**3.96**	**4.60**	**2.60**	**5.13**	**3.73**	**3.81**	**3.21**	**4.39**	**0.789**	**1.63**	**12.6**	0.068	**1.79**	0.140	**10.8**	**11.8**	**6.05**
Lead	mg/L	0.005	0.00173	**0.00877**	-	0.00152	0.00292	-	0.00292	0.00309	-	0.000926	-	-	**0.00555**	< 0.000050	-	0.000170	-	-	0.00126
Magnesium	mg/L	-	2.44	4.83	-	3.03	3.86	-	2.83	2.85	-	4.36	-	-	12.7	47.3	-	31.7	-	-	7.86
Manganese	mg/L	-	0.0422	0.193	-	0.103	0.0557	-	0.0577	0.0645	-	0.643	-	-	-	0.204	-	-	-	-	0.398
Mercury	mg/L	0.0002	-	0.000012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	mg/L	0.0002	< 0.000010	-	-	< 0.000010	< 0.000010	-	< 0.000010	< 0.000010	-	0.0000081	-	-	< 0.0000050	< 0.0000050	-	< 0.0000050	-	-	< 0.0000050
Molybdenum	mg/L	0.04	0.000222	< 0.00050	-	0.000208	0.000219	-	0.000174	0.000174	-	0.000148	-	-	0.000230	0.00176	-	0.000492	-	-	0.000364
Nickel	mg/L	0.025	0.00443	0.0109	-	0.00408	0.00432	-	0.00611	0.00619	-	0.00334	-	-	0.0124	0.00094	-	0.00119	-	-	0.00248
Potassium	mg/L	-	1.61	3.99	-	1.84	2.95	-	1.52	1.53	-	5.53	-	-	3.22	9.54	-	0.990	-	-	3.44
Silver	mg/L	0.0001	< 0.000050	**< 0.00050**	-	< 0.000050	< 0.000050	-	< 0.000050	< 0.000050	-	< 0.000050	-	-	< 0.000050	< 0.000050	-	< 0.000050	-	-	< 0.000050
Sodium	mg/L	-	1.04	< 5.0	-	1.13	1.29	-	< 0.907	0.915	-	0.931	-	-	2.71	17.0	-	8.74	-	-	1.75
Thallium	mg/L	0.0003	0.000032	0.00012	-	0.000024	-	-	0.000059	0.000061	-	< 0.000010	-	-	0.000092	< 0.000010	-	< 0.000010	-	-	0.000017
Titanium	mg/L	-	-	-	-	-	0.0433	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	0.00466	**0.0174**	-	0.00293	**0.00779**	-	**0.00693**	**0.00716**	-	0.00266	-	-	**0.0143**	< 0.00050	-	< 0.00050	-	-	0.00343
Zinc	mg/L	0.03	0.0133	**0.049**	-	0.0116	0.0187	-	0.0146	0.0165	-	0.0117	-	-	**0.0480**	< 0.0030	-	0.0039	-	-	0.0091

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives,July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW2	SW2	SW2	SW2	SW2	SW3	SW3	SW3
Sample ID:			SW-18235-0517-DD-006	SW-18235-1117-DD-004	SW-18235-1117-DD-005	SW-18235-0518-DD-004	SW-18235-110818-DD-002	SW-18235-0519-DD-003	SW-18235-1119-DD-006	SW-18235-1119-DD-007	SW-18235-0520-DD-002	SW-18235-1120-HM-001	SW-18235-1120-HM-002	SW-18235-1121-BK-01	SW-18235-1119-DD-008	SW-18235-122419-JL-01	SW-18235-0520-DD-003	SW-18235-1120-HM-008	SW-18235-1121-BK-02	SW-18235-1117-DD-002	SW-18235-0518-DD-003	SW-18235-110818-DD-008
Sample Date:			5/17/2017	12/1/2017	12/1/2017 Duplicate	5/30/2018	11/8/2018	5/30/2019	11/29/2019	11/29/2019 Duplicate	5/22/2020	11/24/2020	11/24/2020 Duplicate	11/12/2021	11/29/2019	12/24/2019	5/22/2020	11/24/2020	11/12/2021	12/1/2017	5/30/2018	11/8/2018
Parameters	**Units**	**PWQO[1]**																				
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	-	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	-	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW2	SW2	SW2	SW2	SW2	SW3	SW3	SW3
Sample ID:			SW-18235-0517-DD-006	SW-18235-1117-DD-004	SW-18235-1117-DD-005	SW-18235-0518-DD-004	SW-18235-110818-DD-002	SW-18235-0519-DD-003	SW-18235-1119-DD-006	SW-18235-1119-DD-007	SW-18235-0520-DD-002	SW-18235-1120-HM-001	SW-18235-1120-HM-002	SW-18235-1121-BK-01	SW-18235-1119-DD-008	SW-18235-122419-JL-01	SW-18235-0520-DD-003	SW-18235-1120-HM-008	SW-18235-1121-BK-02	SW-18235-1117-DD-002	SW-18235-0518-DD-003	SW-18235-110818-DD-008
Sample Date:			5/17/2017	12/1/2017	12/1/2017 Duplicate	5/30/2018	11/8/2018	5/30/2019	11/29/2019	11/29/2019 Duplicate	5/22/2020	11/24/2020	11/24/2020 Duplicate	11/12/2021	11/29/2019	12/24/2019	5/22/2020	11/24/2020	11/12/2021	12/1/2017	5/30/2018	11/8/2018
Parameters	**Units**	**PWQO[1]**																				
Semi-volatile Organic Compounds																						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	0.047	< 0.028	< 0.028	0.104	< 0.028	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.021 J	< 0.020	< 0.020	< 0.020	< 0.020	0.150	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.239	< 0.020	< 0.020
Anthracene	ug/L	0.0008	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.746	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	0.0004	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.036	< 0.020	0.024	< 0.020	< 0.020	1.37	< 0.020	0.032
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.031	< 0.010	0.017	< 0.010	< 0.010	1.76	< 0.010	0.027
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-	0.061	< 0.020	0.031	< 0.020	-	2.90	< 0.020	0.040
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	< 0.020	-	-	-	-	< 0.020	-	-	-
Benzo(g,h,i)perylene	ug/L	0.00002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.033	< 0.020	< 0.020	< 0.020	< 0.020	1.77	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	0.0002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.812	< 0.020	< 0.020
Chrysene	ug/L	0.0001	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.042	< 0.020	0.026	< 0.020	< 0.020	1.89	< 0.020	0.028
Dibenz(a,h)anthracene	ug/L	0.002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.372	< 0.020	< 0.020
Fluoranthene	ug/L	0.0008	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.047	< 0.020	0.047	< 0.020	< 0.020	4.49	< 0.020	0.065
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.215	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.045	< 0.020	< 0.020	< 0.020	< 0.020	2.47	< 0.020	0.023
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.143	0.073	< 0.050	0.137	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.040	< 0.020	0.022	< 0.020	< 0.020	2.87	< 0.020	0.033
Pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.040	< 0.020	0.041	< 0.020	< 0.020	3.71	< 0.020	0.053

Notes:
All units in ug/L.

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
- No Value/Not Analyzed.
J The result is an estimated value.
R Rejected.
0.054 Does not meet the applicable PWQO criteria.
< 0.10 Method detection limit does not meet PWQO criteria.
< 0.20 Result below method detection limit.

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW3	SW3	SW3	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW5	SW5	SW5	SW5	SW5	SW5
Sample ID:			SW-18235-0519-DD-005	SW-18235-1119-DD-002	SW-18235-0521-DD-002**	SW-18235-0517-DD-001	SW-18235-1117-DD-001	SW-18235-0518-DD-002	SW-18235-110818-DD-001	SW-18235-0519-DD-008	SW-18235-1119-DD-005	SW-18235-0520-DD-006	SW-18235-0520-DD-007	SW-18235-1120-HM-003	SW-18235-1121-BK-04	SW-18235-1121-BK-011	SW-18235-0517-DD-007	SW-18235-1117-DD-003	SW-18235-110818-DD-004	SW-18235-0519-DD-002	SW-18235-1119-DD-009	SW-18235-0520-DD-004
Sample Date:			5/30/2019	11/29/2019	6/1/2021	5/17/2017	12/1/2017	5/30/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	5/22/2020 Duplicate	11/24/2020	11/12/2021	11/12/2021 Duplicate	5/17/2017	12/1/2017	11/8/2018	5/30/2019	11/29/2019	5/22/2020
Parameters	**Units**	**PWQO[1]**																				
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	-	< 1.1	< 1.1	< 1.1	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW3	SW3	SW3	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW5	SW5	SW5	SW5	SW5	SW5
Sample ID:			SW-18235-0519-DD-005	SW-18235-1119-DD-002	SW-18235-0521-DD-002**	SW-18235-0517-DD-001	SW-18235-1117-DD-001	SW-18235-0518-DD-002	SW-18235-110818-DD-001	SW-18235-0519-DD-008	SW-18235-1119-DD-005	SW-18235-0520-DD-006	SW-18235-0520-DD-007	SW-18235-1120-HM-003	SW-18235-1121-BK-04	SW-18235-1121-BK-011	SW-18235-0517-DD-007	SW-18235-1117-DD-003	SW-18235-110818-DD-004	SW-18235-0519-DD-002	SW-18235-1119-DD-009	SW-18235-0520-DD-004
Sample Date:			5/30/2019	11/29/2019	6/1/2021	5/17/2017	12/1/2017	5/30/2018	11/8/2018	5/30/2019	11/29/2019	5/22/2020	5/22/2020 Duplicate	11/24/2020	11/12/2021	11/12/2021 Duplicate	5/17/2017	12/1/2017	11/8/2018	5/30/2019	11/29/2019	5/22/2020
Parameters	**Units**	**PWQO[1]**																				
Semi-volatile Organic Compounds																						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	0.093	< 0.028	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	< 0.020	0.087	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	0.131	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	< 0.020	0.366	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	0.0004	0.027	1.72	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	-	0.016	1.43	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.015	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.026	1.82	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	-	< 0.020	-	-	-	-	-	-	-	-	-	< 0.020	< 0.020	-	-	-	-	-	-
Benzo(g,h,i)perylene	ug/L	0.00002	< 0.020	1.08	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	0.0002	< 0.020	0.608	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	0.0001	0.026	1.60	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	0.002	< 0.020	0.257	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	0.0008	0.062	2.82	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	0.2	< 0.020	0.126	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	1.32	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	0.084	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	0.038	1.42	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	0.053	2.53	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:
All units in ug/L.

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW5	SW5	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7
Sample ID:			SW-18235-1120-HM-004	SW-18235-1121-BK-05	SW-18235-0517-DD-003	SW-018235-122717-DD-001	SW-18235-110818-DD-003	SW-18235-0519-DD-007	SW-18235-1119-DD-003	SW-18235-1120-HM-005	SW-18235-0521-DD-008**	SW-18235-1121-BK-06	SW-18235-0517-DD-004	SW-18235-0517-DD-005	SW-018235-122717-DD-003	SW-18235-0518-DD-007	SW-18235-0518-DD-008	SW-18235-110818-DD-005	SW-18235-110818-DD-007	SW-18235-0519-DD-006	SW-18235-1119-DD-001	SW-18235-0520-DD-005
Sample Date:			11/24/2020	11/12/2021	5/17/2017	12/27/2017	11/8/2018	5/30/2019	11/29/2019	11/24/2020	6/1/2021	11/12/2021	5/17/2017	5/17/2017 Duplicate	12/27/2017	5/30/2018	5/30/2018 Duplicate	11/8/2018	11/8/2018 Duplicate	5/30/2019	11/29/2019	5/22/2020
Parameters	**Units**	**PWQO[1]**																			
Volatile Organic Compounds																					
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.87	0.92	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	**0.86**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	-	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	-	< 1.1	< 1.1	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	-	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW5	SW5	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW7
Sample ID:			SW-18235-1120-HM-004	SW-18235-1121-BK-05	SW-18235-0517-DD-003	SW-018235-122717-DD-001	SW-18235-110818-DD-003	SW-18235-0519-DD-007	SW-18235-1119-DD-003	SW-18235-1120-HM-005	SW-18235-0521-DD-008**	SW-18235-1121-BK-06	SW-18235-0517-DD-004	SW-18235-0517-DD-005	SW-018235-122717-DD-003	SW-18235-0518-DD-007	SW-18235-0518-DD-008	SW-18235-110818-DD-005	SW-18235-110818-DD-007	SW-18235-0519-DD-006	SW-18235-1119-DD-001	SW-18235-0520-DD-005
Sample Date:			11/24/2020	11/12/2021	5/17/2017	12/27/2017	11/8/2018	5/30/2019	11/29/2019	11/24/2020	6/1/2021	11/12/2021	5/17/2017	5/17/2017 Duplicate	12/27/2017	5/30/2018	5/30/2018 Duplicate	11/8/2018	11/8/2018 Duplicate	5/30/2019	11/29/2019	5/22/2020
Parameters	**Units**	**PWQO[1]**																				
Semi-volatile Organic Compounds																						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	< 0.028	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	-	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	0.0004	< 0.020	< 0.020	< 0.020	0.049	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	< 0.010	0.035	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	-	< 0.020	0.053	< 0.020	< 0.020	< 0.020	< 0.020	-	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	< 0.020	-	-	-	-	-	-	0.025	< 0.020	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	ug/L	0.00002	< 0.020	< 0.020	< 0.020	0.028	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	0.0002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	0.0001	< 0.020	< 0.020	< 0.020	0.049	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	0.002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	0.0008	< 0.020	< 0.020	< 0.020	0.113	< 0.020	< 0.020	< 0.020	< 0.020	0.040	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	0.034	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	< 0.020	0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	0.090	< 0.020	< 0.020	< 0.020	< 0.020	0.031	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:
All units in ug/L.

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW7	SW7	SW7	SW7	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW9	SW9	SW9	SW9
Sample ID:			SW-18235-1120-HM-007	SW-18235-0521-DD-004**	SW-18235-0521-DD-005**	SW-18235-1121-BK-07	SW-18235-0517-DD-002	SW-018235-122717-DD-002	SW-18235-0518-DD-006	SW-18235-110818-DD-006	SW-18235-0519-DD-001	SW-18235-0519-DD-004	SW-18235-1119-DD-004	SW-18235-0520-DD-001	SW-18235-1120-HM-009	SW-18235-0521-DD-001**	SW-18235-1121-BK-09
Sample Date:			11/24/2020	6/1/2021	6/1/2021 Duplicate	11/12/2021	5/17/2017	12/27/2017	5/30/2018	11/8/2018	5/30/2019	5/30/2019 Duplicate	11/29/2019	5/22/2020	11/24/2020	6/1/2021	11/12/2021
Parameters	**Units**	**PWQO[1]**															
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**11.2**	< 0.50	**1.05**	**1.04**	**24.5**	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	-	< 3.2	< 3.2	< 3.2	< 3.2	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	-	< 1.1	< 1.1	< 1.1	< 1.1	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1

Table 5.8b

Summary of Surface Water Analytical Results (VOCs and PAHs)
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW7	SW7	SW7	SW7	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW9	SW9	SW9	SW9
Sample ID:			SW-18235-1120-HM-007	SW-18235-0521-DD-004**	SW-18235-0521-DD-005**	SW-18235-1121-BK-07	SW-18235-0517-DD-002	SW-018235-122717-DD-002	SW-18235-0518-DD-006	SW-18235-110818-DD-006	SW-18235-0519-DD-001	SW-18235-0519-DD-004	SW-18235-1119-DD-004	SW-18235-0520-DD-001	SW-18235-1120-HM-009	SW-18235-0521-DD-001**	SW-18235-1121-BK-09
Sample Date:			11/24/2020	6/1/2021	6/1/2021	11/12/2021	5/17/2017	12/27/2017	5/30/2018	11/8/2018	5/30/2019	5/30/2019	11/29/2019	5/22/2020	11/24/2020	6/1/2021	11/12/2021
					Duplicate							Duplicate					
Parameters	**Units**	**PWQO[1]**															
Semi-volatile Organic Compounds																	
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	< 0.028	< 0.028	< 0.028	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	0.0004	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	< 0.010	< 0.066	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	-	-	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	< 0.020	< 0.020	< 0.020	-	-	-	-	-	-	-	-	-	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	0.0002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	0.0001	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	0.002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	0.0008	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:
All units in ug/L.

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
- No Value/Not Analyzed.
J The result is an estimated value.
R Rejected.
0.054 Does not meet the applicable PWQO criteria.
< 0.10 Method detection limit does not meet PWQO criteria.
< 0.20 Result below method detection limit.

Table 5.9

Summary of Soil Gas Monitoring Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

	29-Jan-21							
Gas Probe Location	**Pressure (in. W.C.)**	**CH_4 (% v/v)**	**CO_2 (% v/v)**	**O_2 (% v/v)**	**Bal (% v/v)**	**Water Level (mBTOR)**	**Probe Status**	**Notes**
GP-1D	0.00	-	-	-	-	2.64	FLOODED	
GP-1S	-	-	-	-	-	-	-	Could not open
GP-2D	0.00	-	-	-	-	0.85	-	Blocked at ground surface
GP-2S	0.00	-	-	-	-	1.57	FLOODED	
GP-3D	0.09	-	-	-	-	2.06	FLOODED	
GP-3S	0.10	-	-	-	-	2.00	FLOODED	
GP-4D	0.00	-	-	-	-	3.42	FLOODED	
GP-4S	0.00	-	-	-	-	1.58	FLOODED	
GP5-19	0.00	0.1	3.6	18.9	77.3	1.88	Operational	
GP6-19	0.00	0.0	0.7	20.1	79.0	2.12	Operational	
GP7-19	0.00	0.1	0.2	22.8	76.9	-	Operational	Port glued, no water level
GP8-19	0.00	-	-	-	-	1.42	FLOODED	

- No measurement

Table 5.9

Summary of Soil Gas Monitoring Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

	26-Feb-21							
Gas Probe Location	**Pressure (in. W.C.)**	**CH_4 (% v/v)**	**CO_2 (% v/v)**	**O_2 (% v/v)**	**Bal (% v/v)**	**Water Level (mBTOR)**	**Probe Status**	**Notes**
GP-1D	0.14	-	-	-	-	2.48	FLOODED	
GP-1S	-	-	-	-	-	-	-	Could not open
GP-2D	0.00	-	-	-	-	0.82	-	Blocked at ground surface
GP-2S	0.09	-	-	-	-	1.40	FLOODED	
GP-3D	0.15	-	-	-	-	2.04	FLOODED	
GP-3S	0.00	-	-	-	-	2.04	FLOODED	
GP-4D	0.00	0.1	0.1	21.3	78.5	4.00	Operational	
GP-4S	0.00	-	-	-	-	1.28	FLOODED	
GP5-19	0.15	-	-	-	-	1.58	FLOODED	
GP6-19	0.00	0.0	0.9	16.7	82.4	2.76	Operational	
GP7-19	0.00	0.0	0.1	21.2	78.7	-	Operational	Port glued, no water level
GP8-19	0.00	-	-	-	-	1.23	FLOODED	

- No measurement

Table 5.9

Summary of Soil Gas Monitoring Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Gas Probe Location	31-Mar-21 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status	Notes
GP-1D	0.00	-	-	-	-	2.32	FLOODED	
GP-1S	-	-	-	-	-	-	-	
GP-2D	0.00	-	-	-	-	1.51	FLOODED	
GP-2S	0.00	-	-	-	-	0.81	FLOODED	
GP-3D	0.00	-	-	-	-	1.76	FLOODED	
GP-3S	0.00	-	-	-	-	1.91	FLOODED	
GP-4D	0.00	0.1	0.1	21.6	78.2	4.01	Operational	
GP-4S	-0.10	-	-	-	-	1.27	FLOODED	
GP5-19	0.00	-	-	-	-	1.66	FLOODED	
GP6-19	0.00	0.1	0.4	21.2	78.3	2.77	Operational	Cap stuck, no water level
GP7-19	0.00	0.1	0.1	21.7	78.1	-	Operational	Port glued, no water level
GP8-19	0.00	-	-	-	-	0.97	-	FLOODED

- No measurement

Table 5.9

Summary of Soil Gas Monitoring Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

	30-Apr-21							
Gas Probe Location	**Pressure (in. W.C.)**	**CH_4 (% v/v)**	**CO_2 (% v/v)**	**O_2 (% v/v)**	**Bal (% v/v)**	**Water Level (mBTOR)**	**Probe Status**	**Notes**
GP-1D	0.00	-	-	-	-	2.40	FLOODED	
GP-1S	-	-	-	-	-	-	-	Could not open
GP-2D	0.00	-	-	-	-	0.83	FLOODED	
GP-2S	0.00	-	-	-	-	1.53	FLOODED	
GP-3D	0.10	-	-	-	-	1.72	FLOODED	
GP-3S	0.09	-	-	-	-	1.81	FLOODED	
	-	-	-	-	-	-		
GP-4D	0.40	0.0	0.1	22.0	77.9	4.14	Operational	
GP-4S	0.46	-	-	-	-	1.33	FLOODED	
GP5-19	0.00	0.0	3.8	18.2	77.9	1.77	Operational	
GP6-19	0.10	0.0	0.8	20.7	78.6	1.91	Operational	
GP7-19	0.00	-	-	-	-	1.32	FLOODED	
GP8-19	0.00	-	-	-	-	0.91	FLOODED	

- No measurement

Table 5.9

Summary of Soil Gas Monitoring Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

	30-Jul-21							
Gas Probe Location	**Pressure (in. W.C.)**	**CH_4 (% v/v)**	**CO_2 (% v/v)**	**O_2 (% v/v)**	**Bal (% v/v)**	**Water Level (mBTOR)**	**Probe Status**	**Notes**
GP-1D	0.00	-	-	-	-	2.38	FLOODED	
GP-1S	-	-	-	-	-	-	-	Could not open
GP-2D	0.00	-	-	-	-	0.83	NM	Tall grass NM
GP-2S	0.00	-	-	-	-	1.53	NM	Tall grass NM
GP-3D	0.00	-	-	-	-	1.69	FLOODED	
GP-3S	0.00	-	-	-	-	2.04	FLOODED	
	-	-	-	-	-	-		
GP-4D	0.00	0.0	0.1	20.2	79.7	4.25	Operational	
GP-4S	0.58	-	-	-	-	1.43	FLOODED	
GP5-19	0.00	-	-	-	-	1.57	FLOODED	
GP6-19	0.00	0.0	1.6	17.1	81.4	1.86	Operational	
GP7-19	0.00	0.0	0.4	19.7	80.0	-	Operational	Port glued, no water level
GP8-19	0.00	-	-	-	-	0.88	FLOODED	

- No measurement

Table 5.9

Summary of Soil Gas Monitoring Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Gas Probe Location	30-Sep-21 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status	Notes
GP-1D	0.00	-	-	-	-	2.84	FLOODED	
GP-1S	-	-	-	-	-	-	-	Could not open
GP-2D	0.00	-	-	-	-	0.82	-	Blocked at ground surface
GP-2S	0.05	-	-	-	-	1.55	FLOODED	
GP-3D	0.08	-	-	-	-	1.89	FLOODED	
GP-3S	0.00	-	-	-	-	1.97	FLOODED	
GP-4D	0.06	0.0	0.2	20.6	79.2	4.09	Operational	
GP-4S	0.09	-	-	-	-	1.52	FLOODED	
GP5-19	0.00	-	-	-	-	1.62	FLOODED	
GP6-19	0.00	0.0	2.8	15.9	81.2	2.02	Operational	
GP7-19	0.00	-	-	-	-	1.59	FLOODED	
GP8-19	0.00	-	-	-	-	1.25	FLOODED	

- No measurement

Table 5.9

Summary of Soil Gas Monitoring Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

	21-Dec-21							
Gas Probe Location	**Pressure (in. W.C.)**	**CH_4 (% v/v)**	**CO_2 (% v/v)**	**O_2 (% v/v)**	**Bal (% v/v)**	**Water Level (mBTOR)**	**Probe Status**	**Notes**
GP-1D	0.24	-	-	-	-	2.74	FLOODED	
GP-1S	-	-	-	-	-	-	-	Could not open
GP-2D	0.00	-	-	-	-	0.82	-	Blocked at ground surface
GP-2S	0.00	-	-	-	-	1.46	FLOODED	
GP-3D	-0.21	-	-	-	-	1.89	FLOODED	
GP-3S	-0.20	-	-	-	-	1.67	FLOODED	
GP-4D	0.00	-	-	-	-	1.73	FLOODED	
GP-4S	0.70	-	-	-	-	1.18	FLOODED	
GP5-19	0.00	0.7	1.5	19.7	78.0	2.46	Operational	
GP6-19	0.00	0.0	0.3	20.8	78.9	2.74	Operational	
GP7-19	0.48	-	-	-	-	1.17	FLOODED	
GP8-19	0.08	-	-	-	-	1.38	FLOODED	

- No measurement

Table 5.10

Summary of SWMS Pond Analytical Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND	SWMS-POND
Sample ID:			TDS POND-18235-0319-DD-001	SW2-18235-0519-DD	SW-18235-062519-JL-101	SW-18235-070319-JL-103	SW-18235-071219-JL-105	TDS POND-18235-0819-DD-001	TDS-POND-18235-1119-DD-001	PSW/MS POND-18235-0320-DD-001	PSWMS POND-18235-0520-DD-001	PSWMS POND-18235-0820-DD-001	PSWMS POND-18235-1120-HM-001	POND-18235-0321-DD-001
Sample Date:			3/27/2019	5/30/2019	6/25/2019	7/3/2019	7/12/2019	8/19/2019	12/2/2019	3/20/2020	5/22/2020	8/31/2020	11/24/2020	3/26/2021
Parameters	**Units**	**ECA[1]**												
Field Parameters														
Conductivity, field	uS/cm	-	550	719	-	-	-	454	630	549	573	850	981	774
Dissolved oxygen (DO), field	mg/L	-	0.71	6.15	-	-	-	5.59		6.11	9.6	7.14	11.78	4.39
Oxidation reduction potential (ORP), field	millivolts	-	+10	-107	-	-	-	-	-	-	-	-	-	121
pH, field	s.u.	6.5-8.5	8.13	8.40	-	-	-	6.73	**4.77**	8.19	7.91	6.86	**6.06**	7.48
Temperature, field	Deg C	-	4.90	14.40	-	-	-	27.50	5.90	15.37	23.41	23.27	2.48	13.76
Turbidity, field	NTU	-	396	36.7	-	-	-	29.6	8.1	3.56	709	30.9	104	74.4
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	-	98	120	131	124	122	97	84	102	74	148	17	104
Ammonia-N	mg/L	-	0.021	0.068	0.159	< 0.010	< 0.010	0.038	< 0.010	0.016	0.016	0.013	< 0.010	0.017
Biochemical oxygen demand (BOD)	mg/L	-	< 3.0	3.4	< 2.0	< 3.0 BODL	< 3.0 BODL	4.1	< 2.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chemical oxygen demand (COD)	mg/L	-	31	37	21	26	23	21	11	18	24	37	20	20
Chloride	mg/L	-	14.3	21.7	21.7	22.3	22.5	21.3	20.6	19.8	15.0	47.8	40.1	24.8
Conductivity	uS/cm	-	503	683	690	644	714	606	530	568	560	755	868	846
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	11.0 J	10.9	9.47	9.75	-	4.89	-	8.61	-	9.01	-
Hardness	mg/L	-	230 J	308 J	295	333	333	254	218 J	244 J+	236 J+	288 J+	358 J+	380
Nitrate (as N)	mg/L	-	1.56	< 0.020	0.042	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.028	0.020
Nitrite (as N)	mg/L	-	0.018	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nitrite/Nitrate	mg/L	-	-	-	0.042	< 0.022	< 0.022	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.18	8.35	8.32	8.32	8.33	8.28	7.95	8.20	8.34	**8.69**	8.17	8.25
Phenolics (total)	mg/L	-	< 0.0069	< 0.0026	0.0020	< 0.0010	0.0051	0.0396	< 0.0040	< 0.0047	0.0015	0.0049	0.0010	0.0013
Phosphorus	mg/L	-	0.109	0.0568	0.0311	0.0259	0.0289	0.0339	0.0082	0.0194	0.0324	0.0056	0.0259	0.0473
Sulfate	mg/L	-	136	215	222	227	229	188	163	169	187	176	255	309
Total dissolved solids (TDS)	mg/L	-	316	515	501 DLDS	472 DLDS	507 DLDS	432	315	361	393	433	501	576
Total kjeldahl nitrogen (TKN)	mg/L	-	1.42	1.36	1.16	0.94	0.90	0.74	< 0.54	0.49	0.57	1.11	0.580	0.610
Total suspended solids (TSS)	mg/L	-	34.5	5.2	5.9	7.5	7.6	4.0	2.7	6.1	12.2	16.7	4.9	29.0
Trihalomethanes	mg/L	-	-	-	-	-	-	-	< 0.0032	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	0.00041	0.00494	-	-	-	0.000161	< 0.000000096	0.00082	0.00077	0.000055	0.0000014	0.00072
Xylenes (total)	mg/L	-	-	-	-	-	-	-	< 0.0011	-	-	-	-	-
Metals														
Arsenic	mg/L	0.005	0.00076	0.00140	0.00119	0.00121	0.00130	0.00116	0.00040	0.00050	0.00092	0.00271	0.00088	0.00093
Barium	mg/L	-	0.0324	0.0211	0.0425	0.0442	0.0444	0.0358	0.0257	0.0230	0.0528	0.0450	0.0375 J+	0.0255
Boron	mg/L	0.2	0.172	**0.279**	**0.277**	**0.352**	**0.328**	**0.342**	**0.223**	0.133	-	-	-	-
Boron	mg/L	1.5	-	-	-	-	-	-	-	-	0.134	0.495	0.348	0.150
Cadmium	mg/L	-	0.000027	0.0000188	0.0000148	0.0000079	0.0000127	0.0000092	0.0000050	< 0.0000050	0.0000206	< 0.0000050	< 0.0000050	0.0000135
Calcium	mg/L	-	49.5	61.2	61.0	66.1	63.9	48.3	40.0	47.0	37.3	32.7	63.5	75.2
Chromium	mg/L	-	0.00221	0.00161	0.00111	0.00090	0.00109	0.00074	< 0.00050	< 0.00050	0.00118	< 0.00050	0.00059	0.00130
Copper	mg/L	-	0.0032	0.0033	0.0021	0.0019	0.0020	0.0012	0.0019	0.0020	0.0026	0.0016	0.0039	0.0020
Iron	mg/L	-	1.93	1.36	0.709	< 0.050	0.555	0.209	0.127	0.045	0.597	< 0.010	< 0.010	1.06
Lead	mg/L	-	0.00118	0.000945	0.000400	0.000235	0.000309	0.000167	0.000095	0.000070	0.000385	< 0.000050	0.000073	0.00102
Magnesium	mg/L	-	25.8	37.7	35.7	40.4	39.6	32.3	28.6	30.7	34.6	50.0	48.4	46.6
Mercury (dissolved)	mg/L	-	< 0.000010	< 0.000010	< 0.000010	< 0.000010	< 0.000010	< 0.0000050	< 0.0000050	0.0000054	< 0.0000050	< 0.0000050	< 0.0000050	< 0.0000050
Zinc	mg/L	-	0.0088	0.0053	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	0.0042
Volatile Organic Compounds														
Ethylbenzene	ug/L	-	< 0.50	< 0.50	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo(a)pyrene	ug/L	-	< 0.0050	< 0.010	-	-	-	< 0.0050	< 0.010	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Naphthalene	ug/L	-	0.032	< 0.050	-	-	-	< 0.020	< 0.050	< 0.020	< 0.020	< 0.020	0.021	0.027

Notes:

(1)

-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 5.10

Summary of SWMS Pond Analytical Results
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SWMS-POND	SWMS-POND	SWMS-POND
Sample ID:			POND-18235-0521-DD-011	POND-18235-0821-DD-001	POND-18235-1121-BK-SWMS
Sample Date:			6/1/2021	8/31/2021	11/12/2021
Parameters	**Units**	**ECA[1]**			
Field Parameters					
Conductivity, field	uS/cm	-	NA	721	606
Dissolved oxygen (DO), field	mg/L	-	NA	5.15	10.18
Oxidation reduction potential (ORP), field	millivolts	-	NA	207	190
pH, field	s.u.	6.5-8.5	NA	6.97	6.32
Temperature, field	Deg C	-	NA	24.90	13.54
Turbidity, field	NTU	-	NA	98.9	23.4
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	77.2	131	73.8
Ammonia-N	mg/L	-	< 0.010	0.021	0.015
Biochemical oxygen demand (BOD)	mg/L	-	< 3.0	2.9	< 3.0
Chemical oxygen demand (COD)	mg/L	-	27	28	16
Chloride	mg/L	-	30.6	27.1	13.7
Conductivity	uS/cm	-	860	666	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	11.5	-	4.98
Hardness	mg/L	-	-	286	-
Nitrate (as N)	mg/L	-	< 0.020	< 0.020	< 0.020
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010
Nitrite/Nitrate	mg/L	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.87	8.17	8.28
Phenolics (total)	mg/L	-	0.0082	0.0014	< 0.0010
Phosphorus	mg/L	-	0.0215	0.0685	0.0241
Sulfate	mg/L	-	304	192	152
Total dissolved solids (TDS)	mg/L	-	633	489	301
Total kjeldahl nitrogen (TKN)	mg/L	-	0.590	0.819	0.380
Total suspended solids (TSS)	mg/L	-	8.7	26.7	9.8
Trihalomethanes	mg/L	-	-	-	-
Un-ionized ammonia	mg/L	0.02	<0.00057	0.00161	0.00067
Xylenes (total)	mg/L	-	-	-	-
Metals					
Arsenic	mg/L	0.005	0.00322	0.0045	0.00079
Barium	mg/L	-	0.00960	0.0548	0.0171
Boron	mg/L	0.2	-	-	-
Boron	mg/L	1.5	0.249	0.21	0.114
Cadmium	mg/L	-	< 0.0000050	< 0.000050	< 0.0000050
Calcium	mg/L	-	51.8	56.6	40.1
Chromium	mg/L	-	< 0.00050	< 0.0050	0.00075
Copper	mg/L	-	0.0051	< 0.0050	0.0019
Iron	mg/L	-	0.022	1.02	0.472
Lead	mg/L	-	0.000169	0.00133	0.000359
Magnesium	mg/L	-	61.8	35.0	25.7
Mercury (dissolved)	mg/L	-	< 0.0000050	< 0.0000050	< 0.0000050
Zinc	mg/L	-	0.0032	< 0.030	< 0.0030
Volatile Organic Compounds					
Ethylbenzene	ug/L	-	< 0.50	< 0.50	< 0.50
Benzo(a)pyrene	ug/L	-	< 0.0050	< 0.0050	< 0.0050
Naphthalene	ug/L	-	< 0.020	< 0.020	< 0.020

Notes:

(1)

-	No Value/Not Analyzed.
J	The result is an estimated value.
R	Rejected.
0.054	Does not meet the applicable PWQO criteria.
< 0.10	Method detection limit does not meet PWQO criteria.
< 0.20	Result below method detection limit.

Table 6.1

Groundwater Trigger and Assessment Criteria - Shallow Overburden Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Shallow Overburden Unit

Groundwater Trigger Parameter[1]	Average Median Background Level[2,4]	Maximum Leachate Level[3]	ODWS Characterization[5]	ODWS / Table 2[5]	Maximum Leachate Level to Average Median Background Level Ratio	Maximum Leachate Level to ODWS Ratio	RUC Criteria	Trigger Level
General Chemistry								
Chloride (Cl)	36.9	1440	NHR	250	39.0	5.8	143	122
Metals								
Boron (B)	0.073	16	HR	5.0	220	3.2	1.31	1.11
Chromium (Cr)	0.0010	0.21	HR	0.05	210	4.2	0.013	0.011
Lead (Pb)	0.0001	0.009	HR	0.010	95.1	0.9	0.0026	0.0022
PAHs[6]								
Naphthalene	0.000	14	NV	11	NV	1.3	5.5	4.7
Phenanthrene	0.000	4.0	NV	1	NV	4.0	0.5	0.43
Pyrene	0.000	4.0	NV	4.1	NV	1.0	2.1	1.7
Benzo(a)pyrene	0.0000	0.09	HR	0.01	NV	8.5	0.0025	0.0021
VOCs[6]								
Benzene	0.00	4.3	HR	1	NV	4.3	0.25	0.21
Ethylbenzene	0.00	12	NHR	1.6	NV	7.2	0.8	0.68
Toluene	0.00	41	NHR	60	NV	0.7	30	25.5

Notes:

(1) General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
(2) Average median background concentrations are based on groundwater quality reported at wells MW1B-01, MW1B-07, MW1B-13, OW3B-85, OW3B-07, OW3B-13, OW9B-92, and OW9B-06 between 2004 and 2020.
(3) Highest reported concentration in current landfill leachate between (2010 and 2020).
(4) Where a parameter was analyzed for but was not detected at or above the Method Detection Limit, a value of 1/2 of the lowest MDL was assumed.
(5) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, as amended, prepared by the MECP. Where no ODWS criteria exists, the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act, dated April 15, 2011.
(6) A value of zero was used to calculate the RUC for PAHs and VOCs, as recommended by the MECP.
NV No value.
HR Health Related Parameters.
NHR Non Health Related Parameters.
RUC Reasonable Use Criteria.
RUC for NHR Parameters = (ODWS - Average Background Level) x 0.5 + Average Background Level.
RUC for HR Parameters = (ODWS - Average Background Level) x 0.25 + Average Background Level.
Concentration exceeds ODWS and RUC.

Groundwater Trigger and Assessment Criteria - Basal Overburden/Shallow Bedrock Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Basal Overburden/Shallow Bedrock Unit

Groundwater Trigger Parameter[1]	Average Median Background Level[2,4]	Maximum Leachate Level[3]	ODWS Characterization[5]	ODWS / Table 2[5]	Maximum Leachate Level to Average Median Background Level Ratio	Maximum Leachate Level to ODWS Ratio	RUC Criteria	Trigger Level
General Chemistry								
Chloride (Cl)	15.7	1440	NHR	250	92	5.8	133	113
Metals								
Boron (B)	0.527	16	HR	5.0	31	3.2	1.65	1.40
Chromium (Cr)	0.006	0.21	HR	0.05	35	4.2	0.017	0.014
Lead (Pb)	0.0003	0.009	HR	0.010	35.2	0.9	0.0027	0.0023
PAHs[6]								
Naphthalene	0.000	14	NV	11	NV	1.3	5.5	4.7
Phenanthrene	0.000	4.0	NV	1	NV	4.0	0.5	0.43
Pyrene	0.000	4.0	NV	4.1	NV	1.0	2.1	1.7
Benzo(a)pyrene	0.000	0.09	HR	0.01	NV	8.5	0.0025	0.0021
VOCs[6]								
Benzene	0.000	4.3	HR	1	NV	4.3	0.25	0.21
Ethylbenzene	0.000	12	NHR	1.6	NV	7.2	0.8	0.68
Toluene	0.000	41	NHR	60	NV	0.7	30	25.5

Notes:

(1) General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
(2) Average median background concentrations are based on groundwater quality reported at wells MW1A-01, MW1A-07, MW1A-13, OW3A-85, OW3A-07, OW3A-13 and OW9A-06 between 2004 and 2020.
(3) Highest reported concentration in current landfill leachate between 2010 and 2020.
(4) Where a parameter was analyzed for but was not detected at or above the Method Detection Limit, a value of 1/2 of the lowest MDL was assumed.
(5) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, as amended, prepared by the MECP. Where no ODWS criteria exists, the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act, dated April 15, 2011.
(6) A value of zero was used to calculate the RUC for PAHs and VOCs.
NV No value
HR Health Related Parameters
NHR Non Health Related Parameters
RUC Reasonable Use Criteria
RUC for NHR Parameters = (ODWS - Average Background Level) x 0.5 + Average Background Level
RUC for HR Parameters = (ODWS - Average Background Level) x 0.25 + Average Background Level
Concentration exceeds ODWS and RUC.

Table 6.3A

Summary of RUC Groundwater Assessment - Boundary and Downgradient Wells
Shallow Overburden Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

		Southern Portion of Site							
	RUC	OW1B-06		OW8B-06		MW11B-19		MW12B-19	
	(Trigger Level)	2-Jun-21	8-Nov-21	2-Jun-21	10-Nov-21	2-Jun-21	8-Nov-21	2-Jun-21	8-Nov-21
General Chemistry									
Chloride (Cl)	*122*	39	40	228	184	30	24	--	DRY
Metals									
Boron (B)	*1.11*	< 0.10	0.11	0.80	1.23	0.43	0.42	--	DRY
Chromium (Cr)	*0.011*	<0.0050	--	<0.0050	--	<0.0050	--	--	DRY
Lead (Pb)	*0.0022*	<0.00050	--	< 0.00050	--	<0.00050	--	--	DRY
PAHs									
Naphthalene	*4.7*	< 0.050	--	< 0.050	--	< 0.050	--	--	DRY
Phenanthrene	*0.43*	< 0.020	--	0.032	--	< 0.020	--	--	DRY
Pyrene	*1.7*	< 0.020	--	0.11	--	< 0.020	--	--	DRY
Benzo(a)pyrene	*0.0021*	**< 0.010**	--	0.057	--	< 0.010	--	--	DRY
VOCs									
Benzene	*0.21*	<0.50	--	<0.50	--	<0.50	--	--	DRY
Ethylbenzene	*0.68*	<0.50	--	<0.50	--	<0.50	--	--	DRY
Toluene	*25.5*	< 0.40	--	< 0.40	--	<0.40	--	--	DRY

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
	Concentration exceeds RUC.
--	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled
< 0.10	Method detection limit does not meet criteria.

Summary of RUC Groundwater Assessment - Boundary and Downgradient Wells
Shallow Overburden Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

		Eastern Portion of Site		Western Portion of Site	
	RUC	MW2B-07		MW10B-18	
	(Trigger Level)	2-Jun-21	10-Nov-21	3-Jun-21	12-Nov-21
General Chemistry					
Chloride (Cl)	*122*	32	DRY	37.6	47.2
Metals					
Boron (B)	*1.11*	< 0.10	DRY	< 0.10	0.043
Chromium (Cr)	*0.011*	< 0.0050	DRY	<0.0050	--
Lead (Pb)	*0.0022*	< 0.00050	DRY	< 0.00050	--
PAHs					
Naphthalene	*4.7*	< 0.050	DRY	< 0.050	--
Phenanthrene	*0.4*	0.032	DRY	< 0.020	--
Pyrene	*1.7*	0.061	DRY	< 0.020	--
Benzo(a)pyrene	*0.0021*	0.022	DRY	< 0.010	--
VOCs					
Benzene	*0.2*	<0.50	DRY	<0.50	--
Ethylbenzene	*0.7*	<0.50	DRY	<0.50	--
Toluene	*25.5*	< 0.40	DRY	<0.40	--

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
	Concentration exceeds RUC.
--	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.3B

Summary of RUC Groundwater Assessment - Upgradient/Background Wells
Shallow Overburden Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

		MW1B-13														
	Ontario Drinking Water Standards[1]	**17-May-2017 GW-18235-007**	**26-Jul-2017 GW-18235-010**	**1-Dec-2017 GW-18235-005/006**	**30-May-2018 GW-18235-008**	**12-Jul-2018 GW-18235-008**	**8-Nov-2018 GW-18235-007**	**30-May-2019 GW-18235-006**	**28-Nov-2019 GW-18235-022**	**22-May-2020 GW-18235-0520-DD-008**	**23-Nov-2020 GW-18235-1120-HM-018**	**2-Jun-2021 GW-18235-0521-DD-015**	**9-Nov-2021 GW-18235-1121-BK-012**	**Median or Half of MDL Concentration**	**Average Median Background Level**	**ODWS/ Table 2 [2]**	**RUC (Trigger Level)**
General Chemistry																	
Chloride (Cl)	*250*	52.3	59.2	43.3	52.3	59.2	43.3	51.2	58.9	56.1	57.4	55	55.9	65.5	36.92	250	122
Metals																	
Boron (B)	*5*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	< 0.10	< 0.10	0.1	0.073	5	1.11
Chromium (Cr)	*0.05*	-	<0.005	-	-	<0.005	-	<0.005	-	<0.0050	-	< 0.0050	-	0.0	0.0010	0.05	0.011
Lead (Pb)	*0.01*	-	<0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	-	< 0.00050	-	0.0	0.0001	0.01	0.0022
PAHs																	
Naphthalene [2]	*11*	-	<0.050	-	-	<0.050	-	<0.050	-	<0.050	-	< 0.050	-	0.000	0.000	11	4.7
Phenanthrene [2]	*1*	-	<0.020	-	-	<0.020	-	<0.020	-	0.025	-	0.043	-	0.000	0.000	1	0.4
Pyrene [2]	*4.1*	-	<0.020	-	-	<0.020	-	<0.020	-	0.022	-	0.036	-	0.000	0.000	4.1	1.7
Benzo(a)pyrene	*0.01*	-	<0.010	-	-	<0.010	-	<0.010	-	<0.010	-	< 0.010	-	0.000	0.000	0.01	0.0021
VOCs																	
Benzene	*5*	-	<0.50	-	-	<0.50	-	<0.50	-	<0.50	-	< 0.50	-	0.00	0.000	5	0.21
Ethylbenzene	*2.4*	-	<0.50	-	-	<0.50	-	<0.50	-	<0.50	-	< 0.50	-	0.00	0.000	2.4	0.68
Toluene	*24*	-	<0.50	-	-	<0.50	-	<0.50	-	<0.50	-	< 0.40	-	0.00	0.000	24	25.5

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
(2)	Where no ODWS exists, the generation of the RUC values were developed using Table 2 of the Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011
<0.001	The parameter was not detected at or above the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
	Concetration exceeds ODWS
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.3B

Summary of RUC Groundwater Assessment - Upgradient/Background Wells
Shallow Overburden Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

	Ontario Drinking Water Standards[1]	OW3B-13											Median or Half of MDL Concentration	Average Median Background Level	ODWS/ Table 2 [2]	RUC (Trigger Level)
		17-May-2017 GW-18235-009	26-Jul-2017 GW-18235-0717-DD-012	1-Dec-2017 GW-18235-008	30-May-2018 GW-18235-010	12-Jul-2018 GW-18235-010	8-Nov-2018 GW-18235-010	30-May-2019 GW-18235-004	28-Nov-2019 GW-18235-009	22-May-20 GW-18235-0520-DD-010	25-Nov-20 GW-18235-1120-HM-028	2-Jun-21 GW-18235-0521-DD-018**	9-Nov-21 GW-18235-1121-BK-014				
General Chemistry																
Chloride (Cl)	*250*	5.0	3.26	4.3	2.85	4.07	2.85	1.63	3.3	1.68	4.1	2.03	< 2.5	3.3	36.92	250	122
Metals																	
Boron (B)	*5*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.048	<0.10	< 0.10	< 0.10	0.1	0.073	5	1.11
Chromium (Cr)	*0.05*	-	<0.0005	-	-	<0.0005	-	<0.0005	-	<0.00050	-	< 0.0050	-	0.0	0.0010	0.05	0.011
Lead (Pb)	*0.01*	-	<0.00001	-	-	<0.00001	-	<0.00001	-	<0.000050	-	< 0.00050	-	0.0	0.0001	0.01	0.0022
PAHs																	
Naphthalene [2]	*11*	--	<0.050	--	--	<0.050	--	<0.050	--	<0.050	-	< 0.050	-	0.000	0.000	11	4.7
Phenanthrene [2]	*1*	--	<0.020	--	--	<0.020	--	<0.020	--	<0.020	-	< 0.020	-	0.000	0.000	1	0.4
Pyrene [2]	*4.1*	--	<0.020	--	--	<0.020	--	<0.020	--	<0.020	-	0.022	-	0.000	0.000	4.1	1.7
Benzo(a)pyrene	*0.01*	--	**0.012**	--	--	<0.010	--	<0.010	--	<0.010	-	< 0.010	-	0.000	0.000	0.01	0.0021
VOCs																	
Benzene	*5*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	-	< 0.50	-	0.00	0.000	5	0.21
Ethylbenzene	*2.4*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	-	< 0.50	-	0.00	0.000	2.4	0.68
Toluene	*24*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	-	< 0.40	-	0.00	0.000	24	25.5

Notes:

(1) General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.

(2) Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011

<0.001	The parameter was not detected at or above the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
	Concetration exceeds ODWS
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.3B

Summary of RUC Groundwater Assessment - Upgradient/Background Wells
Shallow Overburden Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

	Ontario Drinking Water Standards[1]	OW9B-06												Median or Half of MDL Concentration	Average Median Background Level	ODWS/ Table 2 [2]	RUC (Trigger Level)
		17-May-2017 GW-18235-011	26-Jul-2017 GW-18235-014	1-Dec-2017 GW-18235-010	30-May-2018 GW-18235-012	12-Jul-2018 GW-18235-013	8-Nov-2018 GW-18235-012	30-May-2019 GW-18235-004	28-Nov-2019 GW-18235-009	22-May-20 GW-18235-0520-DD-012	25-Nov-20 GW-18235-1120-HM-025	2-Jun-21 GW-18235-0521-DD-003	8-Nov-21 GW-18235-1121-BK-001				
General Chemistry																	
Chloride (Cl)	*250*	36.8	42	51.5	41.9	40.6	44.4	43.4	45.0	42.0	40.7	41.8	42.6	42	36.92	250	122
Metals																	
Boron (B)	*5*	0.13	0.13	0.11	0.12	0.11	0.16	0.11	0.12	0.12	0.13	0.12	0.12	0.12	0.073	5	1.11
Chromium (Cr)	*0.05*	-	<0.00050	-	-	<0.00050	-	<0.00050	-	<0.0050	-	< 0.0050	-	0.00025	0.0010	0.05	0.011
Lead (Pb)	*0.01*	-	<0.00005	-	-	<0.00005	-	<0.00005	-	<0.00050	-	< 0.00050	-	0.000025	0.0001	0.01	0.0022
PAHs																	
Naphthalene [2]	*11*	--	<0.050	--	--	<0.050	--	<0.050	--	<0.050	-	< 0.050	-	0.000	0.000	21	4.7
Phenanthrene [2]	*1*	--	<0.020	--	--	<0.020	--	<0.020	--	<0.020	-	< 0.020	-	0.000	0.000	63	0.4
Pyrene [2]	*4.1*	--	<0.020	--	--	<0.020	--	<0.020	--	<0.020	-	< 0.020	-	0.000	0.000	40	1.7
Benzo(a)pyrene	*0.01*	--	<0.010	--	--	<0.010	--	<0.010	--	<0.010	-	< 0.010	-	0.000	0.000	0.01	0.0021
VOCs																	
Benzene	*5*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	-	< 0.50	-	0.00	0.000	5	0.21
Ethylbenzene	*2.4*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	-	< 0.50	-	0.00	0.000	2.4	0.68
Toluene	*24*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	-	< 0.40	-	0.00	0.000	24	25.5

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
(2)	Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011
<0.001	The parameter was not detected at or above the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
	Concetration exceeds ODWS
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.4A

Summary of RUC Assessment - Boundary And Downgradient Wells
Basal Overburden/Shallow Bedrock Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

		Southern Portion of Site							
	RUC	OW1A-06		OW8A-06		MW11A-19		MW12A-19	
	(Trigger Level)	2-Jun-21	8-Nov-21	2-Jun-21	10-Nov-21	1-Jun-21	8-Nov-21	1-Jun-21	10-Nov-21
General Chemistry									
Chloride (Cl)	*113*	14	10.2	11.3/12.4	11.0	14.5	12.6	--	13.4
Metals									
Boron (B)	*1.40*	0.61	0.58	0.57/0.56	0.53	0.61	0.6	--	0.50
Chromium (Cr)	*0.014*	<0.0050	--	<0.0050/<0.0050	--	<0.0050	--	--	--
Lead (Pb)	*0.0023*	<0.00050	--	<0.00050/<0.00050	--	<0.00050	--	--	--
PAHs									
Naphthalene	*4.7*	< 0.050	--	< 0.050	--	< 0.050	--	--	--
Phenanthrene	*0.4*	< 0.020	--	< 0.020	--	< 0.020	--	--	--
Pyrene	*1.7*	< 0.020	--	< 0.020	--	< 0.020	--	--	--
Benzo(a)pyrene	*0.0021*	< 0.010	--	< 0.010	--	< 0.010	--	--	--
VOCs									
Benzene	*0.2*	< 0.50	--	< 0.50	--	< 0.50	--	--	--
Ethylbenzene	*0.7*	< 0.50	--	< 0.50	--	< 0.50	--	--	--
Toluene	*25.5*	< 0.40	--	< 0.40	--	< 0.40	--	--	--

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
	Concentration exceeds RUC.
--	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.4A

Summary of RUC Assessment - Boundary And Downgradient Wells
Basal Overburden/Shallow Bedrock Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

		Eastern Portion of Site		Western Portion of Site	
	RUC	MW2A-01		MW10A-18	
	(Trigger Level)	2-Jun-21	10-Nov-21	3-Jun-21	9-Nov-21
General Chemistry					
Chloride (Cl)	*113*	12.2	11.4	12.3	9.7
Metals					
Boron (B)	*1.40*	0.51	0.5	0.58	0.53
Chromium (Cr)	*0.014*	<0.0050	--	<0.0050	--
Lead (Pb)	*0.0023*	<0.00050	--	<0.00050	--
PAHs					
Naphthalene	*4.7*	< 0.050	--	<0.050	--
Phenanthrene	*0.4*	< 0.020	--	0.077	--
Pyrene	*1.7*	< 0.020	--	0.032	--
Benzo(a)pyrene	*0.0021*	< 0.010	--	< 0.010	--
VOCs					
Benzene	*0.2*	< 0.50	--	< 0.50	--
Ethylbenzene	*0.7*	< 0.50	--	< 0.50	--
Toluene	*25.5*	< 0.40	--	< 0.40	--

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
	Concentration exceeds RUC.
--	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.4B

Summary of RUC Groundwater Assessment - Upgradient/Background Wells
Basal Overburden/Shallow Bedrock Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

		MW1A-13														
	Ontario Drinking Water Standards[1]	17-May-2017 GW-18235-006	26-Jul-2017 GW-18235-009	1-Dec-2017 GW-18235-004	30-May-2018 GW-18235-007	12-Jul-2018 GW-18235-007	8-Nov-2018 GW-18235-006	30-May-2019 GW-18235-005	28-Nov-2019 GW-18235-007	22-May-20 GW-18235-0520-DD-007	23-Nov-20 GW-18235-1120-HM-019	6/2/2021 GW-18235-0521-DD-012 6/2/2021	11/9/2021 GW-18235-1121-BK-010 11/9/2021	Median or Half of MDL Concentration	Average Median Background Level	ODWS/ Table 2 [2]	RUC (Trigger Level)
General Chemistry																	
Chloride (Cl)	*250*	24	20.9	25	26.3	24.8	24.8	23.0	32	20.4	23.0	22.40	18.90	24.8	15.7	250	133
Metals																	
Boron (B)	*5*	0.63	0.69	0.58	0.28	0.65	0.67	0.69	0.66	0.64	0.65	0.68	0.65	0.7	0.527	5	1.65
Chromium (Cr)	*0.05*	-	<0.005	-	-	<0.005	-	<0.005	-	<0.0050	-	< 0.0050	-	0.0025	0.0061	0.05	0.017
Lead (Pb)	*0.01*	-	<0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	-	< 0.00050	-	0.00025	0.0003	0.01	0.0027
PAHs																	
Naphthalene [2]	*11*	-	<0.050	-	-	<0.050	-	<0.050	-	<0.050	--	< 0.050	--	0.000	0.000	11	5.5
Phenanthrene [2]	*1*	-	<0.020	-	-	<0.020	-	0.042	-	<0.020	--	< 0.020	--	0.000	0.000	1	0.50
Pyrene [2]	*4.1*	-	<0.020	-	-	<0.020	-	0.06	-	0.038	--	< 0.020	--	0.000	0.000	4.1	2.1
Benzo(a)pyrene	*0.01*	-	<0.010	-	-	<0.010	-	<0.010	-	<0.010	--	< 0.010	--	0.000	0.000	0.01	0.0025
VOCs																	
Benzene	*5*	-	<0.50	-	-	<0.50	-	<0.50	-	<0.50	--	< 0.50	--	0.00	0.000	5	0.25
Ethylbenzene	*2.4*	-	<0.50	-	-	<0.50	-	<0.50	-	<0.50	--	< 0.50	--	0.00	0.000	2.4	0.80
Toluene	*24*	-	<0.50	-	-	<0.50	-	<0.50	-	<0.50	--	< 0.40	--	0.00	0.000	24	30.0

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
(2)	Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011
<0.001	The parameter was not detected at or above the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
	Concetration exceeds ODWS
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.4B

Summary of RUC Groundwater Assessment - Upgradient/Background Wells
Basal Overburden/Shallow Bedrock Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

		OW3A-13														
	Ontario Drinking Water Standards[1]	17-May-2017 GW-18235-008	26-Jul-2017 GW-18235-011	1-Dec-2017 GW-18235-007	30-May-2018 GW-18235-009	12-Jul-2018 GW-18235-009	8-Nov-2018 GW-18235-008	30-May-2019 GW-18235-003	28-Nov-2019 GW-18235-021	22-May-20 GW-18235-0520-DD-009	24-Nov-20 GW-18235-1120-HM-027	6/2/2021 GW-18235-0521-DD-017**	11/9/2021 GW-18235-1121-BK-013	Median or Half of MDL Concentration	Average Median Background Level	ODWS/ Table 2 [2]	RUC (Trigger Level)
General Chemistry																	
Chloride (Cl)	*250*	7.1	11.0	10.5	11.8	10	11.2	8.85	5.0	8.8	10.7	11.4	7.5	10.3	15.7	250	133
Metals																	
Boron (B)	*5*	0.25	0.41	0.45	0.49	0.46	0.35	0.44	0.13	0.43	0.52	0.50	0.41	0.435	0.527	5	1.65
Chromium (Cr)	*0.05*	-	<0.0050	-	-	<0.0050	-	<0.0050	-	<0.0050	-	< 0.0050	-	0.003	0.0061	0.05	0.017
Lead (Pb)	*0.01*	-	<0.00050	-	-	<0.00050	-	<0.00050	-	0.00103	-	0.00072	-	0.00025	0.0003	0.01	0.0027
PAHs																	
Naphthalene [2]	*11*	--	<0.050	--	--	<0.050	--	<0.050	--	<0.050	--	< 0.050	--	0.000	0.0000	11	5.5
Phenanthrene [2]	*1*	--	<0.020	--	--	<0.020	--	<0.020	--	<0.020	--	< 0.020	--	0.000	0.0000	1	0.50
Pyrene [2]	*4.1*	--	<0.020	--	--	<0.020	--	<0.020	--	<0.020	--	< 0.020	--	0.000	0.0000	4.1	2.1
Benzo(a)pyrene	*0.01*	--	<0.010	--	--	<0.010	--	<0.010	--	<0.010	--	< 0.010	--	0.000	0.0000	0.01	0.0025
VOCs																	
Benzene	*5*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	--	< 0.50	--	0.00	0.0000	5	0.25
Ethylbenzene	*2.4*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	--	< 0.50	--	0.00	0.0000	2.4	0.80
Toluene	*24*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	--	< 0.40	--	0.00	0.0000	24	30.0

Notes:

(1) General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.

(2) Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011

<0.001	The parameter was not detected at or above the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
	Concetration exceeds ODWS
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was not detected above the reported sample quantitation limit.
NS	Not sampled

Table 6.4B

Summary of RUC Groundwater Assessment - Upgradient/Background Wells
Basal Overburden/Shallow Bedrock Unit
2021 Operations and Monitoring Report
Brooks Road Landfill Site

		OW9A-06														
	Ontario Drinking Water Standards[1]	17-May-2017 GW-18235-010	26-Jul-2017 GW-18235-013	1-Dec-2017 GW-18235-009	30-May-2018 GW-18235-011	12-Jul-2018 GW-18235-011/012	8-Nov-2018 GW-18235-010/011	30-May-2019 GW-18235-003	28-Nov-2019 GW-18235-021	22-May-20 GW-18235-0520-DD-011	24-Nov-20 GW-18235-1120-HM-029	6/2/2021 GW-18235-0521-DD-001	11/8/2021 GW-18235-1121-BK-002	Median or Half of MDL Concentration	Average Median Background Level	ODWS/ Table 2 [2]	RUC (Trigger Level)
General Chemistry																	
Chloride (Cl)	*250*	10.9	10.1	11.0	12.4	12.4	12.9	11.1	12.0	12.2	13.0	11.8	11.1	12.1	15.7	250	133
Metals																	
Boron (B)	*5*	0.5	0.49	0.42	0.5	0.46	0.59	0.48	0.47	0.52	0.50	0.55	0.51	0.49500	0.53	5.00	1.65
Chromium (Cr)	*0.05*	-	< 0.0050	-	-	0.0142 J	-	<0.0050	-	<0.0050	-	< 0.0050	-	0.00960	0.01	0.05	0.02
Lead (Pb)	*0.01*	-	< 0.00050	-	-	< 0.00050	-	<0.00050	-	<0.00050	-	< 0.00050	-	0.00025	0.00	0.01	0.00
PAHs																	
Naphthalene [2]	*11*	--	<0.050	--	--	<0.050	--	<0.050	--	<0.050	--	< 0.050	--	0.00	0.00	21.00	5.50
Phenanthrene [2]	*1*	--	<0.020	--	--	<0.020	--	0.030	--	<0.020	--	< 0.020	--	0.00	0.00	63.00	0.50
Pyrene [2]	*4.1*	--	<0.020	--	--	<0.020	--	<0.020	--	<0.020	--	< 0.020	--	0.00	0.00	40.00	2.05
Benzo(a)pyrene	*0.01*	--	<0.010	--	--	<0.010	--	<0.010	--	<0.010	--	< 0.010	--	0.00	0.00	0.01	0.00
VOCs																	
Benzene	*5*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	--	< 0.50	--	0.00	0.00	5.00	0.25
Ethylbenzene	*2.4*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	--	< 0.50	--	0.00	0.00	2.40	0.80
Toluene	*24*	--	<0.50	--	--	<0.50	--	<0.50	--	<0.50	--	< 0.50	--	0.00	0.00	24.00	30.00

Notes:

(1)	General chemistry and metals results are expressed in mg/L and PAH and VOC results are expressed in µg/L.
(2)	Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Ground Water and Sediment Standards for Use under Part XV.I of the Environmental Protection Act, dated April 15, 2011
<0.001	The parameter was not detected at or above the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
	Concetration exceeds ODWS
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was not detected above the reported sample quantitation limit.
NS	Not sampled

Table 9.1

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
1. GENERAL		
Compliance		
(1) This Approval revokes all previous Approvals and Notices of Amendment issued under Part V of the Environmental Protection Act for this Site. The approval given herein, including the terms and conditions set out, replaces all previously issued Approvals and related terms and conditions under Part V of the Act for this Site.	Acknowledged	
(2) The Owner and Operator shall ensure compliance with all the conditions of this Approval and shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.	Acknowledged	
(3) Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Approval.	Acknowledged	
In Accordance		
(4) Except as otherwise provided by this Approval, the Site shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule "A".	Acknowledged	
(5) 1. Construction and installation of aspects described in Schedule "A" must be completed within 5 years of the later of:		
(a) the date this Approval is issued; or	Complete	
(b) if there is a hearing or other litigation in respect of the issuance of this Approval, the date that this hearing or litigation is disposed of, including all appeals.		
2. This Approval ceases to apply in respect of the aspects of the Site noted above that have not been constructed or installed before the later of the dates identified in Condition 1(5)1.		
Interpretation		
(6) Where there is a conflict between a provision of any document listed in Schedule "A" in this Approval, and the conditions of this Approval, the conditions in this Approval shall take precedence.	Acknowledged	
(7) Where there is a conflict between the application and a provision in any document listed in Schedule A, the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and the Ministry approved the amendment.	Acknowledged	
(8) Where there is a conflict between any two documents listed in Schedule "A", the document bearing the most recent date shall take precedence.	Acknowledged	
(9) The conditions of this Approval are severable. If any condition of this Approval, or the application of any condition of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.	Acknowledged	
Other Legal Obligations		
(10) The issuance of, and compliance with, this Approval does not:		
(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; and	Acknowledged	
(b) limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner and Operator to furnish any further information related to compliance with this Approval.		
Adverse Effect		
(11) The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the present, past and historical operations at the Site. Such steps may include accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.	Acknowledged	
(12) Despite an Owner, Operator, or any other person fulfilling any obligations imposed by this Approval, the person remains responsible for any contravention of any other condition of this Approval or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.	Acknowledged	
(13) At no time shall the Owner or Operator allow the discharge of a contaminant that causes or is likely to cause an adverse effect.	Acknowledged	
Change of Ownership		
(14) The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:		
(a) the ownership of the Site;		
(b) the Operator of the Site;	Acknowledged	
(c) the address of the Owner or Operator; and		
(d) the partners, where the Owner or Operator is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R. S. O. 1990, c. B.17, shall be included in the notification.		
(15) No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.	Acknowledged	
(16) In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Approval, and the Owner shall provide a copy of the notification to the District Manager and the Director.	Acknowledged	
Registration on Title Requirement		
(17) Prior to dealing with the property in any way, the Owner shall provide a copy of this Approval and any amendments, to any person who acquires an interest in the property as a result of the dealing.	Acknowledged	
(18) (a) If not already completed, within ninety (90) calendar days from the date of issuance of this Approval, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:		
(i) a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the Site where waste has been and is to be deposited at the Site;		
(ii) proof of ownership of the Site;		A letter addressed to Taylor Buck of the MECP, dated January 8, 2021, requested concurrence on an updated Certificate of Requirement to be filed as an update to the Certificate of Requirement already on title.
(iii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director, verifying the legal description provided in the Certificate of Requirement;		
(iv) the legal abstract of the property; and	Acknowledged	
(v) any supporting documents including a registerable description of the Site.		
(b) If not already completed, within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the Director, the Owner shall:		
(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and		
(ii) submit to the Director and the District Manager, written verification that the Certificate of Requirement has been registered on title.		

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
Registration on Title Requirement - Contaminant Attenuation Zone (CAZ)		
(19) Within thirty (30) calendar days from the date of establishing a contaminant attenuation zone (CAZ) (overburden and/or bedrock aquifers) in either fee simple or by way of a groundwater easement, the Owner shall submit to the Director a completed Certificate of Requirement which shall include: (a) If rights are obtained in fee simple, the Owner shall provide: (i) documentation evidencing ownership of the CAZ obtained in compliance with Regulation 232, as amended; (ii) a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and (iii) a letter signed by a member of the Law Society of Upper Canada; or other qualified legal practitioner acceptable to the Director, verifying the legal description of the CAZ. (b) within fifteen (15) calendar days of receiving a Certificate of Requirement signed or authorized by the Director,the Owner shall: (i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and (ii) submit to the Director and the District Manager, a written verification that the Certificate of Requirement has been registered on title. (c) If rights are obtained by way of a groundwater easement, the Applicant shall: (i) provide a copy of the agreement for the easement; (ii) provide a plan of survey signed and sealed by an Ontario Land Surveyor for the CAZ; and (iii) submit proof of registration on title of the groundwater easement to the Director and District Manager; (d) The Owner shall not amend, or remove, or consent to the removal of the easement or CAZ from title without the prior written consent of the Director.	Acknowledged	
Inspections by the Ministry		
(20) No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the OWRA, the EPA, the PA, the SDWA or the NMA, of any place to which this Approval relates, and without limiting the foregoing: (a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept; (b) to have access to, inspect, and copy any records required to be kept by the conditions of this Approval; (c) to inspect the Site, related equipment and appurtenances; (d) to inspect the practices, procedures, or operations required by the conditions of this Approval; and (e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the EPA, the OWRA, the PA, the SDWA or the NMA.	Acknowledged	
Information and Record Retention		
(21) (a) Except as authorized in writing by the Director, all records required by this Approval shall be retained at the Site for a minimum of two (2) years from their date of creation. (b) The Owner shall retain all documentation listed in Schedule "A" for as long as this Approval is valid. (c) All information and logs required in Conditions 9(1), 10(1), 11(3), 11(4), 12(3), and 12(4) shall be kept at the Site until they are included in the Annual Report. (d) The Owner shall retain employee training records as long as the employee is working at the Site. (e) The Owner shall make all of the above documents available for inspection upon request of Ministry staff.	Acknowledged	
(22) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action under this Approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as: (a) an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Approval or any statute, regulation or other legal requirement; or (b) acceptance by the Ministry of the information's completeness or accuracy.	Acknowledged	
(23) The Owner shall ensure that a copy of this Approval, in its entirety and including all its Notices of Amendment, and documentation listed in Schedule "A", are retained at the Site at all times.	Acknowledged	
(24) Any information related to this Approval and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.	Acknowledged	
2. FINANCIAL ASSURANCE		
(1) (a) Within twenty (20) days of issuance of this Notice, the Owner shall submit to the Director, Financial Assurance as defined in Section 131 of the Environmental Protection Act, in the amount of $8,371,282.00. This Financial Assurance shall provide sufficient funds for the closure and post-closure care/monitoring of the Site. (i) The total amount of financial assurance specified in Condition 2(1)(a) shall be updated by the Owner, as follows, by the specified dates: i. October 1, 2021 - $9,956,333.00 ii. October 1, 2022 - $11,541,383.00 iii. October 1, 2023 - $10,424,285.00 iv. October 1, 2024 - $10,097,075.00	Acknowledged	Amount required for 2021 has been provided.
(b) Commencing on October 1, 2023 and on a three (3) year basis thereafter, the Owner shall provide to the Director a re-evaluation of the amount of the Financial Assurance to facilitate the actions required under Condition 2(1)(a). The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of alternative measures required by the Director upon review of the annual reports. The Financial Assurance must be submitted to the Director within twenty (20) days of written acceptance of the re-evaluation by the Director; (c) The amount of Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is received, Indicating Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial Assurance at least sixty (60) days before the Financial Assurance terminates, the Owner shall forthwith replace the Financial Assurance with cash.		
3. SITE OPERATION		
Operation		
(1) The Site shall be operated and maintained at all times including management and disposal of all waste, in accordance with the EPA, Regulation 347, Regulation 232, and the conditions of this Approval.	Acknowledged	
Service Area		
(2) Waste categories of Industrial, Commercial and Institutional ("ICI waste"), generated from within the geographic boundaries of the Province of Ontario may be received for disposal at this Site.	Acknowledged	
Waste Types		
(3) Only solid non-hazardous ICI waste, including contaminated soils, and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), shall be received for disposal at this Site. No hazardous waste or liquid industrial waste, as defined in Reg. 347, as amended by Reg. 558/00, shall be disposed at this Site.	Acknowledged	
(4) The Owner shall develop and implement a program to inspect waste to ensure that the waste received at the Site is of a type approved for acceptance under this Approval.	Acknowledged	
(5) The Owner shall ensure that all loads of waste are properly inspected by Trained Personnel prior to acceptance at the Site and that the waste vehicles are directed to the appropriate areas for disposal or transfer of the waste. The Owner shall notify the District Manager, in writing, of load rejections at the Site within one (1) business day from their occurrence.	Acknowledged	

Table 9.1

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
Approved Waste Quantities		
(6) The maximum volumetric capacity for the Site including waste and daily cover shall not exceed 1,045,065 cubic metres.	Acknowledged	
(7) The Owner shall ensure that the waste received at the Site does not exceed:		
(a) a total of 151,000 tonnes in any calendar year; and	Acknowledged	
(b) the daily maximum received at the site does not exceed 1,000 tonnes.		
Waste Placement		
(8) No waste shall be landfilled outside of the approved six (6) hectare footprint fill area. The site shall be developed, maintain established buffer areas, and adhere to final contours for waste and final cover material in accordance with the design drawings provided in Appendix L of the Design and Operations Report.	Acknowledged	
(a) The maximum elevation of the fill zone, including final cover, shall be 221.50 metres above mean sea level.		
Signage		
(9) A sign shall be installed and maintained at the main entrance/exit to the Site on which is legibly displayed the following information:		
(a) the name of the Site and Owner;		
(b) the number of the Approval;		
(c) the name of the Operator;		
(d) the normal hours of operation;	Complete	
(e) the allowable and prohibited waste types;		
(f) the telephone number to which complaints may be directed;		
(g) a warning against unauthorized access;		
(h) a twenty-four (24) hour emergency telephone number (if different from above); and		
(i) a warning against dumping outside the Site.		
(10) All landfill signs shall be kept legible, in good repair, and cleaned when required.	Acknowledged	
Nuisance Control (Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic)		
(11) The Site shall be operated and maintained such that vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.	Acknowledged	
(12) The Owner/Operator shall install visual screening berms, in accordance with the Design and Operations Report and shall inspect and maintain them as required, during the operating life of the landfill Site.	Acknowledged	Installation of visual screening fence along west berm completed in 2021
(13) The Owner/Operator shall conduct inspections and ensure that appropriate controls are in place to prevent the acceptance of liquid industrial waste and hazardous waste and to prevent the acceptance of waste from outside the approved service area. Records of violations by haulers or waste generators shall be maintained in the daily records for the Site operations. The Owner/Operator shall ensure that any waste refused for disposal leaves the Site immediately, and the District Manager is notified forthwith, of all waste load refusals at the Site related to requirements in this Certificate, including service area and waste types.	Acknowledged	
(14) The Owner/Operator shall ensure that the leachate collection system piping in the fill area and the connecting forcemain piping which leads to the leachate holding tank, shall be cleaned out at least once per year with a high pressure wash, and video inspections conducted, as necessary, to confirm that the pipes are clean and to determine the need for more frequent cleaning. Assessment of the need to amend the cleaning frequency shall be based on regular inspections of the leachate collection system and monitoring results.	Acknowledged	
(15) A thickness of at least 5 metres of compacted waste and cover material shall be maintained between any landfilled sludge (solid non-hazardous as per Reg. 347) and the granular leachate collection layer and leachate monitoring wells.	Acknowledged	
(16) The Owner/Operator shall take all reasonable steps to prevent off-site nuisance impacts, including visual impacts, transfer of waste, mud, or dust from the Site onto public roads due to landfill operations.	Acknowledged	
Burning of Waste		
(17) Burning of waste at the Site is prohibited.	Acknowledged	
Scavenging		
(18) Scavenging (as defined in Reg. 347) of deposited and/or stockpiled waste is prohibited at the Site. Controlled removal of recycleable/reusable material from the Site may only occur in a designated paved area on the Site, and shall be supervised by Trained Personnel.	Acknowledged	
Hours of Operation		
(19) The permitted hours of operation for the site are from 6:00 a.m. to 6:00 p.m., Monday to Friday, and from 6:00 a.m. to 2:00 p.m. on Saturdays, for site preparation, site maintenance and daily cover activities. The operating hours for receipt of waste for disposal at the Site shall be from 7:00 a.m. to 5:00 p.m., Monday to Friday, and from 7:00 a.m. to 1:00 p.m., on Saturdays. No operations shall take place at the Site outside of the stated hours and the Site shall be closed on statutory holidays.	Acknowledged	
(20) The hours of operation may be amended from time to time to accommodate seasonal or unusual demand, based on prior consultation with the PLC and written concurrence from the District Manager.	Acknowledged	
Site Security		
(21) No waste shall be received, landfilled or removed from the Site unless a site supervisor or other Trained Personnel are present to supervise the operations during operating hours. The Site shall be closed when a supervisor or Trained Personnel are not present to supervise operations at the Site.	Acknowledged	
(22) The Site shall be operated and maintained in a safe and secure manner. During non-operating hours, the Site entrance and exit gates shall be locked and the Site shall be secured against access by unauthorized persons.	Acknowledged	
Cover Material		
(23) Alternative materials to soil may be used as weekly and interim cover material, based on an application with supporting information and applicable fee for a trial use or permanent use, submitted by the Owner to the Director, copied to the District Manager and as approved by the Director via an amendment to this Approval. The alternative material shall be non-hazardous according to Regulation 347 and will be expected to perform at least as well as soil in relation to the following functions:		
(a) control of blowing litter, odours, dust, landfill gas, gulls, vectors, vermin and fires;	Acknowledged	
(b) provision for an aesthetic condition of the landfill during the active life of the Site;		
(c) provision for vehicle access to the active tipping face; and		
(d) compatibility with the design of the Site for groundwater protection, leachate management and landfill gas management.		
(24) Daily, interim and final cover material shall be shall be applied as follows:		
a. Daily Cover - At the end of each working day, the entire working face shall be compacted and covered with a minimum thickness of 150 mm of soil cover, compost, wood chips, or other approved daily cover material. Prior to placing waste at the start of the next operating day, the existing daily cover material shall be scarified or removed to the extent practical, to ensure vertical hydraulic connection is maintained between layers of waste and to promote percolation of leachate downwards to the leachate collection system.		
b. Interim Cover - In areas where landfilling ceases temporarily for a period of 6 months or more, a minimum thickness of 300 mm of soil shall be placed as interim cover and graded to promote surface water runoff. The quality of soil for use as interim cover shall, as a minimum, meet the standards specified in Table 3 of Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Prior to the use of interim cover soil, representative samples shall be taken and analysed for metals, Volatile Organic Compounds (VOCs) and PAHs, to confirm the soil meets the above-mentioned standards.	Acknowledged	
c. Final Cover - Final cover shall be applied progressively as areas of the landfill reach final waste elevations within the fill area. Prior to placement of final cover, the Owner/Operator shall submit for the approval of the Director, a report detailing the specifications, including particle size distribution of the final cover soil which shall confirm the designed infiltration rate of 0.15 m/year, as well as the protocols for testing and acceptance for on-site and off-site final cover soils. All areas of final cover shall be graded and vegetated as soon as practically possible. The final soil cap shall be regularly inspected and maintained after the installation and during the post-closure period. Without limiting the above, the Owner/Operator shall ensure for a minimum of five years after completion of the cap that the Site shall be inspected at least on a quarterly basis to ensure that there is positive drainage along the cap and that during the frost free period of the first two years following completion, such inspections shall be monthly. If any inspection indicates that there is an area of ponding or zero slope, the Owner/Operator shall take all steps necessary to provide positive drainage and rehabilitate the final cover as soon as practically possible.		
d. All on-site and excess soil used for daily, interim, and final cover shall be managed in accordance with Regulation 406.		
Traffic Control		
(25) The Owner/Operator shall ensure that vehicles carrying waste or materials to and from the Site shall only enter the Site from Highway #3 and Brooks Road. At no time shall any vehicle carrying waste or materials to and from the Site travel along Townline Road to access the Site.	Acknowledged	
(26) The Owner/Operator shall be responsible for maintenance and remedial work to the Improvement Area.		
The Improvement Area shall be maintained to the following minimum requirements:		
(a) 300 mm thick granular "A" layer of gravel, meeting all applicable Haldimand County and Ontario Provincial Standards Specification (OPSS) to the Improvement Area; and	Acknowledged	Completion of the improvement area is planned for 2022
(b) Maintain asphalt on the entranceway/exit to the landfill and the parking area for the landfill Site, as well as 30 metres of the road approach on Brooks Road to the entranceway/exit to the Site, extending both north and south of the entranceway/exit, in base asphalt and top coat. The thickness of asphalt shall be a base coarse of 60 mm (HL8), and a surface coarse of 50 mm (HL3).		
Odour Management		
(27) Within ninety (90) days from the issuance of this Approval, the Owner shall submit to the District Manager for approval, an Odour Management Plan that includes mitigation measures to minimize off-Site odour impacts, and if appropriate, a trigger mechanism and contingency plan.	Complete	
(28) The Odour Management Plan shall be reviewed on an annual basis as part of the Annual Report.	Acknowledged	

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
(29) If there is any odour complaint, or significant odour is detected during daily inspection, and the odour is confirmed to originate from the Site, mitigation measures shall be implemented immediately in accordance with the Odour Management Plan approved by the District Manager.	Acknowledged	
(30) If odour causes adverse off-site impacts that are not mitigated through implementation of odour mitigation measures according to the Odour Management Plan, the Owner shall, upon written notification from the District Manager, conduct an investigation into the cause as to why the impacts were not mitigated and submit to the District Manager within the time frame identified in the notice, an assessment of the issues and the need for implementation of contingency actions in accordance with the Odour Management Plan.	Acknowledged	
(31) If the Ministry deems the odour mitigation measures taken as per Condition 3(29) to be unsuitable, insufficient or ineffective, the District Manager may direct the Owner, in writing, to propose further measures to address the noted failure, upset or malfunction, which may include requiring a reduction in the receipt of waste, cessation of the receipt of waste, removal and disposal of waste from the waste diversion area, the removal of leachate from the Site in accordance with Condition 5(5), as well as, making repairs or modifications to equipment or processes. Such measures shall be implemented by the Owner upon approval by the District Manager.	Acknowledged	
(32) If the cessation of the receipt of waste is required, as determined by Condition 3(31), no waste shall be received at the Site until the District Manager is satisfied that odour impacts have been adequately mitigated.	Acknowledged	
4. GROUNDWATER AND SURFACE WATER MONITORING		
Compliance		
(1) The Site shall be operated in such a way as to ensure compliance with the following: (a) Reasonable Use Guideline B-7 for the protection of the groundwater at the Site; and (b) Provincial Water Quality Objectives included in the July 1994 publication entitled Water Management Policies, Guidelines, Provincial Water Quality Objectives, as amended from time to time, or limits set by the Regional Director, or the Canadian Water Quality Guidelines published by the Canadian Council of Ministers of the Environment, 1999 for the protection of the surface water at and off the Site.	Acknowledged	
Surface Water and Groundwater		
(2) The Owner shall monitor surface water and groundwater in accordance with the environmental monitoring program outlined in Schedule "B".	Acknowledged	
(3) A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic and hydrologic training and experience shall execute or directly supervise the execution of the environmental monitoring and reporting program.	Acknowledged	
Groundwater Wells and Monitors		
(4) The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage and maintained in accordance with Regulation 903.	Acknowledged	
(5) Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.	Acknowledged	
(6) Any groundwater monitoring well included in the on-going monitoring program that is damaged shall be assessed, repaired, replaced or decommissioned by the Owner, as required.		
(a) The Owner shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed. (b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the Director or the District Manager for abandonment, shall be decommissioned by the Owner, as required, in accordance with Regulation 903, to prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.	Acknowledged	Integrity of OW8B06 and Blockage at MW1S-07 will be assessed prior to the May 2022 sampling event.

Table 9.1

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
Trigger Mechanisms and Contingency Plans		
(7) In the event of a confirmed exceedance of a site-specific trigger level relating to groundwater or surface water impacts due to leachate, the Owner shall immediately notify the District Manager, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the Owner in accordance with the approved trigger mechanisms and associated contingency plans provided in Appendix J of the Design and Operations Report.	Acknowledged	
(8) If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the Owner shall ensure that the following steps are taken: (a) the Owner shall notify the District Manager, in writing of the need to implement contingency measures, no later than seven (7) days after confirmation of the exceedances; (b) within thirty (30) days from the date of confirming the need to implement contingency measures, detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the Owner to the Director for approval; and (c) the contingency measures shall be implemented by the Owner upon approval by the Director.	Acknowledged	
(9) The Owner shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to surface water or groundwater, are approved in advance by the Director via an amendment to this Approval.	Acknowledged	
Changes to the Monitoring Plan, Trigger Mechanism and Contingency Plan		
(10) The Owner may request to make changes to the environmental monitoring program, Trigger Mechanism and Contingency Plan to the District Manager in accordance with the recommendations of the annual report. The Owner shall make clear reference to the proposed changes in a separate letter that shall accompany the annual report.	Acknowledged	
(11) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the environmental monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to the changes to the monitoring program, to the Director requesting the Approval be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.	Acknowledged	
(12) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the Owner shall follow current Ministry procedures for seeking approval for amending the Approval.	Acknowledged	
5. LEACHATE MANAGEMENT AND DISPOSAL		
(1) Leachate generated at the landfill Site shall be collected, treated and disposed of using the on-site Leachate Treatment System, in accordance with the terms and conditions of the Industrial Sewage Works Approval No. 1122-BKUPSM dated February 3, 2020, as amended. (a) Notwithstanding Condition 5(1), leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall be removed to an off-site facility that is approved by the Ministry to treat leachate generated at the landfill Site.	Acknowledged	
(2) Leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall not be discharged to the natural environment at any time.	Acknowledged	
(3) Any alternative proposal for leachate management and disposal must receive prior written approval of the District Manager.	Acknowledged	
(4) The Owner shall reduce the level of leachate within the landfill to an elevation 191 metres above mean sea level (AMSL), which equates to an average leachate depth of no greater than 0.3 metres, by the earlier of: (a) five (5) years from the issuance date of this ECA; or (b) the date the landfill reaches capacity.	Acknowledged	
(5) In addition to the requirements of Condition 5(4), the interim annual leachate elevation levels and interim landfill capacity-based leachate elevations shall be adhered to pursuant to Schedules "C" and "D" respectively. (a) The leachate elevation, as determined by the pressure transducer located in the leachate collection sump riser pipe shall be used to establish the landfill leachate elevation. The leachate elevation will be considered in compliance with the target leachate elevations if the measurement meets the elevations stated in Schedules "C" and "D" within fifteen (15) days of the compliance date.	Acknowledged	
(6) The Owner shall implement the leachate management contingency measures in the report titled "Leachate Removal Plan, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited", prepared February 7, 2020, as amended, as necessary to meet the leachate elevations in Schedules "C" and "D". (a) if the leachate elevations in Schedules "C" and "D" are not met within 105 days of the anniversary date of the issuance of this Approval the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below the leachate elevation in Schedules "C" and "D": (i) notify the District Manager; (ii) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site; (iii) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site; (iv) install interim cover to cells that have not reached final waste contours and to the working face; (v) install final cover to cells that have reached final waste contours; (vi) establish vegetation on installed cover material where appropriate and weather permitting; and (vii) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate. (b) landfilling activities may commence again when the compliance leachate elevation has been attained; and (c) prior to amending the Leachate Removal Plan proposed amendments shall be submitted to the District Manager for approval.	Acknowledged	
(7) If the leachate elevation in the landfill reaches 199.0 metres AMSL, the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below 199.0 metres AMSL: (a) notify the District Manager; (b) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site; (c) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site; (d) install interim cover to cells that have not reached final waste contours and to the working face; (e) install final cover to cells that have reached final waste contours; (f) establish vegetation on installed cover material where appropriate and weather permitting; and (g) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate.	Acknowledged	
(8) The Owner shall monitor leachate in accordance with the monitoring program outlined in Schedule "B".	Acknowledged	

Table 9.1

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
6. LANDFILL GAS MANAGEMENT		
(1) The Owner/Operator shall ensure that all buildings and structures containing enclosed spaces at the Site, shall be situated, constructed and monitored in a manner which minimizes the potential for explosive hazards due to landfill gas. The Owner/Operator shall install and maintain in good working condition, methane detection and alarm equipment (with active venting or with an effective passive venting system to relieve any possible landfill gas accumulation) for all enclosed buildings at the Site.	Complete	
(2) The Owner/Operator shall ensure that site design plans, specifications and descriptions for the control of landfill gas are such that the subsurface migration of landfill gas meets the requirements of the Ministry's Landfill Standards Guideline, Section 4.10, including but not limited to the following: (a) the concentration of methane gas below the ground surface at the Site boundary must be less than 2.5 per cent by volume; (b) the concentration of methane gas in any on-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition, must be less than 1.0 per cent by volume; (c) sub-condition (b) does not apply to a leachate collection, storage or treatment facility or a landfill gas collection or treatment facility for which specific health and safety measures and procedures are in place relating to the risk of asphyxiation and the risk of explosion; and (d) the concentration of methane gas from the Site in any off-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, must be less than 0.05 per cent by volume (i.e. not present).	Acknowledged	
(3) If the measured gas concentration at a gas probe exceeds the applicable limit listed in Condition 6(2) above, the District Manager shall be notified immediately. The gas concentrations shall be re-measured immediately and daily for a period of up to three (3) consecutive days. If these readings confirm that the applicable limit has been exceeded, the Owner/Operator shall forthwith, implement appropriate control measures.	Acknowledged	
(4) The Owner shall monitor landfill gas in accordance with the monitoring program outlined in Schedule "B".	Acknowledged	
7. STORMWATER MANAGEMENT		
(1) Stormwater runoff generated from the active waste fill area shall be treated by the Owner/Operator as leachate. The Owner/Operator shall ensure that any precipitation falling unto active waste fill areas, not under interim cover, shall be directed to the leachate collection system. If necessary, granular sumps shall be dug into the waste to facilitate drainage of contaminated stormwater towards the leachate collection system.	Acknowledged	
(2) The Owner shall monitor the stormwater management pond in accordance with the monitoring program outlined in Schedule "B".	Acknowledged	
8. EMPLOYEE TRAINING		
(1) A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the Owner or the Operator. Only Trained Personnel shall operate any aspect of the Site or carry out any activity required under this Approval.	Acknowledged	
(2) The Owner shall ensure that all site operations employees have been adequately trained and received on-going training with respect to the following, but not limited to: (a) terms, conditions and operating requirements of this Approval for the Site; (b) the operation, inspection, and maintenance of the Site with respect to the approved design and operations documents; (c) relevant waste management legislation and regulations; (d) environmental concerns related to waste management at the Site; (e) occupational Health and Safety concerns related to waste management at the Site; and (f) emergency procedures and contingency plans in case of fire, spills, off-site impacts and any other emergency situations.	Acknowledged	
9. COMPLAINTS RESPONSE PROCEDURE		
(1) If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure: (a) The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint; (b) The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a written reply to the complainant; and (c) The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and recommendations, if any, for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.	Acknowledged	
10. EMERGENCY AND SPILL RESPONSE		
(1) All Spills as defined in the EPA occurring at or from the Site shall be immediately reported to the Ministry's Spills Action Centre at 1-800-268-6060 and shall be recorded in the log book. The Owner/Operator shall record for each Spill event the contaminant(s) spilled, the quantity or volume of contaminants spilled, the spatial distribution of the area impacted by the Spill, a root cause analysis of the events leading up to the Spill and a list of actions designed to prevent similar Spill events.	Acknowledged	
(2) In addition, the Owner shall submit, to the District Manager a written report within three (3) business days of the Spill event, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the Site.	Acknowledged	
(3) All wastes resulting from a Spill event shall be managed and disposed of in accordance with the EPA and Regulation 347.	Acknowledged	
(4) All equipment and materials required to handle the Spill event shall be: (a) kept on hand at all times that waste landfilling and/or handling is undertaken at the Site; and (b) adequately maintained and kept in good repair.	Acknowledged	
(5) The Owner shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).	Acknowledged	
11. PUBLIC LIAISON COMMITTEE (PLC)		
(1) The Owner or Operator shall maintain and participate in a landfill PLC, which shall function in accordance with the Terms of Reference for the PLC, as amended from time to time. Any amendment to the Terms of Reference must be approved by the District Manager. The PLC shall serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the landfill Site, including environmental monitoring, maintenance, complaint resolution, and new approvals or amendments to existing approvals related to the operation of this landfill Site.	Acknowledged	
(2) The Owner/Operator shall invite representation from the following groups to participate on the PLC: (a) the County of Haldimand; (b) Six Nations of the Grand River; (c) landowners within a minimum 500 metre distance of the Site; (d) residents of Haldimand County; and (e) Lower Grand River Land Trust. The number of representatives from each group shall be as specified in the Terms of Reference approved by the District Manager.	Acknowledged	
(3) Copies of all reports or other submissions required by the conditions of this Approval shall be made available to the PLC and the County of Haldimand, in accordance with the deadlines specified in the Conditions.	Acknowledged	
(4) The Owner or Operator shall provide to the PLC and the County of Haldimand, reasonable notice and opportunities to make comments regarding any proposed amendment to this Approval. The Owner or Operator shall forward to the Director for consideration any written comments received by the Owner or Operator and advise the Director of the essence of any verbal comments received by the Owner or Operator regarding the proposed amendment.	Acknowledged	
12. INSPECTIONS, RECORD KEEPING AND REPORTING **Daily Inspections and Inspection Log** (1) A visual inspection of the entire Site and all equipment on the Site shall be conducted each day the Site is open to ensure that: (a) the Site is secure; (b) the operation of the Site is not causing any nuisances; (c) the operation of the Site is not causing any adverse effects on the environment or impairing water quality; and (d) the Site is being operated in compliance with this Approval.	Acknowledged	
(2) Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the Site if needed.	Acknowledged	

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
(3) An electronic or written record of the inspections shall be maintained and shall include the following: (a) the name and signature of person that conducted the inspection; (b) the date and time of the inspection; (c) the list of all deficiencies discovered during the inspections, including but not limited to: (i) the presence of any leachate seeps; (ii) the condition of the methane venting system; (iii) poor drainage conditions and ponding of surface water; and (iv) the presence of waste outside of the approved fill area; (d) the recommendations for remedial action to address the identified deficiencies; and (e) the date, time and description of the remedial actions taken.	Acknowledged	
Daily Waste Log (4) A daily log shall be maintained in written or electronic format and shall include the following information: (a) the type, date and estimated quantity (tonnes) of all waste, including non-landfilled waste received at the Site; (b) the type, date and estimated quantity (tonnes) of cover material applied at the Site; (c) the area of the Site in which waste disposal operations are taking place; (d) a record of litter collection activities and the application of any dust suppressants; (e) a record of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known; and (f) a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service.	Acknowledged	
Other Information (5) Any information requested, by the Director, the District Manager or a Provincial Officer, concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided to the Ministry, upon request.	Acknowledged	
Annual Report (6) A written report on the development, operation and monitoring of the Site, shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the District Manager, by March 31st of the year following the period being reported upon. (7) The Annual Report shall include but not be limited to the following information: (a) the results and an interpretive analysis of the results of all leachate, groundwater surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs; (b) an assessment on the Site's compliance with Guideline B7; (c) an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the Ministry approved contingency plans; (d) site plans showing the existing contours of the Site; areas of landfilling operation during the reporting period; areas of intended operation during the next reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; facilities existing, added or removed during the reporting period; and site preparations and facilities planned for installation during the next reporting period; (e) summaries of any actions taken for the odour management plan and compliance with the leachate removal plan; (f) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period; (g) a calculation of the remaining capacity of the Site or an estimate of the remaining Site life; (h) summary of total annual quantity (tonnes) of waste received at the Site; (i) a summary of any complaints received and the responses made; (j) a summary of the information included in the logs required by Conditions 9(1), 10(1), 11(3), 11(4), 11(5), and 12(2); (k) a summary of the daily waste log; (l) a discussion of any operational problems encountered at the Site and corrective action taken; (m) any changes to the Ministry approved Design and Operations Report and the Closure Plan that have been approved by the Director since the last Annual Report; (n) a report on the status of all monitoring wells and a statement as to compliance with Regulation 903; (o) a description and location of any leachate seeps identified during the daily inspection of the Site and the mitigative measures taken to address the presence of seeps; (p) a summary of the daily inspections conducted over the monitoring period; (q) any other information with respect to the Site which the District Manager may require from time to time; (r) a copy of the most current ministry approved monitoring programs in table format; (s) compliance status with all conditions of the Approval and the approved Design and Operations Plan; (t) a "Monitoring and Screening Checklist" completed and signed by a Qualified Professional; and (u) items identified in Section 7.7 Annual Progress Report of the Design and Operations Report;	Acknowledged	

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
13. CLOSURE PLAN		
(1) At least two (2) years prior to the anticipated date of closure of this Site, or when the Site reaches 90% capacity, whichever comes first, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site closure plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring, and end use. The plan shall include but not be limited to the following information:		
(a) A plan showing Site appearance after closure;		
(b) A description of the proposed end-use of the Site;		
(c) Description of the procedures for closure of the Site, including:		
i. advance notification of the public of the landfill closure;		
ii. posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;		
iii. completion, inspection and maintenance of the final cover and landscaping;		
iv. site security;		
v. removal of unnecessary landfill-related structures, buildings and facilities;	Acknowledged	
vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and		
vii. a schedule indicating the time-period for implementing sub-conditions (i) to (vi) above.		
(d) Description of the procedures for post-closure care of the Site, including:		
i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;		
ii. record keeping and reporting; and		
iii. complaint contact and response procedures;		
(e) An assessment of the adequacy of and need to implement the contingency plans for leachate and landfill gas;		
(f) An updated estimate of the contaminating life span of the Site, based on the results of the monitoring programs to date; and		
(g) An update of the cost estimate for financial assurance and the amount which has been provided to the Director.		
(2) The Site shall be closed in accordance with the closure plan as approved by the Director.	Acknowledged	
The following Schedule "A" forms part of this Approval		
Schedule "A"		
1. Application for an amendment to ECA No. A110302 for a vertical expansion. Signed by Richard Weldon, Managing Partner, 2270386 Ontario Limited. Dated April 26, 2019. The application includes all supporting documentation and consists of the following:		
i. Design and Operations Report Vertical Expansion, Brooks Road Landfill Site, 2270386 Ontario Inc., Prepared by GHD, April 18, 2019;		
ii. Appendix A - Provisional CofA No. A110302 and Amendments;		
iii. Appendix B - Site Preparation Reports;		
iv. Appendix C - Site Legal Surveys;		
v. Appendix D - Geotechnical Assessment;		
vi. Appendix E - HELP Model Outputs;		
vii. Appendix F - Hydrologic Modeling;		
vii. Appendix G - Surface Water Supporting Engineering Calculations;		
viii. Appendix H - Landfill Gas Production and Air Dispersion Modeling Results;		
ix. Appendix I - Fugitive Odour Best Management Practices Plan and BRE Odour Complaint Response Procedure;		
ix. Appendix J - Trigger Level Program;		
ix. Appendix K - Financial Assurance Plan; and		
ix. Appendix L - Design and Operations Report Drawings.		
2. Leachate Removal Plan, Brooks Road landfill Site Haldimand County, 2270386 Ontario Limited. Report No 90. Prepared by GHD, February 7, 2020.		
The following Schedule "B" forms part of this Approval		
Schedule "B"		
Table B1: Groundwater, Surface Water, Leachate and Landfill Gas Monitoring Programs		
Notes:		
1. Groundwater levels will be measured during May and November sampling events.		
2. Surface water levels and flows will be measured for all sampling events.		
3. A - Indicator parameters (groundwater): alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, and DOC.		
4. B - Metals: aluminum, arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, nickel.		
B - PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, benzo(ghi)perylene.		
B - VOCs: chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, acetone, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, methyl-t-butyl ether, 1,1-dichloroethane, methyl ethyl ketone, cis-1,2-dichloroethene, chloroform, 1,2-dichloroethane, 1,1,1-trichloroethane, carbon tetrachloride, benzene, 1,2-dichloropropane trichloroethene, bromodichloromethane, cis-1,3-dichloropropene, methyl isobutyl ketone, trans-1,3-dichloropropene, 1,1,2-trichloroethane, toluene, 2-hexanone, dibromochloromethane, 1,2-dibromoethane, tetrachloroethene, 1,1,1,2-tetrachloroethane, chlorobenzene, ethylbenzene, m,p,o-xylenes, bromoform, styrene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene.		
B - Inorganic chemistry parameters: alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulfates, DOC, TDS, suspended solids, phenol, BOD5, COD, pH, total phosphorus, potassium, conductivity, calcium.		
5. C - Indicator parameters (surface water): alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, pH, total phosphorus, TDS, suspended solids, sulphate, BOD5, COD, phenol, temperature, and dissolved oxygen.		
6. WL - only: water level or leachate level only.		
7. Leachate: Leachate water levels shall be collected on a monthly basis at leachate monitoring well LW1-17 and the inclined leachate collection sump riser pipe, while an annual leachate chemistry sample is required to be collected in May from the collection sump. Compliance with the leachate level elevation shall be determined by the pressure transducer that is located in the leachate collection sump riser pipe.		
8. Landfill Gas: Sampling is to occur monthly from December 1 to April 30 and quarterly from May through November for % lower explosive limit methane concentration of combustible gas, carbon dioxide, oxygen and balance gases, gas pressure, and water level.		
The following Schedule "C" forms part of this Approval		
Schedule "C"		
Table C1: Target leachate elevations to reach leachate elevation 191 m AMSL based on the anniversary date of the issuance of this Approval.		
The following Schedule "D" forms part of this Approval		
Schedule "D"		
Table D1: Capacity-Based Target Leachate Elevations		

Table 9.1

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
EA Compliance Report and Monitoring Commitments		
4.1 The Proponent shall prepare and submit to the Director for approval and for the public record, an Environmental Assessment compliance monitoring program.	Complete	
4.2 The compliance monitoring program shall be submitted within one year from the Date of Approval, or 60 days before the commencement of Construction, whichever is earlier, or by another date agreed upon by the Director.	Complete	
4.3 The compliance monitoring program shall include a description of how the Proponent will: a. monitor implementation of the Undertaking in accordance with the Environmental Assessment with respect to mitigation measures, public consultation, and additional studies and work to be carried out; b. monitor compliance with the conditions in this Notice of Approval; and, c. monitor compliance with all commitments made in the Environmental Assessment and the subsequent review of and approval process for the Environmental Assessment with respect to mitigation measures, public consultation, and additional studies and work to be carried out.	Complete	
4.4 The compliance monitoring program must contain an implementation schedule for monitoring activities to be completed.	Complete	
4.5 The Director may require the Proponent to amend the compliance monitoring program at any time. Should an amendment be required, the Director will notify the Proponent in writing of the required amendment and the date by which the Proponent must complete and submit the amendment to the Director.	Acknowledged	
4.6 The Proponent shall submit the amended compliance monitoring program to the Director within the time period specified by the Director.	Acknowledged	
4.7 The Proponent shall implement the compliance monitoring program and any amendments to it.	Acknowledged	
5.1 The Proponent shall prepare an annual compliance report outlining the results of the compliance monitoring program (Condition 4 above) and place the document on the public record.	Acknowledged	
5.2 The first compliance report shall be submitted to the Director for review and for the public record no later than one year following the Date of Approval. Each subsequent annual compliance report shall be submitted on the date that is the anniversary of the Date of Approval thereafter. Each report shall cover the previous year to the date of report submission.	Acknowledged	
5.3 The Proponent shall submit annual compliance reports until all conditions are satisfied.	Acknowledged	
5.4 Once all conditions in this Notice of Approval have been satisfied, the Proponent shall notify the Director in writing that the final annual compliance report is being submitted, and that all conditions in this Notice of Approval have been satisfied. The Ministry will confirm whether all conditions have been satisfied and the Director will state this in writing to the Proponent.	Acknowledged	
5.5 The Proponent shall retain either on the Site or in another location approved by the Director, copies of the annual compliance reports for each reporting year and any associated documentation of compliance monitoring activities.	Acknowledged	
5.6 The Proponent shall make the compliance reports and associated documentation available to the Director or a designate in a timely manner when requested to do so by the Ministry.	Acknowledged	
6. Complaint Protocol		
6.1 The Proponent shall prepare and implement a complaint protocol that sets out provisions for dealing with and responding to inquiries and complaints during all stages of the Undertaking. The complaint protocol shall include a procedure for notifying the Ministry's Hamilton District Office of the complaints received.	Complete	
6.2 The Proponent shall submit the complaint protocol to the Director for approval and for the public record within one year from the Date of Approval, or 60 days before the start of Construction, whichever is earlier, or by another date agreed upon by the Director.	Complete	
6.3 The Director may require the Proponent to amend the complaint protocol at any time. Should an amendment be required, the Director shall notify the proponent in writing of the amendment required and when the amendment must be completed.	Acknowledged	
6.4 The Proponent shall submit the amended complaint protocol to the Director within the time period specified by the Director.	Acknowledged	
6.5 The Proponent shall implement the complaint protocol and any amendments to it.	Acknowledged	
6.6 The Proponent shall provide a summary on the complaints received and how they were addressed as part of the annual compliance reporting (Condition 5) and post the summary on the website as part of the public record.	Acknowledged	
7 Consultation with Indigenous Communities		
7.1 The Proponent shall prepare, in consultation with Indigenous Communities, an Indigenous consultation plan that sets forth: a. how, during the planning, design, Construction, operation, and closure of the Undertaking, the Proponent will consult with Indigenous Communities and provide them with opportunities to be involved in environmental monitoring activities; b. how the Proponent will notify Indigenous Communitis, using a notification protocol, if archaeological resources or Indigenous remains are encountered during the planning, design, Construction, operation, and closure of the Undertaking; and, c. how the Proponent will issue notices and updates to Indigenous communities on key steps in the planning, design, Construction, operation, and closure of the Undertaking.	Complete	
7.2 90 days before the start of Construction or by such other date as may be agreed to in writing by the Director, the Proponent shall submit the Indigenous consultation plan to the Director for approval, with an outline of how the Proponent consulted on it as be Condition 7.1 above.	Complete	
7.3 Once the Director is satisfied with the Indigenous consultation plan, the Proponent shall implement the Indigenous consultation plan durin gthe planning, design, Construction, operation, and closure of the Undertaking	Acknowledged	
8. Air Quality and Odour		
8.1 When applying for an Environmental Compliance Approval, the Proponent shall provide, to the satisfaction of the Ministry, the following as part of its application: a. an emissions summary and dispersion modelling report that includes landfill gas; b. an odour assessment and modelling report for the expanded landfill Site; c. a dust management plan for the Site which shall include fugitive dust emissions from all sources at the Site; and d. an odour management plan detailing the measures for addressing the potential odours that may emanate from the Site.	Complete	
8.2 The Proponent shall prepare and implement a landfill gas mitigation plan that specifies measures for monitoring and reducing landfill gas emissions for the Construction, operation, closure and post-closure phases of the expanded landfill Site. The Proponent shall report on changes in landfill gas production in its annual compliance report (Condition 5 above).	Acknowledged	
9. Groundwater and Surface Water Protection		
9.1 When applying for an Environmental Compliance Approval, the Proponent shall provide, to the satisfaction of the Ministry, the following information as part of its application. A. information documenting the performance of the existing leachate management system at the Site; b. a description in the design and operations report on how the Proponent will manage the rate of fill and potential leachate generation; and, c. a leachate management plan for the vertical landfill expansion.	Complete	
10 Extreme Weather Events		
10.1 When applying for an Environmental Compliance Approval, the Proponent shall provide to the satisfaction of the Ministry as part of its application, an assessment of landfill vulnerability to side slope stability failure due to extreme weather events. The Proponent shall complete a slope stability modelling exercise to determine the appropriate safety factor to be applied to the design of the vertically expanded landfill and identify appropriate mitigation and contingency measures to prevent side slope failure.	Complete	
11 Waste Diversion		
11.1 The Proponent shall develop and implement a waste diversion protocol which shall contain information on awareness programs for waste generators and haulers, and on-site waste segregation protocols to maximize the diversion of industrial, commercial and institutional waste, including organics. The Proponent shall submit the waste diversion protocol to the Ministry in its application for an Environmental Compliance Approval and report industrial, commercial and institutional waste diversion amounts in its annual compliance report (Condition 5 above).	Complete	

Table 9.1

Summary of Environmental Compliance Approval
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Conditions	Status	Comments
12. Wetland and Species at Risk Protection 12.1 The Proponent shall install a permanent silt fence that extends the entire perimeter of the Site property to exclude wildlife from accessing the Site. This exclusion fence shall be routinely monitored and maintained in good working condition throughout the Construction, operation and closure of the landfill.	Complete	Construction of silt fencing completed in 2021.
12.2The Proponent shall train staff in the identification of Blanding's Turtle and other Species at Risk known to be within the general vicinity of the Site. Training shall include Specieis at Risk awareness and the appropriate steps to take upon encountering a Species at Risk. In the event that a Species at Risk is found on the Site property, all activities that could potentially harm the animal shall cease and a Minitry of Natural Resources and Forestry biologist shall be contacted.	Complete	GHD prepared a Site-specific SAR identification guide for Brooks Road Environmental Site staff and visitor use.
12.3 The Proponent shall develop and implement a wetland monitoring program to demonstrate that there are no impairments to the water quality, quantity, vegetation, or wildlife in the Cayuga Swamp Wetland Complex located adjacent to the Site as a result of the Undertaking. The Proponent shall prepare wetland monitoring reports outlining the results of the wetland monitoring program. The Proponent shall provide copies of the wetland monitoring reports to the Ministry of Natural Resources and Forestry and submit them to the Ministry as part of its annual compliance report (Condition 5 above).	Acknowledged	A Wetland Monitoring report was submitted in February 2022.
13. Duration of Approval 13.1 If Construction has not commenced within 2 years of the Date of Approval, the Proponent shall conduct a review of the Environmental Assessment and submit that review to the Director. The review shall look at the potential environmental effects and mitigation measures, and identify any changes to these components. If Construction has not commenced within 5 years of the Date of Approval, this Notice of Approval shall expire.	Complete	

Appendices

Appendix A

Legal Plan of Survey

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PLAN OF SURVEY
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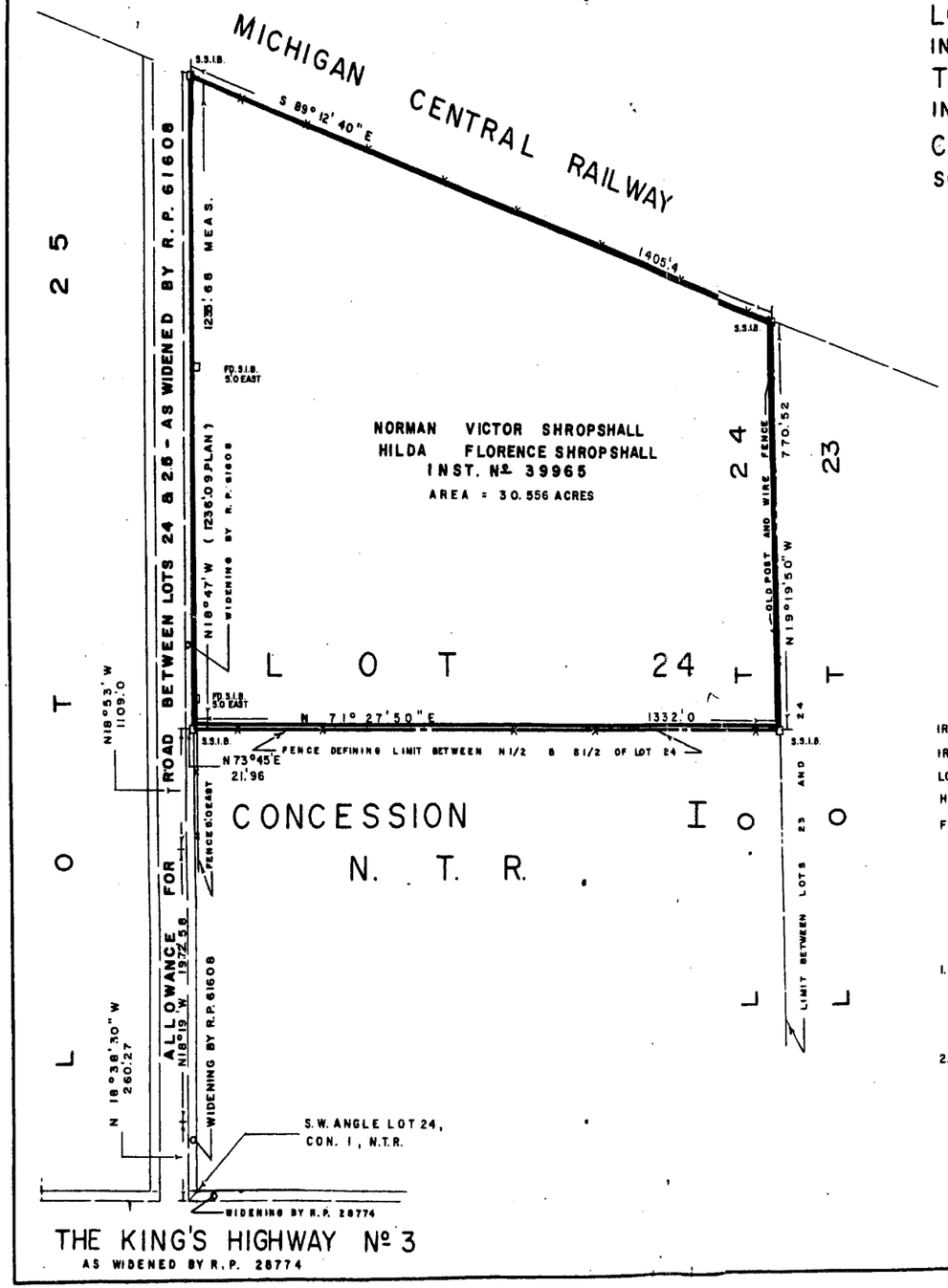
LOT 24 - CONCESSION I - N.T.R.
IN THE
TOWNSHIP OF NORTH CAYUGA
IN THE
COUNTY OF HALDIMAND
SCALE: 1" = 200'



N

LEGEND

IRON BARS 1"x1"x48" SHOWN	S.I.B.
IRON BARS 1"x1"x36" SHOWN	S.S.I.B.
LOT LINES SHOWN	
HALF LOT LINES SHOWN	
FENCES SHOWN	x—x—x

I HEREBY CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT AND THE REGISTRY ACT AND THE REGULATIONS MADE THEREUNDER.

2. THE SURVEY WAS COMPLETED ON THE 2ND DAY OF NOVEMBER, 1973

DATED NOVEMBER 5TH, 1973 — H. V. Jewitt

H. V. JEWITT
ONTARIO LAND SURVEYOR
90 KENT ST. S, SIMCOE, ONTARIO.

C.A.L. 1-49

120-0228ENG

PLAN OF SURVEY OF

PART OF THE NORTH HALF OF LOT 24 CONCESSION 1, NORTH OF TALBOT ROAD

GEOGRAPHIC TOWNSHIP OF NORTH CAYUGA

HALDIMAND COUNTY

SCALE 1 : 1000

10 0 10 20 30 40 50 60 70 80 90 100 metres

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
2014

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT

DATE March 10 2014

LES RUDNICKI
ONTARIO LAND SURVEYOR

PLAN 18R-7151

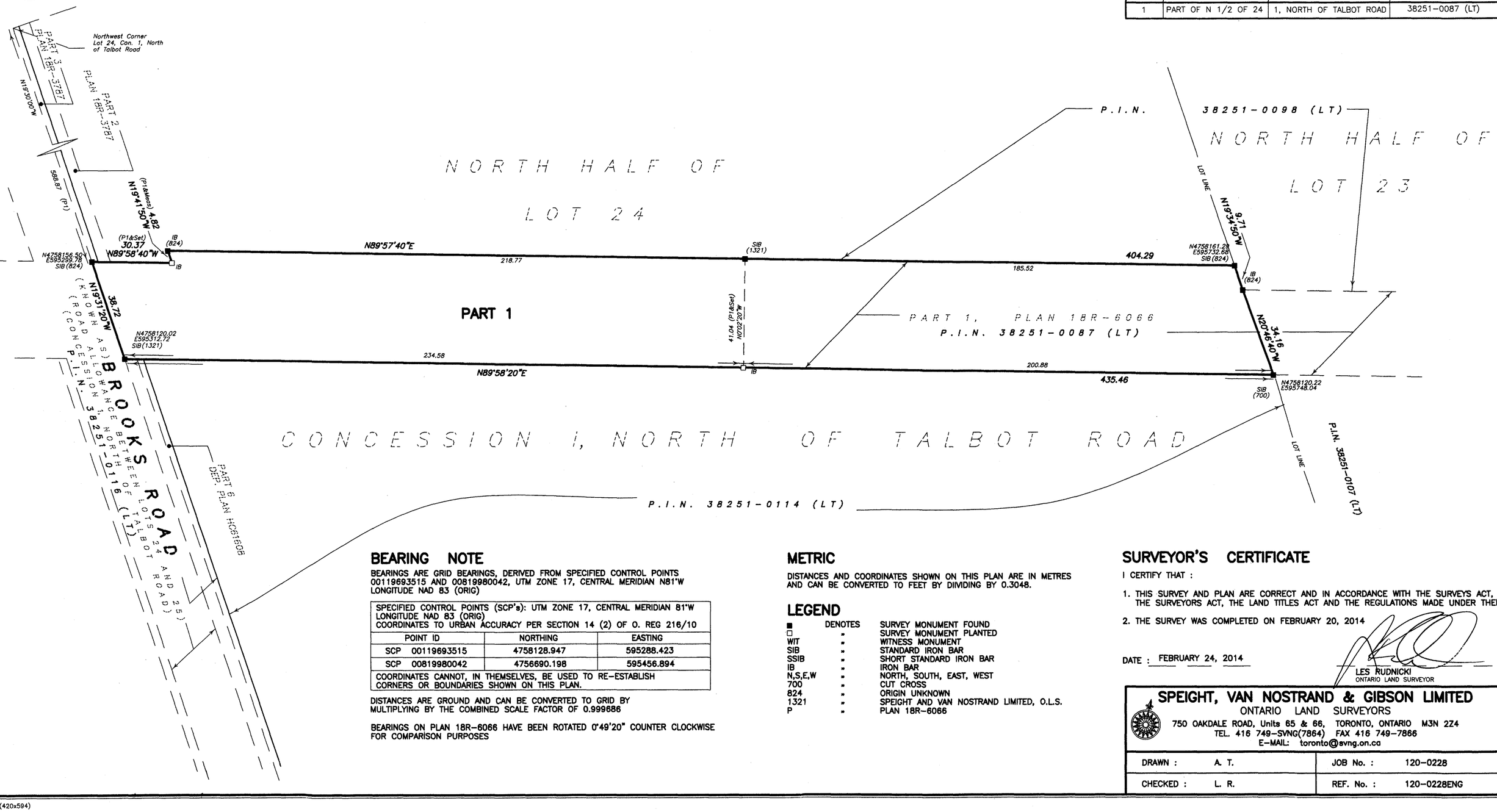
RECEIVED AND DEPOSITED

DATE March 11, 2014

REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF THE HALDIMAND REGISTRY OFFICE (No. 18)

SCHEDULE

PART	LOT	CONCESSION	PART OF PIN
1	PART OF N 1/2 OF 24	1, NORTH OF TALBOT ROAD	38251-0087 (LT)



BEARING NOTE

BEARINGS ARE GRID BEARINGS, DERIVED FROM SPECIFIED CONTROL POINTS 00119693515 AND 00819980042, UTM ZONE 17, CENTRAL MERIDIAN N81°W LONGITUDE NAD 83 (ORIG)

SPECIFIED CONTROL POINTS (SCP's): UTM ZONE 17, CENTRAL MERIDIAN 81°W LONGITUDE NAD 83 (ORIG)
COORDINATES TO URBAN ACCURACY PER SECTION 14 (2) OF O. REG 216/10

POINT ID	NORTHING	EASTING
SCP 00119693515	4758128.947	595288.423
SCP 00819980042	4756690.198	595456.894

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999686

BEARINGS ON PLAN 18R-6066 HAVE BEEN ROTATED 0°49'20" COUNTER CLOCKWISE FOR COMPARISON PURPOSES

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	"	SURVEY MONUMENT PLANTED
WIT	"	WITNESS MONUMENT
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
IB	"	IRON BAR
N,S,E,W	"	NORTH, SOUTH, EAST, WEST
700	"	CUT CROSS
824	"	ORIGIN UNKNOWN
1321	"	SPEIGHT AND VAN NOSTRAND LIMITED, O.L.S.
P	"	PLAN 18R-6066

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON FEBRUARY 20, 2014

DATE : FEBRUARY 24, 2014

LES RUDNICKI
ONTARIO LAND SURVEYOR

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
750 OAKDALE ROAD, Units 65 & 66, TORONTO, ONTARIO M3N 2Z4
TEL. 416 749-SVNG(7864) FAX 416 749-7866
E-MAIL: toronto@svng.on.ca

DRAWN :	A. T.	JOB No. :	120-0228
CHECKED :	L. R.	REF. No. :	120-0228ENG

A2 (420x594)

Appendix B

Environmental Compliance Approvals

Content Copy Of Original

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 8922-9ZHR29
Issue Date: October 8, 2015

2270386 Ontario Limited
160 Cumberland Ave, No. 300
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd, Lot 24, Concession 1, North of Talbot Road Haldimand County, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

- one (1) shredder, equipped with a diesel engine rated at 315 kilowatts, having a production rate of 30 tonnes per hour;

all in accordance with the Application for Environmental Compliance Approval (Air and Noise) and all supporting information dated September 3, 2014, and signed by Paul Zizek of 2270386 Ontario Limited.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this Environmental Compliance Approval, including the application and supporting documentation listed above.

2. "Company" means 2270386 Ontario Limited, that is responsible for the construction or operation of the Plant and includes any successors and assigns.

3. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA.

4. "District Manager" means the District Manager of the appropriate local district office of the Ministry, at the geographic location where the Plant is operated.

5. "EPA" means the Environmental Protection Act , R.S.O. 1990, c.E.19, as amended.

6. "Equipment" means the equipment and processes described in the Company's application, this Approval and in the supporting documentation referred to herein, to the extent approved by this Approval.

7. "Facility" means the entire operation where the Equipment is located.

8. "Manual" means a document or a set of documents that provides written instructions to staff of the Company.

9. "Ministry" means the ministry of the government of Ontario responsible for the EPA and includes all officials, employees or other persons acting on its behalf.

10. "Publication NPC-300" means the Ministry Publication NPC-300, "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300", August, 2013, as amended.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PERFORMANCE REQUIREMENTS

1. The Company shall ensure that the noise emissions from the Facility comply with the limits determined in accordance with Ministry Publication NPC-300.

OPERATION AND MAINTENANCE

2. The Company shall ensure that the Equipment is properly operated and maintained at all times. The Company shall:

(1) prepare, not later than three (3) months after the date of this Approval, and update, as necessary, a Manual outlining the operating procedures and a maintenance program for the Equipment, including:

(a) routine operating and maintenance procedures in accordance with good engineering practices, and as recommended by the Equipment suppliers;

(b) emergency procedures;

(c) procedures for any record keeping activities relating to operation and maintenance of the Equipment;

(d) all appropriate measures to minimize noise and dust emissions from all potential sources;

(e) procedures for recording and responding to environmental complaints relating to the operation of the Equipment; and

(2) implement the recommendations of the Manual.

FUGITIVE DUST CONTROL

3. The Company shall prepare, before commencement of operation of the Equipment, implement and update as necessary, a Best Management Practices Plan for the control of fugitive dust emissions from the Facility. This Best Management Practices Plan shall include, but not be limited to:

(1) identification of the main sources of fugitive dust emissions such as:

(a) on-site traffic;

(b) paved roads/areas;

(c) unpaved roads/areas;

(d) material stock piles;

(e) loading/unloading areas and loading/unloading techniques;

(f) material spills;

(g) material conveyance systems;

(h) exposed openings in process and storage buildings; and

(i) general work areas;

(2) potential causes for high dust emissions and opacity resulting from these sources;

(3) preventative and control measures in place or under development to minimize the likelihood of high dust emissions and opacity from the sources of fugitive dust emissions identified above. Details of the preventative and control measures shall include:

(a) a description of the control equipment to be installed;

(b) a description of the preventative procedures to be implemented; and/or

(c) the frequency of occurrence of periodic preventative activities, including material application rates as applicable;

(4) an implementation schedule for the Best Management Practices Plan, including training of personnel; and

(5) inspection and maintenance procedures and monitoring initiatives to ensure effective implementation of the preventative and control measures.

RECORD RETENTION

4. The Company shall retain, for a minimum of two (2) years from the date of their creation, all records and information related to or resulting from the recording activities required by this Approval, and make these records available for review by staff of the Ministry upon request. The Company shall retain:

(1) all records on the maintenance, repair and inspection of the Equipment;

(2) all records of any upset conditions associated with the operation of the Equipment;

(3) all records on the environmental complaints, including:

(a) a description, time, date and location of each incident;
(b) operating conditions (e.g. upset conditions, etc.) at the time of the incident;
(c) wind direction and other weather conditions at the time of the incident;
(d) the name(s) of Company personnel responsible for handling the incident;

(e) the cause of the incident;
(f) the Company's response to the incident; and
(g) a description of the measures taken to address the cause of the incident and to prevent a similar occurrence in the future, and the outcome of the measures taken.

NOTIFICATION REQUIREMENTS

5. The Company shall notify the District Manager, in writing, of each environmental complaint within two (2) business days of the complaint. The notification shall include:

(1) a description of the nature of the complaint;
(2) a description, time, date and location of each incident;
(3) operating conditions (e.g. upset conditions, etc.) at the time of the incident;
(4) wind direction and other weather conditions at the time of the incident;
(5) the name(s) of Company personnel responsible for handling the incident;
(6) the cause of the incident;
(7) the Company response to the incident; and
(8) a description of the measures taken to address the cause of the incident and to prevent a similar occurrence in the future, and the outcome of the measures taken.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition Nos. 1 to 3, inclusive, are included to provide the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Equipment and to emphasize that the Equipment must be maintained and operated according to a procedure that will result in compliance with the EPA, the regulations and this Approval.

2. Condition No. 4 is included to require the Company to keep records and to provide information to the Ministry so that compliance with the EPA, the regulations and this Approval can be verified.

3. Condition No. 5 is included to require the Company to notify/report to the Ministry so that compliance with the EPA, the regulations and this Approval can be verified.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, 1993 , S.O. 1993, c. 28 (Environmental Bill of Rights), the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;

7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5	AND	The Environmental Commissioner 1075 Bay Street, Suite 605 Toronto, Ontario M5S 2B1	AND	The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment and Climate Change 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

This instrument is subject to Section 38 of the Environmental Bill of Rights, 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca , you can determine when the leave to appeal period ends.

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 8th day of October, 2015

Rudolf Wan, P.Eng.
Director
appointed for the purposes of Part II.1 of
the *Environmental Protection Act*

QN/
c: District Manager, MOECC Hamilton - District
Matthew Griffin, Conestoga-Rovers & Associates

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 1122-BKUPSM
Issue Date: February 3, 2020

2270386 Ontario Limited
162 Cumberland St
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd, Lot 24, Concession 1 North of Talbot Road
County of Haldimand

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

A stormwater management facility and a leachate collection, treatment, and disposal system to service the Brooks Road Landfill Site (formerly Edwards Landfill Site), located in Part of Lot 24, Concession 1, North of Talbot Road, Haldimand County, discharging to a roadside ditch along the east side of Brooks Road, consisting of the following:

Leachate Treatment System

A leachate treatment system designed and installed for a Rated Capacity of 200 m³/day to service the Brooks Landfill Site, located at the south-central side of the landfill site, with an effluent discharge system to discharge effluent to a roadside ditch along Brooks Road with a Rated Capacity of 45 m^3 /day, with a Peak Daily Flow of 60 m^3/day and such other removal of effluent from the Landfill Site in compliance with law, including Ontario Regulation 347, and consisting of the following:

- One (1) leachate collection sump located in the south-east corner of Stage One part of the landfill, equipped with one (1) 6.3 L/sec at 14 m TDH pump discharging through one (1) approximately 35 m long 76.2 mm diameter forcemain into the primary settling tank described below.

- One (1) 28 m³ **Primary Settling Tank** receiving leachate from the existing leachate collection sump, equipped with baffle walls and one (1) 7 L/sec at 9.0 m TDH PST pump, three (3) level floats, and pH monitor, discharging through one (1) 500 micron opening strainer installed on the

feed line to an aeration system described below.

- One (1) **Aeration System** comprising of two (2) 114 m³ capacity concrete tanks in series each aeration tank equipped with 1" lateral air diffusers, two (2) air blowers each with 910 m³/hr (530 cfm) capacity at 13 psi head loss, and the second aeration tank fitted with three (3) level floats, discharging via one (1) 66 m³/hr capacity at 106 m TDH feed pump to the Membrane Biofiltration Reactor (MBR) treatment system described below.

- One (1) 200 m³/day Rated Capacity **Membrane Biofiltration Reactor (MBR) Treatment System** consisting 8 mm diameter membranes housed in four (4) 200 mm diameter tubular modules installed in series and providing a filtration surface area of 36.7 m² per module, designed to operate at maximum pressure of 8 Bar (116 psi) at 40º C with a circulation velocity of 3 m/sec, providing a total filtration area of 146.8 m², equipped with one (1) 200 m³/hr capacity MBR recirculation pump to be used to recirculate activated sludge across the membranes, discharging to a UV disinfection system described below.

- Two (2) **UV Disinfection Units** operating in parallel, each unit capable of providing minimum UV dosage of 40 mJ/cm² at a flow of 114 L/min, discharging by gravity to an effluent transfer tank described below.

- Effluent discharge system consisting of:
  - One (1) 12.5 m³ capacity **Effluent Transfer Tank** equipped with one (1) 7 L/sec at 11 m TDH capacity effluent pump and three (3) level floats, to be used as temporary storage tank to transfer effluent to the existing effluent discharge holding tanks described below.
  - Three (3) 150 m³ capacity **Effluent Discharge Holding Tanks.**
  - Discharge piping from the **Effluent Discharge Holding Tanks** and flow measuring device for a Rated Capacity of 45 m^3/day with a Peak Daily Flow of 60 m^3/day, discharging to the roadside ditch.
  - Discharge piping from the **Effluent Discharge Holding Tanks** and control valve for loading of haulage units for lawful removal of effluent from the Site

- One (1) 12.5 m³ capacity **Sludge Storage Tank**, providing approximately eight (8) days sludge storage capacity, equipped with one (1) 7 L/sec at 7 m TDH capacity sludge pump transferring sludge to the landfill for disposal.

- A chemical feed system consisting of:

  Nitrification
  - one (1) 9 L/hr at 44 psi capacity chemical metering pump dosing **magnesium hydroxide** from a dual wall storage tank to the aeration tank described above for alkalinity control.

  Phosphorus Removal
  - one (1) 9 L/hr at 44 psi capacity chemical metering pump dosing **alum** into the feed line of the aeration tank described above for phosphorus removal.

  Acid Cleaning

- one (1) 24 L/hr at 145 psi capacity chemical metering pump dosing **citric acid** into the MBR feed piping during an acid cleaning of the membranes to remove calcified minerals.

Oxidation Cleaning
- one (1) 78 L/hr at 145 psi capacity chemical metering pump dosing **sodium hypochlorite** into the MBR feed piping during a chlorine cleaning of the membranes to remove accumulated sludge.

Alkaline Cleaning
- one (1) 24 L/hr at 145 psi capacity chemical metering pump dosing **magnesium hydroxide** into the MBR feed piping during an alkaline cleaning of the membranes to remove accumulated fats, oil, and grease.

Leachate Collection System

- a leachate collection, transmission, and storage, designed to handle a maximum of 60 m³/day of leachate generated from the site, consisting of two (2) 75.7 L/min capacity leachate pumps and one (1) 50 mm diameter HDPE forcemain.

Stormwater Management System

A stormwater management facility to service the Brooks Road Landfill Site with a total drainage area of 14.91 ha and an approved landfill footprint of 6.07 ha, designed to provide quantity and quality control of stormwater runoff from storm events with up to 1:100 year return frequency, consisting of the following:

Stormwater Management System (SWMS)

A stormwater management system to provide quality and quantity control of stormwater runoff from the site during the active operation and post closure of the landfill site, consisting of the following:

- one (1) perimeter ditch running from the north-east corner of the landfill site along the east side and south side of the landfill foot print, having a 0.3 m bottom width, a minimum of 1.0 m depth, and 3H:1V side slopes on the road side, conveying collected stormwater runoff to a stormwater management pond described below.

- one (1) perimeter ditch running from the north-east corner of the landfill site along the north side and west side of the landfill foot print, having a 0.3 m bottom width, a minimum of 1.0 m depth, and 3H:1V side slopes on the road side, conveying collected stormwater runoff to a stormwater management pond described below.

- one (1) inlet structure including two (2) 600 mm diameter concrete culverts and an open swale covered with turf reinforcement mat discharging into a forebay described below.

- one (1) forebay with approximate length of 29 m, upstream width of 4 m and downstream width of 15 m, a permanent pool depth of 0.60 m, and side slopes of 4H:1V, equipped with a berm with top

elevation 197.85 m AMSL, discharging to a stormwater management pond described below.

- one (1) wet detention stormwater management pond **(SWMS Pond)** to be located on south west corner of the site providing a total storage capacity of 6,768 m³ consisting of a permanent pool storage volume of 1,266 m³ (at elevation 197.85 m AMSL) with a maximum depth of 0.60 m and an extended storage volume of 5,502 m³ with an extended storage depth of 0.34 m (at elevation of 198.19 m AMSL).

- one (1) outlet structure consisting of one (1) 150 mm diameter perforated PVC pipe with an invert elevation of 197.85 m AMSL, equipped with 75 mm orifice plate, an outlet control valve, and one (1) 600 mm x 1200 mm concrete catch basin, discharging to a roadside ditch along the east side of Brooks Road.

- one (1) emergency by-pass structure consisting of a 2.0 meter wide rip-rap spillway at invert elevation of 199.10 m AMSL discharging to a roadside ditch along Brooks Road,

Including all controls and associated appurtenances,

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document and any schedules attached to it, and the application;

"BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"CBOD5" means 5 day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in unfiltered sample;

"Daily Concentration" means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for purposes of Part II.1, EPA;

"District Manager" means the District Manager of the Hamilton District Office;

"EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

"Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of a named equipment;

"Limited Operational Flexibility" (LOF) means any modifications that the Owner is permitted to make to the Works under this Approval;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Monthly Average Concentration" means the arithmetic mean of all Daily Concentrations of a contaminant in the effluent sampled or measured, or both, during a calendar month;

"Monthly Average Daily Flow" means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month;

"Notice of Modifications" means the form entitled "Notice of Modifications to Sewage Works";

"Owner" means 2270386 Ontario Limited and its successors and assignees;

"OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

"Previous Works" means those portions of the sewage works previously constructed and approved under an Approval;

"Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this Approval;

"Rated Capacity" means the Monthly Average Daily Flow for which the Works are approved to handle;

"Works" means the sewage works described in the Owner's application, and this Approval, and includes Proposed Works, Previous Works, and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

I. GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(3) Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the documents listed in the Schedule submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner or operating authority, or both.

(b) change of address of Owner or operating authority or address of new owner or operating authority.

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Partnerships Registration Act.

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the Corporations Information Act shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this Condition will refer to this Approval's number.

II. LEACHATE COLLECTION AND TREATMENT FACILITY

3. LEACHATE MANAGEMENT

(1) Leachate generated at the landfill Site shall be collected, treated and disposed of using the on-site leachate treatment system

(a) Notwithstanding Condition 3(1), leachate generated at the landfill Site that is not treated using the on-site leachate treatment system shall be removed to an off-site facility that is approved by the Ministry to treat leachate generated at the landfill Site.

(b) In the event there is effluent from leachate that has been treated in the on-site leachate treatment system that cannot be disposed of to the roadside ditch, such effluent may be disposed of to an off-site facility provided such disposal is completed lawfully, including pursuant to Ontario Regulation 347.

(2) Leachate generated at the Landfill Site that is not treated using the on-site leachate treatment system shall not be discharged to the natural environment at any time.

4. OPERATIONS AND MAINTENANCE

(1) Within six (6) months of the issuance date of this Approval, the Owner shall prepare and submit for approval to the Director and a copy to the District Manager a "Contingency and Remedial Action Plan for the Works (**On-site leachate treatment system**)" which shall provide detailed action plans that will be implemented during any event when the effluent limits set under Condition 6(1) are not met;

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the works.

(b) inspection programs, including frequency of inspection, for the works and the methods or tests employed to detect when maintenance is necessary.

(c) repair and maintenance programs, including the frequency of repair and maintenance for the works.

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager, and

(e) complaint procedures for receiving and responding to public complaints.

(3) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

5. EFFLUENT OBJECTIVES

(1) The Owner shall use best efforts to design, construct and operate the works with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the Works.

Table 1 - Effluent Objectives	
Effluent Parameter	**Concentration Objective** (milligrams per litre unless otherwise indicated)
CBOD5	5.0
Total Suspended Solids (TSS)	5.0
Total Ammonia Nitrogen (TAN)	1.0
Total Phosphorus (TP)	0.2
Zinc	0.03
Phenols	0.005
Ethylbenzene	0.008

(2) As a further effluent objective, the Owner shall use best efforts to maintain the pH of the effluent from the works within the range of 6.5 to 8.5, inclusive, at all times.

(3) The Owner shall include in all reports submitted in accordance with Condition 12 a summary of the efforts made and results achieved under this Condition.

6. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the works such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the works.

Table 2 - Effluent Limits	
Effluent Parameter	**Concentration Limit** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
CBOD5	10.0
Total Suspended Solids (TSS)	10.0
Total Ammonia as Nitrogen (TAN)	3.0
Total Phosphorus (TP)	0.29
Toxicity (Daphnia magna)	Non-acutely lethal
Toxicity (Rainbow Trout)	Non-acutely lethal
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

(2) The Owner shall ensure that monitoring results for effluent discharge parameters outlined in Condition 9(3) meet the concentration limits set out in Column 2 of subsection (1).

(3) For the purposes of determining compliance with and enforcing subsection (1):

(a) The Concentration of a parameter named in Column 1 of subsection (1), sampled in accordance with Condition 9(3) shall not exceed the corresponding maximum concentration set out in Column 2 of subsection (1).

(b) The pH of the effluent shall be maintained within the limits outlined in subsection (1), at all times.

(4) In the event of any instance of non-compliance with the effluent limits stipulated under Condition 6(1), the Owner shall implement the "Contingency and Remedial Action Plan for the Works (**On-site leachate treatment system**)" prepared under Condition 3(1), and shall determine appropriate control measures to achieve effluent limits and the time lines for the implementation of identified control measures. The Owner shall submit the proposed control measures and implementation time lines for approval to the Director and a copy to the District Manager.

(5) If compliance with effluent limits are not met within the time lines approved under Condition 6(4), the Owner shall discontinue effluent discharge from the Works and implement off-site disposal of leachate for proper treatment.

(6) In the event that any of the control measures proposed under Condition 6(4) require the installation or an upgrade of the Works, the Owner shall submit an application to the Director for an amendment of this Approval.

7. EFFLUENT - VISUAL OBSERVATIONS

(1) Notwithstanding any other condition in this Approval, the Owner shall ensure that the effluent from the works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters.

8. SPECIAL CONDITION

(1) The Owner shall operate the roadside ditch discharge system for the On-Site Leachate Treatment System at the approved Rated Capacity of 45 m^3/day and Peak Daily Flow of 60 m^3/day until an approval is issued by the Director to operate the roadside ditch discharge system at a higher rated capacity. To obtain approval for using the roadside ditch discharge system at a higher rated capacity, the Owner shall complete a detailed receiving surface water assimilative capacity study and submit the study report along with a proposal for effluent limits to the Ministry's Regional Technical Support Section for review and recommendation. Upon receiving review comments and recommendation of the effluent limits from the Technical Support Section, the Owner shall submit to the Director an application for amendment of this Approval and a detailed design brief for approval of the higher rated capacity for the roadside ditch discharge system.

9. EFFLUENT MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the sewage works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Leachate grab samples shall be collected and analyzed at the following sampling point and at the sampling frequencies specified for each parameter listed:

Table 3 - Influent Leachate Monitoring
Sampling Point: Leachate Storage Tank

Parameters	Frequency	Parameter	Frequency
CBOD5	Monthly	Chlorides	Quarterly
Total Suspended Solids (TSS)	Monthly	Nitrate as Nitrogen	Quarterly
Total Ammonia as Nitrogen (TAN)	Monthly	Arsenic	Quarterly
Total Phosphorus (TP)	Monthly	Barium	Quarterly
pH	Monthly	Boron	Quarterly
Zinc	Monthly	Chromium	Quarterly
Phenols	Monthly	Copper	Quarterly
Ethylbenzene	Monthly	Iron	Quarterly
		Lead	Quarterly
		Benzo(a)pyrene	Quarterly
		Naphtalene	Quarterly
		Benzene	Quarterly
		Toluene	Quarterly

(3) Effluent samples shall be collected and analyzed at the following sampling point, at the sampling frequencies and using the sample type specified for each parameter listed:

Table 4 - Effluent Monitoring
Sampling Point: Effluent Discharge Pipe
Discharge to Brooks Road Ditch

Parameters	Sample Type	Frequency
CBOD5	Grab	Monthly
Total Suspended Solids (TSS)	Grab	Monthly
Total Ammonia as Nitrogen (TAN)	Grab	Monthly
Total Phosphorus (TP)	Grab	Monthly
pH	Grab	Monthly
Zinc	Grab	Monthly
Phenols	Grab	Monthly
Ethylbenzene	Grab	Monthly
Chlorides	Grab	Quarterly
Nitrate as Nitrogen	Grab	Quarterly
Arsenic	Grab	Quarterly
Barium	Grab	Quarterly
Boron	Grab	Quarterly
Chromium	Grab	Quarterly
Copper	Grab	Quarterly
Iron	Grab	Quarterly
Lead	Grab	Quarterly
Benzo(a)pyrene	Grab	Quarterly
Naphtalene	Grab	Quarterly
Benzene	Grab	Quarterly
Toluene	Grab	Quarterly
Acute Lethality Test (Rainbow Trout and Daphnia magna)	Grab	Quarterly

(4) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended from time to time by more recently published editions.
(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions, and
(c) the Environment Canada publications "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" (EPS 1/RM/13 Second Edition - December 2000)

and "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna" (EPS 1/RM/14 Second Edition - December 2000), as amended from time to time by more recently published editions.

(5) The measurement frequencies specified in subsections (2) and (3) in respect of any parameter are minimum requirements which may, after one (1) year of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(6) The owner shall install and maintain (a) continuous flow measuring device(s) to measure the flow rate of the effluent discharged from the sewage works, with an accuracy to within plus or minus fifteen (15) per cent of the actual flow rate for the entire design range of the flow measuring device and record the flow rate at a daily frequency..

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

III - STORMWATER MANAGEMENT FACILITY

10. MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following stormwater monitoring program. Stormwater grab samples shall be collected from the Stormwater Management System **(SWMS) Pond** at a **quarterly frequency** (Spring, Summer, Fall, and Winter) and analysed for the following parameters:

Table 5 - Stormwater Monitoring
Sampling Point: **SWMS Pond**

General Parameters	Metals	Field Parameters
Alkalinity	Arsenic	Conductivity
Conductivity	Barium	Dissolved Oxygen
Hardness	Boron	pH
pH	Cadmium	Temperature
Chloride	Chromium	
Sulphate	Copper	
Nitrate as Nitrogen	Iron	
Nitrite as Nitrogen	Lead	
Total Ammonia as Nitrogen (TAN)	Mercury	
Total Suspended Solids	Zinc	
Total Dissolved Solids		
Chemical Oxygen Demand	**Organics**	
Total Phosphorus	Benzo(a)pyrene	
Total Kjeldahl Nitrogen	Ethylbenzene	
Biological Oxygen Demand (BOD5)	Naphthalene	
Phenols		

(2) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions.

11. OPERATION AND MAINTENANCE

(1) The stormwater run-off generated from the active waste fill area shall be considered contaminated and treated as leachate. The Owner shall ensure that any precipitation falling unto active waste fill areas, not under interim cover, shall be directed to the leachate collection system.

(2) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(3) The Owner shall prepare an operations manual within six (6) months of Substantial Completion of the Works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works.

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary for operational efficiency and environmental protection of the receiving body.

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works.

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager, and

(e) complaint procedures for receiving and responding to public complaints.

(4) The Owner shall maintain the operations manual current and retain a copy at the location of the Works or operational office of the Owner for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(5) The Owner shall undertake an inspection of the condition of the stormwater management ponds and ditches, at least once a year, and undertake any necessary cleaning and maintenance to prevent the

excessive build-up of sediment and/or decaying vegetation.

(6) The Owner shall undertake an inspection and necessary maintenance of the SWMS pond and associated erosion controls including temporary berms, silt fences, rocks and straw bale check dams at least once a year to ensure that the Works are effectively protecting the environment.

(7) The Owner shall maintain a logbook to record the results of the stormwater management pond inspections and any cleaning and maintenance operations undertaken and shall keep the logbook at the site or operational office of the Owner for inspection by the Ministry.

Stormwater Management System (SWMS)

(8) Before the commencement of operation of the Works, the Owner shall prepare a "Stormwater Contingency and Remedial Action Plan" for the Works and provide a copy to the District Manager.

(9) The Owner shall operate the Works in a **normally open position**. The Owner shall compare monitoring results obtained from the Works under Condition 10(1) with the trigger levels of the selected trigger parameters listed in Table 7 to identify any potential leachate impact to stormwater discharged from the ponds.

Table 7 - Trigger Parameters

Parameter	Trigger Level (mg/L)
Un-ionized Ammonia	0.02
Arsenic	0.005
Boron	1.5
pH (unitless)	6.5 to 8.5

(10) In the event that a monitoring result for any of the parameters listed in Table 7 exceeds its corresponding trigger level concentration, the Owner shall re-sample within two weeks period to confirm the trigger level concentration exceedance for that parameter.

(11) In the event that the trigger level concentration exceedance of any parameter of concern is not confirmed after the second round of sampling conducted under Condition 11(10), then, normal stormwater monitoring shall be resumed.

(12) In the event that the trigger level concentration exceedance of any parameter of concern is confirmed after the second round of sampling conducted under Condition 11(10), the Owner shall operate the Works in a **normally closed position** and notify the District Manager forthwith.

(13) While operating the Works in a **normally closed position**, the Owner shall implement the "Stormwater Contingency and Remedial Action Plan" prepared under Condition 11(8) and collect a grab sample and analyze for the trigger parameters listed under Condition 11(9) at a **weekly frequency** preferably after a rainfall event.

(14) The Owner shall resume operating the Works in a **normally open position** if monitoring results for all

trigger parameters from three (3) consecutive sampling events conducted under Condition 11(13) are less than their respective trigger level concentrations.

(15) Discharge of contaminated stormwater from the Works to storm sewer/surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

IV - GENERAL

12. REPORTING

(1) One week prior to the start up of the operation of the works, the Owner shall notify the District Manager (in writing) of the pending start up date.

(2) The Owner shall report to the District Manager or designate, any exceedance of any parameter specified in Condition 6 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedance.

(3) In addition to the obligations under Part X of the Environmental Protection Act, the Owner shall, within ten (10) working days of the occurrence of any reportable spill as defined on Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(4) The Owner shall prepare and submit a performance report to the District Manager on an annual basis by April 30th. The first such report shall cover the first annual period following the commencement of operation of the works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 6, including an overview of the success and adequacy of the sewage works.

(b) a description of any operating problems encountered and corrective actions taken.

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works.

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period.

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment, and

(f) a description of efforts made and results achieved in meeting the effluent objectives outlined in Condition 5.

13. LIMITED OPERATIONAL FLEXIBILITY

(1) The Owner may make modifications to the Works in accordance with the Terms and Conditions of this Approval and subject to the Ministry's "Limited Operational Flexibility Criteria for Modifications to Sewage Works", included under Schedule B of this Approval, as amended.

(2) Sewage works under Limited Operational Flexibility shall adhere to the design guidelines contained within the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended.

(3) The Owner shall ensure at all times, that the Works, related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this Approval.

(4) For greater certainty, the following are not permitted as part of Limited Operational Flexibility:

(a) Modifications to the Works that result in an increase of the approved Rated Capacity of the Works.

(b) Modifications to the Works that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall.

(c) Modifications to the treatment process technology of the Works, or modifications that involve construction of new reactors (tanks) or alter the treatment train process design.

(d) Modifications to the Works approved under s.9 of the EPA, and

(e) Modifications to the Works pursuant to an order issued by the Ministry.

(5) Implementation of Limited Operational Flexibility is not intended to be used for piecemeal measures that result in major alterations or expansions.

(6) If the implementation of Limited Operational Flexibility requires changes to be made to the Emergency Response, Spill Reporting and Contingency Plan, the Owner shall, provide a revised copy of this plan for approval to the local fire services authority prior to implementing Limited Operational Flexibility.

(7) For greater certainty, any modification made under the Limited Operational Flexibility may only be carried out after other legal obligations have been complied with, including those arising from the *Environmental Protection Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, Lake Simcoe Protection Act* and *Greenbelt Act.*

(8) At least thirty (30) days prior to implementing Limited Operational Flexibility, the Owner shall complete a Notice of Modifications describing any proposed modifications to the Works and submit it to the District Manager.

(9) The Owner shall not proceed with implementation of Limited Operational Flexibility until the District Manager has provided written acceptance of the Notice of Modifications or a minimum of thirty (30) days have passed since the day the District Manager acknowledged the receipt of the Notice of Modifications.

Schedule A

1. Application for Approval of Industrial Sewage Works submitted by Mr. Richard Weldon, Managing Partner, 2270386 Ontario Inc., dated September 9, 2019 and supporting information prepared by GHD Consulting Engineers.

2. Letter from GHD to Mr. Paul Widmeyer, Ministry of Environment, Conservation and Parks, Re: Permanent Stormwater Management System ECA No. 4142-ASEKJ2 dated September 17, 2019.

3. Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated September 11, 2013 and design specifications and drawings Prepared by Conestoga-Rovers & Associates Ltd., Waterloo, Ontario.

4. Letter from Peter Kemp, B. Eng., Conestoga-Rovers & Associates Ltd., to Stefanos Habtom, P. Eng., dated May 31, 2014 in response to an additional information request dated April 10, 2014.
5. Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated May 15, 2015 and design specifications and drawings for the leachate treatment system prepared by KOESTER CANADA, Brantford, Ontario.

6. Revised Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated December 15, 2017 but received on January 8, 2018 and revised design specifications and drawings for the leachate treatment system prepared by KOESTER CANADA, Brantford, Ontario.

Schedule B

Limited Operational Flexibility Criteria for Modifications to Industrial Sewage Works

1. The modifications to sewage works approved under an Environmental Compliance Approval (Approval) that are permitted under the Limited Operational Flexibility (LOF), are outlined below and are subject to the LOF conditions in the Approval, and require the submission of the Notice of Modifications. If there is a conflict between the sewage works listed below and the Terms and Conditions in the Approval, the Terms and Conditions in the Approval shall take precedence.

1.1 Sewage Pumping Stations

a. Alter pumping capacity by adding or replacing equipment where new equipment is located within an existing sewage treatment plant site or an existing sewage pumping station site, provided that the modifications do not result in an increase of the sewage treatment plant Rated Capacity and the existing flow process and/or treatment train are maintained, as applicable.

1.2 Sewage Treatment Process

a. Installing additional chemical dosage equipment including replacing with alternative chemicals for pH adjustment or coagulants (non-toxic polymers) provided that there are no modifications of treatment processes or other modifications that may alter the intent of operations and may have negative impacts on the effluent quantity and quality.

b. Expanding the buffer zone between a sanitary sewage lagoon facility or land treatment area and adjacent uses provided that the buffer zone is entirely on the proponent's land.

c. Optimizing existing sanitary sewage lagoons with the purpose to increase efficiency of treatment operations provided that existing sewage treatment plant rated capacity is not exceeded and where no land acquisition is required.

d. Optimizing existing sewage treatment plant equipment with the purpose to increase the efficiency of the existing treatment operations, provided that there are no modifications to the works that result in an increase of the Rated Capacity, and may have adverse effects to the effluent quality or location of the discharge.

e. Replacement, refurbishment of previously approved equipment in whole or in part with Equivalent Equipment, like-for-like of different make and model, provided that the firm capacity, reliability, performance standard, level of quality and redundancy of the group of equipment is kept the same. For clarity purposes, the following equipment can be considered under this provision: screens, grit separators, blowers, aeration equipment, sludge thickeners, dewatering equipment, UV systems, chlorine contact equipment, bio-disks, and sludge digester systems.

1.3 Sewage Treatment Plant Outfall

a. Replacement of discharge pipe with similar pipe size provided that the outfall location is not changed.

1.4 Sanitary Sewers

a. Pipe relining and replacement with similar pipe size within the Sewage Treatment Plant site, where the nominal diameter is not greater than 1,200 mm.

1.5 Pilot Systems

a. Installation of pilot systems for new or existing technologies provided that:

i. any effluent from the pilot system is discharged to the inlet of the sewage treatment plant or hauled off-site for proper disposal,
ii. any effluent from the pilot system discharged to the inlet of the sewage treatment plant or sewage conveyance system does not significantly alter the composition/concentration of the influent sewage to be treated in the downstream process; and that it does not add any inhibiting substances to the downstream process, and
iii. the pilot system's duration does not exceed a maximum of two years; and a report with results is submitted to the Director and District Manager three months after completion of the pilot project.

2. Sewage works that are exempt from section 53 of the OWRA by O. Reg. 525/98 continue to be exempt and are not required to follow the notification process under this Limited Operational Flexibility.

3. Normal or emergency operational modifications, such as repairs, reconstructions, or other improvements that are part of maintenance activities, including cleaning, renovations to existing approved sewage works equipment, provided that the modification is made with Equivalent Equipment, are considered pre-approved.

4. The modifications noted in section (3) above are <u>not</u> required to follow the notification protocols under Limited Operational Flexibility, provided that the number of pieces and description of the equipment as described in the Approval does not change.

Ontario
Ministry of
the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:
1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Conforms with the Limited Operational Flexibility as per the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name (Print)	PEO License Number

Signature	Date (mm/dd/yy)

Name of Employer

Part 4 – Declaration by Owner

I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name of Owner Representative (Print)	Owner representative's title (Print)

Owner Representative's Signature	Date (mm/dd/yy)

Notice of Modifications Dec-2013.pdf

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent Owners of the works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is imposed to ensure consistency between approvals granted by the Ministry.

4. Conditions 4 and 11 are included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the works.

5. Condition 5 is imposed to establish non-enforceable effluent quality objectives which the Owner is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 5 are exceeded.

6. Conditions 6 and 7 are imposed to ensure that the effluent discharged from the Works to the Brooks Road side ditch meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.

7. Condition 8 is included to ensure that treatment capacity for the leachate treatment system is established based on proper receiving surface water assimilative capacity assessment and effluent limits requirements.

8. Conditions 9 and 10 are included to require the Owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved Works is consistent with the (design objectives and) effluent limits specified in the Approval and that the approved works does not cause any impairment to the receiving watercourse.

9. Condition 12 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

10. Condition 13 is included to ensure that the Works are operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider. These Conditions are also included to ensure that a Professional Engineer has reviewed the proposed modifications and attests that the modifications are in line with that of Limited Operational Flexibility, and provide assurance that the proposed modifications comply with the Ministry's requirements stipulated in the Terms and Conditions of this Approval, Ministry policies, guidelines, and industry engineering standards and best management practices.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4142-ASEKJ2 issued on January 29, 2018.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 3rd day of February, 2020

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

HV/

c: District Manager, MECP Hamilton - District
Greg Ferraro, GHD

Notice of Modifications Dec-2013.pdf

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A110302
Issue Date: March 27, 2020

2270386 Ontario Limited
162 Cumberland St
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd
Lot 24, Concession 1 NORTH
Haldimand County

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

a waste disposal site (landfill) with a total site area of 14.3 hectares of which 6 hectares is approved for landfilling.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" or "ECA" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A";

"Contaminating Life Span" means contaminating life span as defined in Ontario Regulation 232/98;

"Design and Operations Report" means the Design and Operations Report Vertical Expansion, Brooks Road Landfill Site, Prepared by GHD, April 18, 2019 that was submitted in support of the Approval

"Director" means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part II.1 of the EPA;

"District Manager" means the District Manager of the local district office of the Ministry in which the Site is geographically located;

"EPA" means Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended;

"Improvement Area" means the area of Brooks Road, between Highway #3 (also known as Talbot Road) and Townline Road;

“Ministry” means the Ontario Ministry of the Environment, Conservation and Parks;

"NMA" means Nutrient Management Act, 2002, S.O. 2002, c. 4, as amended;

"Odour Management Plan" means a document which describes the measures to minimize odour emissions from the Site;

"Operator” means any person, other than the Owner's employees, authorized by the Owner as having the charge, management or control of any aspect of the Site and includes its successors or assigns;

"Owner" means any person that is responsible for the establishment or operation of the Site being approved by this Approval, and includes 2270386 Ontario Limited and its successors and assigns;

“OWRA” means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

“PA” means the Pesticides Act, R.S.O. 1990, c. P-11, as amended;

"Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the OWRA, Section 5 of the EPA, Section 17 of the PA, Section 4 of the NMA, or Section 8 of the SDWA;

"Refrigerant Appliances" means household appliances which use, or may use refrigerants, and which include, but is not restricted to, refrigerators, freezers and air-conditioning systems;

"Regional Director" means the Regional Director of the local Regional Office of the Ministry in which the Site is located;

"Regulation 232" means Ontario Regulation 232/98 - Landfilling Sites made under the EPA, as amended;

"Regulation 347" or "Reg. 347" means means Regulation 347, R.R.O. 1990, General - Waste Management, made under the EPA, as amended;

"Regulation 406" means means Regulation 406/19, R.S.O. 1990, On-site and Excess Soil Management, made under the EPA, as amended;

"Regulation 558" means Ontario Regulation 558/00 - General Waste Management, made under the EPA, as amended;

"Regulation 903" means Regulation 903 - Wells, R.R.O. 1990, made under the OWRA, as amended;

"SDWA" means Safe Drinking Water Act, 2002, S.O. 2002, c. 32, as amended;

“Site" means the entire waste disposal site, including the buffer lands, at the Brooks Road Landfill Site, Lot 24, Concession 1 North, Haldimand County; and

“Trained Personnel” means personnel knowledgeable in the following through instruction and/or practice:

a. relevant waste management legislation, regulations and guidelines;
b. major environmental concerns pertaining to the waste to be handled;
c. occupational health and safety concerns pertaining to the processes and wastes to be handled;
d. management procedures including the use and operation of equipment for the processes and wastes to be handled;
e. emergency response procedures;
f. specific written procedures for the control of nuisance conditions;
g. specific written procedures for refusal of unacceptable waste loads; and
h. the requirements of this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

Compliance

(1) This Approval revokes all previous Approvals and Notices of Amendment issued under Part V of the Environmental Protection Act for this Site. The approval given herein, including the terms and conditions set out, replaces all previously issued Approvals and related terms and conditions under Part V of the Act for this Site.

(2) The Owner and Operator shall ensure compliance with all the conditions of this Approval and shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(3) Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Approval.

In Accordance

(4) Except as otherwise provided by this Approval, the Site shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule “A”.

(5) 1. Construction and installation of aspects described in Schedule "A" must be completed within 5 years of the later of:

(a) the date this Approval is issued; or

(b) if there is a hearing or other litigation in respect of the issuance of this Approval, the date that this hearing or litigation is disposed of, including all appeals.

2. This Approval ceases to apply in respect of the aspects of the Site noted above that have not been constructed or installed before the later of the dates identified in Condition 1(5)1.

Interpretation

(6) Where there is a conflict between a provision of any document listed in Schedule "A" in this Approval, and the conditions of this Approval, the conditions in this Approval shall take precedence.

(7) Where there is a conflict between the application and a provision in any document listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and the Ministry approved the amendment.

(8) Where there is a conflict between any two documents listed in Schedule "A", the document bearing the most recent date shall take precedence.

(9) The conditions of this Approval are severable. If any condition of this Approval, or the application of any condition of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

Other Legal Obligations

(10) The issuance of, and compliance with, this Approval does not:
(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; and
(b) limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner and Operator to furnish any further information related to compliance with this Approval.

Adverse Effect

(11) The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the present, past and historical operations at the Site. Such steps may include accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

(12) Despite an Owner, Operator, or any other person fulfilling any obligations imposed by this Approval, the person remains responsible for any contravention of any other condition of this Approval or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

(13) At no time shall the Owner or Operator allow the discharge of a contaminant that causes or is likely to

cause an adverse effect.

Change of Ownership

(14) The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:
(a) the ownership of the Site;
(b) the Operator of the Site;
(c) the address of the Owner or Operator; and
(d) the partners, where the Owner or Operator is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R. S. O. 1990, c. B.17, shall be included in the notification.

(15) No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

(16) In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Approval, and the Owner shall provide a copy of the notification to the District Manager and the Director.

Registration on Title Requirement

(17) Prior to dealing with the property in any way, the Owner shall provide a copy of this Approval and any amendments, to any person who acquires an interest in the property as a result of the dealing.

(18) (a) If not already completed, within ninety (90) calendar days from the date of issuance of this Approval, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:
(i) a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the Site where waste has been and is to be deposited at the Site;
(ii) proof of ownership of the Site;
(iii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director, verifying the legal description provided in the Certificate of Requirement;
(iv) the legal abstract of the property; and
(v) any supporting documents including a registerable description of the Site.

(b) If not already completed, within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the Director, the Owner shall:
(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and the District Manager, written verification that the Certificate of Requirement has been registered on title.

Registration on Title Requirement - Contaminant Attenuation Zone (CAZ)

(19) Within thirty (30) calendar days from the date of establishing a contaminant attenuation zone (CAZ) (overburden and/or bedrock aquifers) in either fee simple or by way of a groundwater easement, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:

(a) If rights are obtained in fee simple, the Owner shall provide:
  (i) documentation evidencing ownership of the CAZ obtained in compliance with Regulation 232, as amended;
  (ii) a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and
  (iii) a letter signed by a member of the Law Society of Upper Canada; or other qualified legal practitioner acceptable to the Director, verifying the legal description of the CAZ.

(b) within fifteen (15) calendar days of receiving a Certificate of Requirement signed or authorized by the Director,the Owner shall:
  (i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
  (ii) submit to the Director and the District Manager, a written verification that the Certificate of Requirement has been registered on title.

(c) If rights are obtained by way of a groundwater easement, the Applicant shall:
  (i) provide a copy of the agreement for the easement;
  (ii) provide a plan of survey signed and sealed by an Ontario Land Surveyor for the CAZ; and
  (iii) submit proof of registration on title of the groundwater easement to the Director and District Manager;

(d) The Owner shall not amend, or remove, or consent to the removal of the easement or CAZ from title without the prior written consent of the Director.

Inspections by the Ministry

(20) No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the OWRA, the EPA, the PA, the SDWA or the NMA, of any place to which this Approval relates, and without limiting the foregoing:
(a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept;
(b) to have access to, inspect, and copy any records required to be kept by the conditions of this Approval;
(c) to inspect the Site, related equipment and appurtenances;
(d) to inspect the practices, procedures, or operations required by the conditions of this Approval; and
(e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the EPA, the OWRA, the PA, the SDWA or the NMA.

Information and Record Retention

(21) (a) Except as authorized in writing by the Director, all records required by this Approval shall be retained at the Site for a minimum of two (2) years from their date of creation.

(b) The Owner shall retain all documentation listed in Schedule "A" for as long as this Approval is valid.
(c) All information and logs required in Conditions 9(1), 10(1), 11(3), 11(4), 12(3), and 12(4) shall be kept at the Site until they are included in the Annual Report.
(d) The Owner shall retain employee training records as long as the employee is working at the Site.
(e) The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

(22) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action under this Approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
(a) an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Approval or any statute, regulation or other legal requirement; or
(b) acceptance by the Ministry of the information's completeness or accuracy.

(23) The Owner shall ensure that a copy of this Approval, in its entirety and including all its Notices of Amendment, and documentation listed in Schedule "A", are retained at the Site at all times.

(24) Any information related to this Approval and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

2. FINANCIAL ASSURANCE

(1) (a) Within twenty (20) days of issuance of this Notice, the Owner shall submit to the Director, Financial Assurance as defined in Section 131 of the Environmental Protection Act, in the amount of **$8,371,282.00.** This Financial Assurance shall provide sufficient funds for the closure and post-closure care/monitoring of the Site.

(i) The total amount of financial assurance specified in Condition 2(1)(a) shall be updated by the *Owner,* as follows, by the specified dates:

i. October 1, 2021 - **$9,956,333.00**
ii. October 1, 2022 - **$11,541,383.00**
iii. October 1, 2023 - **$10,424,285.00**
iv. October 1, 2024 - **$10,097,075.00**

(b) Commencing on October 1, 2023 and on a three (3) year basis thereafter, the Owner shall provide to the Director a re-evaluation of the amount of the Financial Assurance to facilitate the actions required under Condition 2(1)(a). The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of alternative measures required by the Director upon review of the annual reports. The Financial Assurance must be submitted to the Director within twenty (20) days of written acceptance of the re-evaluation by the Director;

(c) The amount of Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is received, indicating Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial Assurance at least sixty (60) days before the Financial Assurance terminates, the Owner shall forthwith replace the Financial Assurance with cash.

3. SITE OPERATION

Operation

(1) The Site shall be operated and maintained at all times including management and disposal of all waste, in accordance with the EPA, Regulation 347, Regulation 232, and the conditions of this Approval.

Service Area

(2) Waste categories of Industrial, Commercial and Institutional ("ICI waste"), generated from within the geographic boundaries of the Province of Ontario may be received for disposal at this Site.

Waste Types

(3) Only solid non-hazardous ICI waste, including contaminated soils, and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), shall be received for disposal at this Site. No hazardous waste or liquid industrial waste**,** as defined in Reg. 347, as amended by Reg. 558/00, shall be disposed at this Site.

(4) The Owner shall develop and implement a program to inspect waste to ensure that the waste received at the Site is of a type approved for acceptance under this Approval.

(5) The Owner shall ensure that all loads of waste are properly inspected by Trained Personnel prior to acceptance at the Site and that the waste vehicles are directed to the appropriate areas for disposal or transfer of the waste. The Owner shall notify the District Manager, in writing, of load rejections at the Site within one (1) business day from their occurrence.

Approved Waste Quantities

(6) The maximum volumetric capacity for the Site including waste and daily cover shall not exceed 1,045,065 cubic metres.

(7) The Owner shall ensure that the waste received at the Site does not exceed:
(a) a total of 151,000 tonnes in any calendar year; and
(b) the daily maximum received at the site does not exceed 1,000 tonnes.

Waste Placement

(8) No waste shall be landfilled outside of the approved six (6) hectare footprint fill area. The site shall be developed, maintain established buffer areas, and adhere to final contours for waste and final cover material in accordance with the design drawings provided in Appendix L of the Design and Operations Report.

(a) The maximum elevation of the fill zone, including final cover, shall be 221.50 metres above mean sea level.

Signage

(9) A sign shall be installed and maintained at the main entrance/exit to the Site on which is legibly displayed the following information:

(a) the name of the Site and Owner;
(b) the number of the Approval;
(c) the name of the Operator;
(d) the normal hours of operation;
(e) the allowable and prohibited waste types;
(f) the telephone number to which complaints may be directed;
(g) a warning against unauthorized access;
(h) a twenty-four (24) hour emergency telephone number (if different from above); and
(i) a warning against dumping outside the Site.

(10) All landfill signs shall be kept legible, in good repair, and cleaned when required.

Nuisance Control (Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic)

(11) The Site shall be operated and maintained such that vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.

(12) The Owner/Operator shall install visual screening berms, in accordance with the Design and Operations Report and shall inspect and maintain them as required, during the operating life of the landfill Site.

(13) The Owner/Operator shall conduct inspections and ensure that appropriate controls are in place to prevent the acceptance of liquid industrial waste and hazardous waste and to prevent the acceptance of waste from outside the approved service area. Records of violations by haulers or waste generators shall be maintained in the daily records for the Site operations. The Owner/Operator shall ensure that any waste refused for disposal leaves the Site immediately, and the District Manager is notified forthwith, of all waste load refusals at the Site related to requirements in this Certificate, including service area and waste types.

(14) The Owner/Operator shall ensure that the leachate collection system piping in the fill area and the connecting forcemain piping which leads to the leachate holding tank, shall be cleaned out at least once per year with a high pressure wash, and video inspections conducted, as necessary, to confirm that the pipes are clean and to determine the need for more frequent cleaning. Assessment of the need to amend the cleaning frequency shall be based on regular inspections of the leachate collection system and monitoring results.

(15) A thickness of at least 5 metres of compacted waste and cover material shall be maintained between any landfilled sludge (solid non-hazardous as per Reg. 347) and the granular leachate collection layer and leachate monitoring wells.

(16) The Owner/Operator shall take all reasonable steps to prevent off-site nuisance impacts, including visual impacts, transfer of waste, mud, or dust from the Site onto public roads due to landfill operations.

Burning of Waste

(17) Burning of waste at the Site is prohibited.

Scavenging

(18) Scavenging (as defined in Reg. 347) of deposited and/or stockpiled waste is prohibited at the Site. Controlled removal of recycleable/reusable material from the Site may only occur in a designated paved area on the Site, and shall be supervised by Trained Personnel.

Hours of Operation

(19) The permitted hours of operation for the site are from 6:00 a.m. to 6:00 p.m., Monday to Friday, and from 6:00 a.m. to 2:00 p.m. on Saturdays, for site preparation, site maintenance and daily cover activities. The operating hours for receipt of waste for disposal at the Site shall be from 7:00 a.m. to 5:00 p.m., Monday to Friday, and from 7:00 a.m. to 1:00 p.m., on Saturdays. No operations shall take place at the Site outside of the stated hours and the Site shall be closed on statutory holidays.

(20) The hours of operation may be amended from time to time to accommodate seasonal or unusual demand, based on prior consultation with the PLC and written concurrence from the District Manager.

Site Security

(21) No waste shall be received, landfilled or removed from the Site unless a site supervisor or other Trained Personnel are present to supervise the operations during operating hours. The Site shall be closed when a supervisor or Trained Personnel are not present to supervise operations at the Site.

(22) The Site shall be operated and maintained in a safe and secure manner. During non-operating hours, the Site entrance and exit gates shall be locked and the Site shall be secured against access by unauthorized persons.

Cover Material

(23) Alternative materials to soil may be used as weekly and interim cover material, based on an application with supporting information and applicable fee for a trial use or permanent use, submitted by the Owner to the Director, copied to the District Manager and as approved by the Director via an amendment to this Approval. The alternative material shall be non-hazardous according to Regulation 347 and will be expected to perform at least as well as soil in relation to the following functions:

(a) control of blowing litter, odours, dust, landfill gas, gulls, vectors, vermin and fires;
(b) provision for an aesthetic condition of the landfill during the active life of the Site;
(c) provision for vehicle access to the active tipping face; and
(d) compatibility with the design of the Site for groundwater protection, leachate management and landfill gas management.

(24) Daily, interim and final cover material shall be shall be applied as follows:

a. Daily Cover - At the end of each working day, the entire working face shall be compacted and covered with a minimum thickness of 150 mm of soil cover, compost, wood chips, or other approved daily cover material. Prior to placing waste at the start of the next operating day, the existing daily cover material shall be scarified or removed to the extent practical, to ensure vertical hydraulic connection is maintained between layers of waste and to promote percolation of leachate downwards to the leachate collection system.
b. Interim Cover - In areas where landfilling ceases temporarily for a period of 6 months or more, a minimum thickness of 300 mm of soil shall be placed as interim cover and graded to promote surface water runoff. The quality of soil for use as interim cover shall, as a minimum, meet the standards specified in Table 3 of Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Prior to the use of interim cover soil, representative samples shall be taken and analysed for metals, Volatile Organic Compounds (VOCs) and PAHs, to confirm the soil meets the above-mentioned standards.
c. Final Cover - Final cover shall be applied progressively as areas of the landfill reach final waste elevations within the fill area. Prior to placement of final cover, the Owner/Operator shall submit for the approval of the Director, a report detailing the specifications, including particle size distribution of the final cover soil which shall confirm the designed infiltration rate of 0.15 m/year, as well as the protocols for testing and acceptance for on-site and off-site final cover soils. All areas of final cover shall be graded and vegetated as soon as practically possible. The final soil cap shall be regularly inspected and maintained after the installation and during the post-closure period. Without limiting the above, the Owner/Operator shall ensure for a minimum of five years after completion of the cap that the Site shall be inspected at least on a quarterly basis to ensure that there is positive drainage along the cap and that during the frost free period of the first two years following completion, such inspections shall be monthly. If any inspection indicates that there is an area of ponding or zero slope, the Owner/Operator shall take all steps necessary to provide positive drainage and rehabilitate the final cover as soon as practically possible.
d. All on-site and excess soil used for daily, interim, and final cover shall be managed in accordance with Regulation 406.

Traffic Control

(25) The Owner/Operator shall ensure that vehicles carrying waste or materials to and from the Site shall only enter the Site from Highway #3 and Brooks Road. At no time shall any vehicle carrying waste or materials to and from the Site travel along Townline Road to access the Site.

(26) The Owner/Operator shall be responsible for maintenance and remedial work to the Improvement Area.

The Improvement Area shall be maintained to the following minimum requirements:

(a) 300 mm thick granular "A" layer of gravel, meeting all applicable Haldimand County and Ontario Provincial Standards Specification (OPSS) to the Improvement Area; and

(b) Maintain asphalt on the entranceway/exit to the landfill and the parking area for the landfill Site, as well as 30 metres of the road approach on Brooks Road to the entranceway/exit to the Site, extending both north and south of the entranceway/exit, in base asphalt and top coat. The thickness of asphalt shall be a base coarse of 60 mm (HL8), and a surface coarse of 50 mm (HL3).

Odour Management

(27) Within ninety (90) days from the issuance of this Approval, the Owner shall submit to the District Manager for approval, an Odour Management Plan that includes mitigation measures to minimize off-Site odour impacts, and if appropriate, a trigger mechanism and contingency plan.

(28) The Odour Management Plan shall be reviewed on an annual basis as part of the Annual Report.

(29) If there is any odour complaint, or significant odour is detected during daily inspection, and the odour is confirmed to originate from the Site, mitigation measures shall be implemented immediately in accordance with the Odour Management Plan approved by the District Manager.

(30) If odour causes adverse off-site impacts that are not mitigated through implementation of odour mitigation measures according to the Odour Management Plan, the Owner shall, upon written notification from the District Manager, conduct an investigation into the cause as to why the impacts were not mitigated and submit to the District Manager within the time frame identified in the notice, an assessment of the issues and the need for implementation of contingency actions in accordance with the Odour Management Plan.

(31) If the Ministry deems the odour mitigation measures taken as per Condition 3(29) to be unsuitable, insufficient or ineffective, the District Manager may direct the Owner, in writing, to propose further measures to address the noted failure, upset or malfunction, which may include requiring a reduction in the receipt of waste, cessation of the receipt of waste, removal and disposal of waste from the waste diversion area, the removal of leachate from the Site in accordance with Condition 5(5), as well as, making repairs or modifications to equipment or processes. Such measures shall be implemented by the Owner upon approval by the District Manager.

(32) If the cessation of the receipt of waste is required, as determined by Condition 3(31), no waste shall be received at the Site until the District Manager is satisfied that odour impacts have been adequately mitigated.

4. GROUNDWATER AND SURFACE WATER MONITORING

Compliance

(1) The Site shall be operated in such a way as to ensure compliance with the following:

(a) Reasonable Use Guideline B-7 for the protection of the groundwater at the Site; and

(b) Provincial Water Quality Objectives included in the July 1994 publication entitled *Water Management Policies, Guidelines, Provincial Water Quality Objectives,* as amended from time to time, or limits set by the Regional Director, or the *Canadian Water Quality Guidelines* published by the Canadian Council of Ministers of the Environment, 1999 for the protection of the surface water at and off the Site.

Surface Water and Groundwater

(2) The Owner shall monitor surface water and groundwater in accordance with the environmental monitoring program outlined in Schedule "B".

(3) A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic and hydrologic training and experience shall execute or directly supervise the execution of the environmental monitoring and reporting program.

Groundwater Wells and Monitors

(4) The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage and maintained in accordance with Regulation 903.

(5) Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.

(6) Any groundwater monitoring well included in the on-going monitoring program that is damaged shall be assessed, repaired, replaced or decommissioned by the Owner, as required.

(a) The Owner shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed.

(b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the Director or the District Manager for abandonment, shall be decommissioned by the Owner, as required, in accordance with Regulation 903, to prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

Trigger Mechanisms and Contingency Plans

(7) In the event of a confirmed exceedance of a site-specific trigger level relating to groundwater or surface water impacts due to leachate, the Owner shall immediately notify the District Manager, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be

carried out by the Owner in accordance with the approved trigger mechanisms and associated contingency plans provided in Appendix J of the Design and Operations Report.

(8) If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the Owner shall ensure that the following steps are taken:

(a) the Owner shall notify the District Manager, in writing of the need to implement contingency measures, no later than seven (7) days after confirmation of the exceedances;
(b) within thirty (30) days from the date of confirming the need to implement contingency measures, detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the Owner to the Director for approval; and
(c) the contingency measures shall be implemented by the Owner upon approval by the Director.

(9) The Owner shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to surface water or groundwater, are approved in advance by the Director via an amendment to this Approval.

Changes to the Monitoring Plan, Trigger Mechanism and Contingency Plan

(10) The Owner may request to make changes to the environmental monitoring program, Trigger Mechanism and Contingency Plan to the District Manager in accordance with the recommendations of the annual report. The Owner shall make clear reference to the proposed changes in a separate letter that shall accompany the annual report.

(11) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the environmental monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to the changes to the monitoring program, to the Director requesting the Approval be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

(12) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the Owner shall follow current Ministry procedures for seeking approval for amending the Approval.

5. LEACHATE MANAGEMENT AND DISPOSAL

(1) Leachate generated at the landfill Site shall be collected, treated and disposed of using the on-site Leachate Treatment System, in accordance with the terms and conditions of the Industrial Sewage Works Approval No. 1122-BKUPSM dated February 3, 2020, as amended.

(a) Notwithstanding Condition 5(1), leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall be removed to an off-site facility that is approved by the Ministry to treat leachate generated at the landfill Site.

(2) Leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall not be discharged to the natural environment at any time.

(3) Any alternative proposal for leachate management and disposal must receive prior written approval of the District Manager.

(4) The Owner shall reduce the level of leachate within the landfill to an elevation 191 metres above mean sea level (AMSL), which equates to an average leachate depth of no greater than 0.3 metres, by the earlier of:

(a) five (5) years from the issuance date of this ECA; or
(b) the date the landfill reaches capacity.

(5) In addition to the requirements of Condition 5(4), the interim annual leachate elevation levels and interim landfill capacity-based leachate elevations shall be adhered to pursuant to Schedules "C" and "D" respectively.

(a) The leachate elevation, as determined by the pressure transducer located in the leachate collection sump riser pipe shall be used to establish the landfill leachate elevation. The leachate elevation will be considered in compliance with the target leachate elevations if the measurement meets the elevations stated in Schedules "C" and "D" within fifteen (15) days of the compliance date.

(6) The Owner shall implement the leachate management contingency measures in the report titled "Leachate Removal Plan, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited", prepared February 7, 2020, as amended, as necessary to meet the leachate elevations in Schedules "C" and "D".

(a) if the leachate elevations in Schedules "C" and "D" are not met within 105 days of the anniversary date of the issuance of this Approval the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below the leachate elevation in Schedules "C" and "D":
    (i) notify the District Manager;
    (ii) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site;
    (iii) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site;
    (iv) install interim cover to cells that have not reached final waste contours and to the working face;
    (v) install final cover to cells that have reached final waste contours;
    (vi) establish vegetation on installed cover material where appropriate and weather permitting; and
    (vii) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate.

(b) landfilling activities may commence again when the compliance leachate elevation has been attained; and
(c) prior to amending the Leachate Removal Plan proposed amendments shall be submitted to the District Manager for approval.

(7) If the leachate elevation in the landfill reaches 199.0 metres AMSL, the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below 199.0 metres AMSL:

(a) notify the District Manager;
(b) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site;
(c) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site;
(d) install interim cover to cells that have not reached final waste contours and to the working face;
(e) install final cover to cells that have reached final waste contours;
(f) establish vegetation on installed cover material where appropriate and weather permitting; and
(g) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate.

(8) The Owner shall monitor leachate in accordance with the monitoring program outlined in Schedule "B".

6. LANDFILL GAS MANAGEMENT

(1) The Owner/Operator shall ensure that all buildings and structures containing enclosed spaces at the Site, shall be situated, constructed and monitored in a manner which minimizes the potential for explosive hazards due to landfill gas. The Owner/Operator shall install and maintain in good working condition, methane detection and alarm equipment (with active venting or with an effective passive venting system to relieve any possible landfill gas accumulation) for all enclosed buildings at the Site.

(2) The Owner/Operator shall ensure that site design plans, specifications and descriptions for the control of landfill gas are such that the subsurface migration of landfill gas meets the requirements of the Ministry's Landfill Standards Guideline, Section 4.10, including but not limited to the following:

(a) the concentration of methane gas below the ground surface at the Site boundary must be less than 2.5 per cent by volume;
(b) the concentration of methane gas in any on-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition, must be less than 1.0 per cent by volume;
(c) sub-condition (b) does not apply to a leachate collection, storage or treatment facility or a landfill gas collection or treatment facility for which specific health and safety measures and procedures are in place relating to the risk of asphyxiation and the risk of explosion; and
(d) the concentration of methane gas from the Site in any off-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, must be less than 0.05 per cent by volume (i.e. not present).

(3) If the measured gas concentration at a gas probe exceeds the applicable limit listed in Condition 6(2) above, the District Manager shall be notified immediately. The gas concentrations shall be re-measured immediately and daily for a period of up to three (3) consecutive days. If these readings confirm that the applicable limit has been exceeded, the Owner/Operator shall forthwith, implement appropriate control measures.

(4) The Owner shall monitor landfill gas in accordance with the monitoring program outlined in Schedule "B".

7. STORMWATER MANAGEMENT

(1) Stormwater runoff generated from the active waste fill area shall be treated by the Owner/Operator as leachate. The Owner/Operator shall ensure that any precipitation falling unto active waste fill areas, not under interim cover, shall be directed to the leachate collection system. If necessary, granular sumps shall be dug into the waste to facilitate drainage of contaminated stormwater towards the leachate collection system.

(2) The Owner shall monitor the stormwater management pond in accordance with the monitoring program outlined in Schedule "B".

8. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the Owner or the Operator. Only Trained Personnel shall operate any aspect of the Site or carry out any activity required under this Approval.

(2) The Owner shall ensure that all site operations employees have been adequately trained and received on-going training with respect to the following, but not limited to:

(a) terms, conditions and operating requirements of this Approval for the Site;
(b) the operation, inspection, and maintenance of the Site with respect to the approved design and operations documents;
(c) relevant waste management legislation and regulations;
(d) environmental concerns related to waste management at the Site;
(e) occupational Health and Safety concerns related to waste management at the Site; and
(f) emergency procedures and contingency plans in case of fire, spills, off-site impacts and any other emergency situations.

9. COMPLAINTS RESPONSE PROCEDURE

(1) If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:

(a) The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;
(b) The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a written reply to the complainant; and
(c) The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and recommendations, if any, for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

10. EMERGENCY AND SPILL RESPONSE

(1) All Spills as defined in the EPA occurring at or from the Site shall be immediately reported to the **Ministry's Spills Action Centre at 1-800-268-6060** and shall be recorded in the log book. The Owner/Operator shall record for each Spill event the contaminant(s) spilled, the quantity or volume of contaminants spilled, the spatial distribution of the area impacted by the Spill, a root cause analysis of the events leading up to the Spill and a list of actions designed to prevent similar Spill events.

(2) In addition, the Owner shall submit, to the District Manager a written report within three (3) business days of the Spill event, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the Site.

(3) All wastes resulting from a Spill event shall be managed and disposed of in accordance with the EPA and Regulation 347.

(4) All equipment and materials required to handle the Spill event shall be:

(a) kept on hand at all times that waste landfilling and/or handling is undertaken at the Site; and
(b) adequately maintained and kept in good repair.

(5) The Owner shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).

11. PUBLIC LIAISON COMMITTEE (PLC)

(1) The Owner or Operator shall maintain and participate in a landfill PLC, which shall function in accordance with the Terms of Reference for the PLC, as amended from time to time. Any amendment to the Terms of Reference must be approved by the District Manager. The PLC shall serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the landfill Site, including environmental monitoring, maintenance, complaint resolution, and new approvals or amendments to existing approvals related to the operation of this landfill Site.

(2) The Owner/Operator shall invite representation from the following groups to participate on the PLC:

(a) the County of Haldimand;
(b) Six Nations of the Grand River;
(c) landowners within a minimum 500 metre distance of the Site;
(d) residents of Haldimand County; and
(e) Lower Grand River Land Trust.

The number of representatives from each group shall be as specified in the Terms of Reference approved by the District Manager.

(3) Copies of all reports or other submissions required by the conditions of this Approval shall be made available to the PLC and the County of Haldimand, in accordance with the deadlines specified in the Conditions.

(4) The Owner or Operator shall provide to the PLC and the County of Haldimand, reasonable notice and opportunities to make comments regarding any proposed amendment to this Approval. The Owner or Operator shall forward to the Director for consideration any written comments received by the Owner or Operator and advise the Director of the essence of any verbal comments received by the Owner or Operator regarding the proposed amendment.

12. INSPECTIONS, RECORD KEEPING AND REPORTING

Daily Inspections and Inspection Log

(1) A visual inspection of the entire Site and all equipment on the Site shall be conducted each day the Site is open to ensure that:
(a) the Site is secure;
(b) the operation of the Site is not causing any nuisances;
(c) the operation of the Site is not causing any adverse effects on the environment or impairing water quality; and
(d) the Site is being operated in compliance with this Approval.

(2) Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the Site if needed**.**

(3) An electronic or written record of the inspections shall be maintained and shall include the following:
(a) the name and signature of person that conducted the inspection;
(b) the date and time of the inspection;
(c) the list of all deficiencies discovered during the inspections, including but not limited to:
(i) the presence of any leachate seeps;
(ii) the condition of the methane venting system;
(iii) poor drainage conditions and ponding of surface water; and
(iv) the presence of waste outside of the approved fill area;

(d) the recommendations for remedial action to address the identified deficiencies; and
(e) the date, time and description of the remedial actions taken.

Daily Waste Log

(4) A daily log shall be maintained in written or electronic format and shall include the following information:
(a) the type, date and estimated quantity (tonnes) of all waste, including non-landfilled waste received at the Site;
(b) the type, date and estimated quantity (tonnes) of cover material applied at the Site;
(c) the area of the Site in which waste disposal operations are taking place;
(d) a record of litter collection activities and the application of any dust suppressants;
(e) a record of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known; and
(f) a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service.

Other Information

(5) Any information requested, by the Director, the District Manager or a Provincial Officer, concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided to the Ministry, upon request.

Annual Report

(6) A written report on the development, operation and monitoring of the Site, shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the District Manager, by March 31st of the year following the period being reported upon.

(7) The Annual Report shall include but not be limited to the following information:

(a) the results and an interpretive analysis of the results of all leachate, groundwater surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
(b) an assessment on the Site's compliance with Guideline B7;
(c) an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the Ministry approved contingency plans;
(d) site plans showing the existing contours of the Site; areas of landfilling operation during the reporting period; areas of intended operation during the next reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; facilities existing, added or removed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;
(e) summaries of any actions taken for the odour management plan and compliance with the leachate removal plan;
(f) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or

placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;

(g) a calculation of the remaining capacity of the Site or an estimate of the remaining Site life;
(h) summary of total annual quantity (tonnes) of waste received at the Site;
(i) a summary of any complaints received and the responses made;
(j) a summary of the information included in the logs required by Conditions 9(1), 10(1), 11(3), 11(4), 11(5), and 12(2);
(k) a summary of the daily waste log;
(l) a discussion of any operational problems encountered at the Site and corrective action taken;
(m) any changes to the Ministry approved Design and Operations Report and the Closure Plan that have been approved by the Director since the last Annual Report;
(n) a report on the status of all monitoring wells and a statement as to compliance with Regulation 903;
(o) a description and location of any leachate seeps identified during the daily inspection of the Site and the mitigative measures taken to address the presence of seeps;
(p) a summary of the daily inspections conducted over the monitoring period;
(q) any other information with respect to the Site which the District Manager may require from time to time;
(r) a copy of the most current ministry approved monitoring programs in table format;
(s) compliance status with all conditions of the Approval and the approved Design and Operations Plan;
(t) a "Monitoring and Screening Checklist" completed and signed by a Qualified Professional; and
(u) items identified in Section 7.7 Annual Progress Report of the Design and Operations Report;

13. CLOSURE PLAN

(1) At least two (2) years prior to the anticipated date of closure of this Site, or when the Site reaches 90% capacity, whichever comes first, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site closure plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring, and end use. The plan shall include but not be limited to the following information:

(a) A plan showing Site appearance after closure;
(b) A description of the proposed end-use of the Site;
(c) Description of the procedures for closure of the Site, including:
    i. advance notification of the public of the landfill closure;
    ii. posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
    iii. completion, inspection and maintenance of the final cover and landscaping;
    iv. site security;
    v. removal of unnecessary landfill-related structures, buildings and facilities;
    vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
    vii. a schedule indicating the time-period for implementing sub-conditions (i) to (vi) above.

(d) Description of the procedures for post-closure care of the Site, including:
   i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
   ii. record keeping and reporting; and
   iii. complaint contact and response procedures;
(e) An assessment of the adequacy of and need to implement the contingency plans for leachate and landfill gas;
(f) An updated estimate of the contaminating life span of the Site, based on the results of the monitoring programs to date; and
(g) An update of the cost estimate for financial assurance and the amount which has been provided to the Director.

(2) The Site shall be closed in accordance with the closure plan as approved by the Director.

The following Schedule "A" forms part of this Approval

Schedule "A"

1. Application for an amendment to ECA No. A110302 for a vertical expansion. Signed by Richard Weldon, Managing Partner, 2270386 Ontario Limited. Dated April 26, 2019. The application includes all supporting documentation and consists of the following:

   i. Design and Operations Report Vertical Expansion, Brooks Road Landfill Site, 2270386 Ontario Inc., Prepared by GHD, April 18, 2019;
   ii. Appendix A - Provisional CofA No. A110302 and Amendments;
   iii. Appendix B - Site Preparation Reports;
   iv. Appendix C - Site Legal Surveys;
   v. Appendix D - Geotechnical Assessment;
   vi. Appendix E - HELP Model Outputs;
   vii. Appendix F - Hydrologic Modeling;
   vii. Appendix G - Surface Water Supporting Engineering Calculations;
   viii. Appendix H - Landfill Gas Production and Air Dispersion Modeling Results;
   ix. Appendix I - Fugitive Odour Best Management Practices Plan and BRE Odour Complaint Response Procedure;
   ix. Appendix J - Trigger Level Program;
   ix. Appendix K - Financial Assurance Plan; and
   ix. Appendix L - Design and Operations Report Drawings.

2. Leachate Removal Plan, Brooks Road landfill Site Haldimand County, 2270386 Ontario Limited. Report No 90. Prepared by GHD, February 7, 2020.

The following Schedule "B" forms part of this Approval

Schedule "B"

Table B1: Groundwater, Surface Water, Leachate and Landfill Gas Monitoring Programs

	Location	March	May	August	November
Groundwater[1]	OW1A-06	-	B[4]	-	A[3]
	OW1B-06	-	B	-	A
	OW3A-07	-	B	-	A
	OW3B-07	-	B	-	A
	OW5A-06	-	B	-	A
	OW5B-07	-	B	-	A
	OW8A-06	-	B	-	A
	OW8B-06	-	B	-	A
	OW8D-07 (Gypsum Mine)	-	B	-	WL - only[6]
	OW8S-07 (Gypsum Mine)	-	B	-	WL - only
	OW9A-06	-	B	-	A
	OW9B-06	-	B	-	A
	MW1-03	-	WL - only	-	WL - only
	MW1A-07	-	B	-	A
	MW1B-07	-	B	-	A
	MW1D-07 (Gypsum Mine)	-	B	-	WL - only
	MW1S-07 (Gypsum Mine)	-	B	-	WL - only
	MW2-03	-	WL - only	-	WL - only
	MW2A-01	-	B	-	A
	MW2B-07	-	B	-	A
	MW2D-07 (Gypsum Mine)	-	B	-	WL - only
	MW2S-07 (Gypsum Mine)	-	B	-	WL - only
	MW3-03	-	WL - only	-	WL - only
	MW4A-09	-	WL - only	-	WL - only
	MW5A-09	-	B	-	A
	MW5B-09	-	B	-	A
	MW6A-07	-	B	-	A
	MW6B-07	-	B	-	A
	MW10A-18	-	B	-	A

	MW10B-18	-	B	-	A
	MW11A	-	B	-	A
	MW11B	-	B	-	A
	MW12A	-	B	-	A
	MW12B	-	B	-	A
Surface Water[2]	SW1	C[5]	B	C	B
	SW3	C	B	C	B
	SW4	C	B	C	B
	SW5	C	B	C	B
	SW6	C	B	C	B
	SW7	C	B	C	B
	SW8	C	B	C	B
	SW9	C	B	C	B
Leachate[7]	Leachate Collection System Sump Riser Pipe	See Note #7	B	-	-
	LW1-17		-	-	-
Landfill Gas[8]	GP-1A	See Note #8			
	GP-1B				
	GP-2A				
	GP-2B				
	GP-3A				
	GP-3B				
	GP-4A				
	GP-4B				
	GP-5				
	GP-6				
	GP-7				
	GP-8				
QA/QC	Groundwater Duplicate	-	B	-	A
	Surface Water Duplicate	C	B	C	B
	Field Blank	C	B	C	B

Notes:

1. Groundwater levels will be measured during May and November sampling events.

2. Surface water levels and flows will be measured for all sampling events.

3. **A - Indicator parameters (groundwater):** alkalinity, ammonia, barium, boron, calcium, chloride,

conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, and DOC.

4. **B - Metals:** aluminum, arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, nickel.

   B - PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, benzo(ghi)perylene.

   B - VOCs: chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, acetone, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, methyl-t-butyl ether, 1,1-dichloroethane, methyl ethyl ketone, cis-1,2-dichloroethene, chloroform, 1,2-dichloroethane, 1,1,1-trichloroethane, carbon tetrachloride, benzene, 1,2-dichloropropane trichloroethene, bromodichloromethane, cis-1,3-dichloropropene, methyl isobutyl ketone, trans-1,3-dichloropropene, 1,1,2-trichloroethane, toluene, 2-hexanone, dibromochloromethane, 1,2-dibromoethane, tetrachloroethene, 1,1,1,2-tetrachloroethane, chlorobenzene, ethylbenzene, m,p,o-xylenes, bromoform, styrene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene.

   B - Inorganic chemistry parameters: alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulfates, DOC, TDS, suspended solids, phenol, BOD5, COD, pH, total phosphorus, potassium, conductivity, calcium.

5. **C - Indicator parameters (surface water):** alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, pH, total phosphorus, TDS, suspended solids, sulphate, BOD5, COD, phenol, temperature, and dissolved oxygen.

6. **WL - only:** water level or leachate level only.

7. **Leachate:** Leachate water levels shall be collected on a monthly basis at leachate monitoring well LW1-17 and the inclined leachate collection sump riser pipe, while an annual leachate chemistry sample is required to be collected in May from the collection sump. Compliance with the leachate level elevation shall be determined by the pressure transducer that is located in the leachate collection sump riser pipe.

8. **Landfill Gas:** Sampling is to occur monthly from December 1 to April 30 and quarterly from May through November for % lower explosive limit methane concentration of combustible gas, carbon dioxide, oxygen and balance gases, gas pressure, and water level.

The following Schedule "C" forms part of this Approval

Schedule "C"

Table C1: Target leachate elevations to reach leachate elevation 191 m AMSL based on the anniversary date of the issuance of this Approval.

Year (From Date of Issuance of this ECA)	Required Leachate Elevation (m AMSL)	Estimated Leachate Volume in Landfill (m^3)	Volume Removed in Excess of Generation (m^3)	Forecasted Leachate Generation Rate (m^3/day)	LTS Discharge to Ditch (m^3/day)	Required Average Excess Leachate Removal (m^3/day)
0	198.5	40,000	-	44	45	0
1	196	28,000	12,000	44	45	32
2	193.8	18,000	10,000	42	45	24
3	192.1	10,000	8,000	44	45	21
4	191.3	4,000	6,000	45	45	16
5	191	2,000	2,000	49	45	9.5
6+	191	2,000	0	33	45	0

The following Schedule "D" forms part of this Approval

Schedule "D"

Table D1: Capacity-Based Target Leachate Elevations

Estimated Landfilled Volume (m^3)	Required Leachate Elevation (m AMSL)
680,000	197.9
710,000	197.4
740,000	196.8
770,000	196.2
800,000	195.7
830,000	195.1
860,000	194.5
890,000	193.9
920,000	193.4
950,000	192.8
980,000	192.2
1,010,000	191.7
1,040,000	191.1
1,045,065	191.0

The reasons for the imposition of these terms and conditions are as follows:

Conditions 1(1), 1(2), 1(4), 1(5), 1(6), 1(7), 1(8), 1(9), 1(10), 1(11), 1(13), 1(20), 1(21), 1(22), and 1(23) are to clarify the legal rights and responsibilities of the Owner and Operator under this Approval.

Conditions 1(3) and 7(4) are to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

Condition 1(12) is to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.

Condition 1(14) is to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Approval.

Condition 1(15) is to ensure that the successor is aware of its legal responsibilities.

Conditions 1(16), 1(17) and 1(18) clarify that the Part II.1 Director is an individual with authority pursuant to

Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the Approval to any person who will acquire an interest in the property as a result of the dealing.

Condition 1(19) is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Approval. This Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Act, the OWRA, the PA, the NMA and the SDWA.

Condition 1(24) clarifies what information may be subject to the Freedom of Information Act.

Condition 2(1) is to ensure that sufficient funds are available to the Ministry for closure and post-closure activities at the Site in the event that the Owner is unable or unwilling to do so.

Conditions 3(1), 3(11), 3(12), 3(13), 3(14), 3(15), 3(16), 12(1) and 12(2) are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.

Conditions 3(2), 3(3), 3(4), and 3(5) are to specify the approved area from which waste may be accepted at the Site, and the types of waste that may be accepted for disposal at the Site based on the Owner's application and supporting documentation.

Conditions 3(6), 3(7), and 3(8) are to specify restrictions on the extent of landfilling and the maximum rates to be accepted for disposal at the Site based on the Owner's application and supporting documentation. These limits define the approved volumetric capacity of the site.

Conditions 3(9) and 3(10) are to ensure that users of the Site are fully aware of important information and restrictions related to Site operations and access under this Approval.

Condition 3(17) is to ensure open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance effects, and the potential fire hazard.

Condition 3(18) is to ensure that uncontrolled removal of material from waste at the Site is avoided. Scavenging of deposited waste can be detrimental to the public health and safety and cause damage to the natural environment.

Conditions 3(19) and 3(20) are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.

Conditions 3(21) and 3(22) are to ensure that the Site is supervised by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.

Condition 3(23) is to specify the approval requirements for use of alternative cover material at the Site.

Condition 3(24) is to ensure that daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the site.

Condition 3(25) is to ensure that potential truck traffic impacts on the immediate local community is limited to the existing main roads.

Condition 3(26) is to ensure that public road servicing the Site (described as "Improvement Area") meets the applicable standards. Condition 3(26) also ensures that the Improvement Area is maintained regularly as per agreement between the Owner/Operator of the Site and Haldimand County.

Conditions 3(27), 3(28), 3(29), 3(30), 3(31), and 3(32) are to ensure that the Site is operated in a manner that does not result in unacceptable odour emissions and mitigation measures are employed in event of an odour impact.

Condition 4(1) is to provide the groundwater and surface water limits to prevent water pollution at the Site

Conditions 4(2), 4(3), 5(2), 6(4), and 7(2) are included to require the Owner to demonstrate that the Site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.

Conditions 4(4), 4(5), and 4(6) are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.

Conditions 4(7), 4(8), and 4(9) are added to ensure the Owner has a plan with an organized set of procedures for identifying and responding to potential issues relating to groundwater and surface water contamination at the Site's compliance point.

Conditions 4(10), 4(11), and 4(12) are included to streamline the approval of the changes to the monitoring plan.

Condition 5(1) is added to ensure that leachate generated at this Site is disposed of in an environmentally acceptable manner.

Conditions 6(1), 6(2), 6(3), and 6(5) are to ensure that off-site migration of landfill gas is monitored and all buildings at the Site are free of any landfill gas accumulation, which due to a methane gas component may be explosive and thus create a danger to any persons at the Site.

Condition 7(1) is added to ensure to ensure that both surface water and stormwater is managed in an environmentally acceptable manner.

Conditions 8(1) and 8(2) are to ensure that the Site is operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.

Condition 9(1) is added to ensure that any complaints regarding landfill operations at this Site are responded to in a timely and efficient manner.

Condition 10(1) is to ensure the Owner immediately responds to a spill.

Conditions 10(2), 10(3), 10(4), and 10(5) are to ensure that the Owner notifies the Ministry forthwith of any spills so that an appropriate response can be determined.

Conditions 11(1), 11(2), 11(3), and 11(4) are added to establish a forum for the exchange of information and public dialogue on activities carried out at the landfill Site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and protection of the natural environment.

Condition 12(3) is to ensure that detailed records of Site inspections are recorded and maintained for inspection and information purposes.

Condition 12(4) and 12(5) are added to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.

Conditions 12(6) and 12(7) are added to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.

Condition 13(1) is added to ensure that final closure of the Site is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A110302 issued on July 10, 1980

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental

compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 27th day of March, 2020

Mohsen Keyvani, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

CF/

c: District Manager, MECP Hamilton - District
Daniel Turner P. Eng., GHD

Appendix C

Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1A-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	200.42 199.64					
0.5	GP-GRAVEL (FILL), with clay, loose, medium to well graded	199.18	CONCRETE	1		20	5
	CL-CLAY (FILL), with silt, soft, low plasticity, brown, moist	199.03					
1.0	CL-SILTY CLAY, trace gravel, trace sand, firm, low plasticity, brown, dry, grey bands		2" PVC RISER				
1.5			BENTONITE				
2.0				2		100	21
2.5							
3.0	- moist at 3.05m BGS						
3.5				3		75	18
4.0							
4.5	CI-SILTY CLAY, firm, medium to high plasticity, brown, with grey, moist	195.07					
5.0				4		80	12
5.5							
6.0							
6.5				5		80	14

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1A-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
7.5	- trace gravel 3cm Ø at 7.62m BGS			6		100	19
8.0							
8.5							
9.0				7		75	17
9.5							
10.0							
10.5							
11.0	CI-GRAVELLY CLAY, with silt, soft, medium plasticity, brown, wet	188.67		8		70	33
11.5							
12.0	CH-CLAY, trace silt, soft, high plasticity, grey, moist	187.45					
12.5				9		80	11
13.0							
13.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1A-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	ML-SILT, with sand, with clay, some gravel, soft, low plasticity, grey, moist	185.62	BENTONITE CHIPS	10		60	39
14.5							
15.0							
15.5			2" PVC SCREEN	11		50	25
16.0							
16.5			SAND PACK				
17.0	- bedrock inferred at 17.07m BGS			12		50	16
17.5							
18.0	END OF BOREHOLE @ 18.14m BGS	181.50					
18.5							
19.0							
19.5							
20.0							
20.5							

WELL DETAILS
Screened interval:
184.55 to 183.03m
15.09 to 16.61m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
185.77 to 185.16m
13.87 to 14.48m BGS
Material: BENTONITE CHIPS
Sand Pack:
185.16 to 181.50m
14.48 to 18.14m BGS
Material: SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1B-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	200.50 199.70					
0.5	GP-GRAVEL (FILL), with clay, loose, medium to well graded	199.24	CONCRETE 2" PVC WELL CASING				
	CL-CLAY (FILL), with silt, soft, low plasticity, brown, moist	199.09					
1.0	CL-SILTY CLAY, trace gravel, trace sand, firm, low plasticity, brown, dry, grey bands		BENTONITE				
1.5			2" PVC WELL SCREEN				
2.0			SAND PACK				
2.5							
3.0	- moist at 3.05m BGS						
3.5							
4.0	END OF BOREHOLE @ 3.96m BGS	195.74					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
198.79 to 195.74m
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
199.55 to 198.94m
0.15 to 0.76m BGS
Material: BENTONITE
Sand Pack:
198.94 to 195.74m
0.76 to 3.96m BGS
Material: SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.22 200.51					
0.0	CL-CLAY (FILL), with silt, firm, medium to high plasticity, brown to grey, moist	200.36	CONCRETE	1		40	11
	TOPSOIL	200.21					
0.5	GP/CL-GRAVEL AND CLAY, intermixed, dense, well graded, grey, dry	199.90					
	CL-CLAY, with silt, very firm, high plasticity, brown to grey, moist to wet		2" PVC WELL CASING				
1.0							
1.5			BENTONITE GROUT				
2.0				2		100	7
2.5							
3.0							
3.5				3		90	20
4.0							
4.5		195.94					
	CL-CLAY, trace silt, trace gravel, very firm, high plasticity, grey with brown and reddish brown streaks, moist			4		60	14
5.0	- silt with sand seam from 4.88 to 5.18m BGS						
5.5							
6.0		194.41					
	CL-CLAY, with silt, trace gravel, very firm, high plasticity, brown to grey, with reddish streaks, moist			5		95	11
6.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
7.5							
8.0				6		50	17
8.5							
9.0							
9.5				7		0	19
		190.76					
10.0	CL-CLAY, trace silt, trace gravel, firm, very high plasticity, grey, moist						
10.5							
11.0				8		55	11
11.5							
12.0							
12.5				9		90	10
13.0							
13.5	- clay, with sand and gravel from 13.72 to 14.33m BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
14.5				10		30	13
15.0			BENTONITE				
15.5				11		100	7
16.0							
16.5			2" PVC WELL SCREEN				
17.0				12		30	5
17.5			SAND PACK				
18.0	- bedrock inferred at 17.98m BGS						
18.5							
19.0							
	END OF BOREHOLE @ 19.20m BGS	181.31					
19.5							
20.0							
20.5							

WELL DETAILS
Screened interval:
184.36 to 181.31m
16.15 to 19.20m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
185.57 to 184.97m
14.94 to 15.54m BGS
Material: BENTONITE
Sand Pack:
184.97 to 181.31m
15.54 to 19.20m BGS

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
21.5			Material: SAND					
22.0								
22.5								
23.0								
23.5								
24.0								
24.5								
25.0								
25.5								
26.0								
26.5								
27.0								
27.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3B-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.22 200.50					
0.0	CL-CLAY (FILL), with silt, firm, medium to high plasticity, brown to grey, moist	200.35	CONCRETE 2" PVC WELL CASING				
	TOPSOIL	200.20					
0.5	GP/CL-GRAVEL AND CLAY, intermixed, dense, well graded, grey, dry	199.89					
	CL-CLAY, with silt, very firm, high plasticity, brown to grey, moist to wet		BENTONITE				
1.0							
1.5			2" PVC WELL SCREEN				
2.0							
2.5			SAND PACK				
3.0							
3.5							
4.0	END OF BOREHOLE @ 3.96m BGS	196.54					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
199.59 to 196.54m
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
200.35 to 199.74m
0.15 to 0.76m BGS
Material: BENTONITE
Sand Pack:
199.74 to 196.54m
0.76 to 3.96m BGS
Material: SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: GP-1D
DATE COMPLETED: November 30, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: P. KEMP

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	CI-INORGANIC SILTY CLAY, medium plasticity, light brown, dry		1" PVC WELL CASING				
1.0			BENTONITE GRAVEL				
1.5		1.52					
2.0	CI-INORGANIC SILTY CLAY, medium plasticity, dark brown, slightly moist		8-1/4" BOREHOLE				
2.5							
3.0							
3.5			1" PVC WELL SCREEN				
4.0			PEA GRAVEL				
4.5	END OF BOREHOLE @ 4.42m BGS	4.42					
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
3.00 to 4.27m BGS
Length: 1.27m
Diameter: 25mm
Slot Size: 0.030
Material: PVC
Seal:
0.00 to 2.84m BGS
Material: BENTONITE
Sand Pack:
2.84 to 4.42m BGS
Material: PEA GRAVEL

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: GP-1S
DATE COMPLETED: November 30, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: P. KEMP

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	CI-INORGANIC SILTY CLAY, medium plasticity, dark brown, trace brown, moist		1" PVC WELL CASING BENTONITE GRAVEL 8-1/4" BOREHOLE 1" PVC WELL SCREEN PEA GRAVEL				
1.0							
1.5							
2.0							
2.5	END OF BOREHOLE @ 2.13m BGS	2.13					
3.0							
3.5							
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
0.94 to 1.98m BGS
Length: 1.04m
Diameter: 25mm
Slot Size: 0.030
Material: PVC
Seal:
0.00 to 0.79m BGS
Material: BENTONITE
Sand Pack:
0.79 to 2.13m BGS
Material: PEA GRAVEL

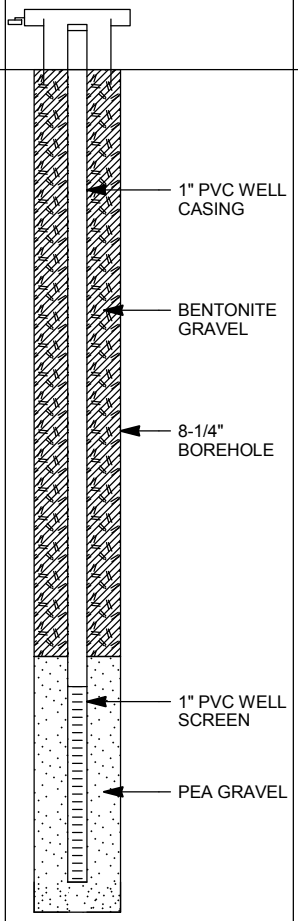
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: GP-2D
DATE COMPLETED: December 3, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	OL/CL-ORGANIC SILT/ORGANIC SILTY CLAY, low plasticity						
	CI-INORGANIC SILTY CLAY, medium plasticity, dark grey to brown, moist	0.30					
	END OF BOREHOLE @ 4.27m BGS	4.27					



WELL DETAILS
Screened interval:
3.12 to 4.11m BGS
Length: 0.99m
Diameter: 25mm
Slot Size: 0.030
Material: PVC
Seal:
0.00 to 2.97m BGS
Material: BENTONITE
Sand Pack:
2.97 to 4.27m BGS
Material: PEA GRAVEL

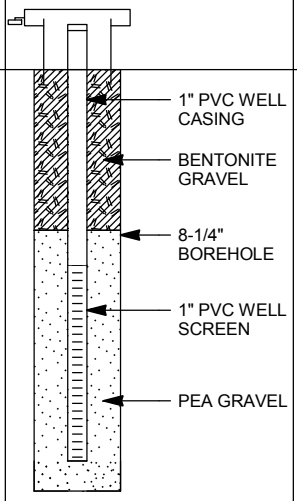
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: GP-2S
DATE COMPLETED: December 3, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	OL/CL-ORGANIC SILT/ORGANIC SILTY CLAY, low plasticity						
	CI-INORGANIC SILTY CLAY, medium plasticity, dark grey to brown, moist	0.30					
	END OF BOREHOLE @ 2.13m BGS	2.13					



WELL DETAILS
Screened interval:
0.99 to 1.98m BGS
Length: 0.99m
Diameter: 25mm
Slot Size: 0.030
Material: PVC
Seal:
0.00 to 0.81m BGS
Material: BENTONITE
Sand Pack:
0.81 to 2.13m BGS
Material: PEA GRAVEL

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5

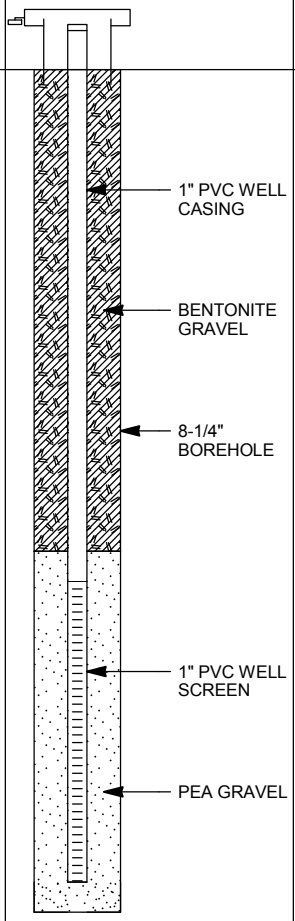
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: GP-3D
DATE COMPLETED: November 30, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: P. KEMP

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	OL/CL-ORGANIC SILT/ORGANIC SILTY CLAY, low plasticity						
	CI-INORGANIC SILTY CLAY, medium plasticity, light brown, moist	0.30					
	END OF BOREHOLE @ 4.27m BGS	4.27					



WELL DETAILS
Screened interval:
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 25mm
Slot Size: 0.030
Material: PVC
Seal:
0.00 to 2.44m BGS
Material: BENTONITE
Sand Pack:
2.44 to 4.27m BGS
Material: PEA GRAVEL

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: GP-3S
DATE COMPLETED: November 30, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: P. KEMP

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	OL/CL-ORGANIC SILT/ORGANIC SILTY CLAY, low plasticity, light greyish brown clay mixed with dark brown topsoil	0.30	1" PVC WELL CASING BENTONITE GRAVEL 8-1/4" BOREHOLE 1" PVC WELL SCREEN PEA GRAVEL				
0.5	CI-INORGANIC SILTY CLAY, medium plasticity, light brown						
1.0							
1.5							
2.0							
	END OF BOREHOLE @ 2.29m BGS	2.29					
2.5							
3.0							
3.5							
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
0.99 to 1.98m BGS
Length: 0.99m
Diameter: 25mm
Slot Size: 0.030
Material: PVC
Seal:
0.00 to 0.84m BGS
Material: BENTONITE
Sand Pack:
0.84 to 2.29m BGS
Material: PEA GRAVEL

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.22 200.15 199.72					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log MW1A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 18235-2007-BEDROCK.GPJ CRA_CORP.GDT 4/15/16

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5							
11.0							
11.5			BENTONITE PORTLAND				
12.0			51mm Ø SCH 40 PVC RISER				
12.5			102mm Ø STEEL CASING				
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							
16.5							
17.0	END OF OVERBURDEN HOLE @ 16.76m BGS						
17.5							
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
17.0	Weathered Bedrock - Dolomitic Shale, gravel sized fragments, light and dark grey in colour, fine texture, moderately to highly weathered - iron oxidization present	182.96 182.65				
17.5	DOLOSTONE-SHALE BEDROCK (SALINA FORMATION), dolostone shale, light grey/dark grey, thin horizontal laminations to wavy beds, fine grained and micro-crystalline, argillaceous, slightly weathered; occasional to frequent gypsum beds/nodules, occasional selenite crystals - fracture, slightly weathered, suspect open aperture - suspect horizontal fractures with very close aperture; suspect vertical fractures randomly interesecting bedding planes from 17.45 to 17.53 m.bgs - fracture, moderately weathered, iron oxizidization present - gypsum bed (21.5cm), white, micro-crystalline, minor inclusions of dark grey shale		96mm Ø COREHOLE			
18.0						
18.5						
19.0						
19.5						
20.0				4	99	99
20.5						
21.0						
21.5				5	100	100
22.0						
22.5						
23.0			BENTONITE GRAVEL	6	100	100
23.5						
24.0	- gypsum bed (37cm), white, micro-crystalline, <5% dolomitic-shale		NO.2 SILICA SAND			
24.5						
25.0			51mm Ø SCH 40 PVC SCREEN	7	94	94
25.5						
26.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
27.0				8	98	98
27.5						
28.0				9	78	78
28.5			BENTONITE GRAVEL			
29.0						
29.5				10	98	98
30.0	- gypsum bed (5.1cm) - gypsum bed (2.5cm)					
30.5						
	END OF BOREHOLE @ 30.68m BGS	169.04				
31.0			WELL DETAILS Screened interval: 175.95 to 173.51m AMSL 23.77 to 26.21m BGS Length: 2.44m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 173.51 to 169.04m AMSL 26.21 to 30.68m BGS Material: Bentonite Gravel Sand Pack: 176.25 to 173.51m AMSL 23.47 to 26.21m BGS Material: No.2 SILICA SAND ---------- Seal: 177.17 to 176.25m AMSL 22.56 to 23.47m BGS Material: Bentonite Gravel ---------- Seal: 199.11 to 177.17m AMSL 0.61 to 22.56m BGS Material: Cement-Bentonite Grout			
31.5						
32.0						
32.5						
33.0						
33.5						
34.0						
34.5						
35.0						
35.5						
36.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1S-07
DATE COMPLETED: May 17, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.21 200.14 199.65					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log MW1A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING BENTONITE				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1S-07
DATE COMPLETED: May 17, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5			PORTLAND				
11.0							
11.5							
12.0			51mm Ø SCH 40 PVC RISER				
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							
16.5	END OF OVERBURDEN HOLE @ 16.46m BGS						
17.0							
17.5							
18.0							
18.5							
19.0							
19.5							

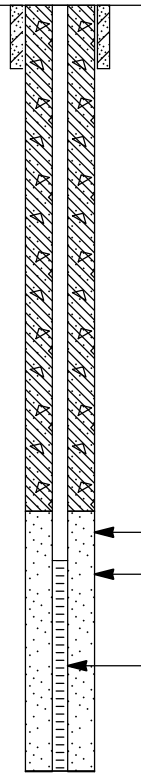
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1S-07
DATE COMPLETED: May 17, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
16.5	Please refer to Bedrock Stratigraphy Log MW1D-07.	183.19				
17.0				1	70	51
17.5						
18.0						
18.5				2	100	100
19.0						
19.5						
20.0						
20.5				3	100	100
21.0						
21.5	END OF BOREHOLE @ 21.54m BGS	178.11				
22.0						
22.5						
23.0						
23.5						
24.0						
24.5						
25.0						
25.5						



WELL DETAILS
Screened interval:
179.63 to 178.11m AMSL
20.02 to 21.54m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:
199.65 to 179.99m AMSL
0.00 to 19.66m BGS
Material: Cement-Bentonite Grout
Sand Pack:
181.21 to 178.11m AMSL
18.44 to 21.54m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	201.21 201.16 200.63					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log MW2A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5							
11.0							
11.5							
12.0							
12.5			BENTONITE PORTLAND				
13.0							
13.5			51mm Ø SCH 40 PVC RISER				
14.0							
14.5							
15.0	END OF OVERBURDEN HOLE @ 14.94m BGS						
15.5							
16.0							
16.5							
17.0							
17.5							
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
15.0	DOLOSTONE-SHALE BEDROCK (SALINA FORMATION), dolomite shale, light grey/dark grey, thin horizontal laminations to wavy beds, fine grained and microcrystalline, argillaceous, gypsiferous, slightly weathered in upper 3 metres, no gypsum apparent in upper 0.7 metres; occasional to frequent gypsum beds/nodules, occasional selenite crystals	185.70		1	64	50
15.5	- highly fractured					
16.0				2	23	0
16.5						
17.0	- fracture, moderately weathered, oxizidization present			3	100	44
17.5	- fracture, moderately weathered, 10 degree angle, apparent oxidization					
18.0	- 5.08cm of conglomerate, mudstone gravel size particles interbedded within dolomitic-shale			4	84	45
18.5	- fractured zone inferred (27cm), weathered sub-angular gravel					
19.0	- fracture inferred			5	100	89
19.5	- gypsum bed (7.5cm), minor shale inclusions		96mm Ø COREHOLE			
20.0	- gypsum/selenite bed (2.5cm), micro to fine crystalline structure; fracture inferred, slight weathering					
20.5	- fracture inferred - gypsum (~75%), intermixed with dolomitic-shale, 11.5cm zone			6	100	86
21.0	- fracture, moderately weathered					
21.5	- gypsum bed (6.4cm), minor shale inclusions			7	100	100
22.0						
22.5	- gypsum bed (19cm), minor shale inclusions					
23.0				8	100	100
23.5						
24.0	- gypsum (60-70%), 7.6cm zone					

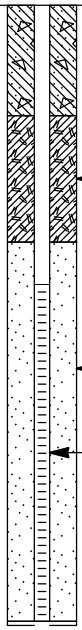
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
25.0				9	100	100
25.5						
26.0	- fracture - fracture					
26.5				10	100	100
27.0	- gypsum bed (23cm), minor shale inclusions					
27.5	- gypsum (~50%), 8.9cm zone					
28.0	- gypsum bed (91.5cm), minor shale inclusions			11	100	100
28.5						
29.0	END OF BOREHOLE @ 28.96m BGS	171.68				
29.5						
30.0						
30.5						
31.0						
31.5						
32.0						
32.5						
33.0						
33.5						
34.0						



WELL DETAILS
Screened interval:
173.20 to 171.68m AMSL
27.43 to 28.96m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
175.33 to 174.42m AMSL
25.30 to 26.21m BGS
Material: Bentonite Gravel
Sand Pack:
174.42 to 171.68m AMSL
26.21 to 28.96m BGS
Material: No.2 SILICA SAND

Seal:
200.63 to 174.95m AMSL
0.00 to 25.68m BGS
Material: Cement-Bentonite Grout

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	201.20 201.13 200.49					
0.5	Please refer to Overburden Stratigraphy Log MW2A-01.						
1.0							
1.5							
2.0							
2.5							
3.0							
3.5							
4.0							
4.5							
5.0							
5.5							
6.0			260mm Ø BOREHOLE				
6.5							
7.0							
7.5			PORTLAND BENTONITE				
8.0							
8.5							
9.0			102mm Ø STEEL CASING				
9.5			BENTONITE				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5			PORTLAND 51mm Ø SCH 40 PVC RISER				
11.0							
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0	END OF OVERBURDEN HOLE @ 14.94m BGS						
15.5							
16.0							
16.5							
17.0							
17.5							
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
15.0	Please refer to Bedrock Stratigraphy Log MW2D-07.	185.55				
15.5						
16.0						
16.5						
17.0						
17.5						
18.0						
18.5						
19.0						
19.5						
20.0			96mm Ø COREHOLE			
20.5						
21.0						
21.5			NO.2 SILICA SAND			
22.0						
22.5			51mm Ø SCH 40 PVC SCREEN			
23.0	END OF BOREHOLE @ 22.86m BGS	177.63				
23.5						
24.0						

WELL DETAILS
Screened interval:
179.15 to 177.63m AMSL
21.34 to 22.86m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %	
25.0			200.49 to 180.68m AMSL 0.00 to 19.81m BGS Material: Bentonite Gravel Sand Pack: 180.68 to 179.15m AMSL 19.81 to 21.34m BGS Material: No.2 SILICA SAND				
25.5							
26.0							
26.5							
27.0							
27.5							
28.0							
28.5							
29.0							
29.5							
30.0							
30.5							
31.0							
31.5							
32.0							
32.5							
33.0							
33.5							
34.0							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.38 199.32 198.98					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log OW8A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5							
11.0							
11.5							
12.0							
12.5							
13.0							
13.5							
14.0			BENTONITE PORTLAND				
14.5			51mm Ø SCH 40 PVC RISER				
15.0							
15.5							
16.0							
16.5							
17.0							
17.5	END OF OVERBURDEN HOLE @ 17.68m BGS						
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
17.5						
18.0	DOLOSTONE-SHALE BEDROCK (SALINA FORMATION), dolostone shale, light grey/dark grey, thin horizontal laminations to wavy beds, fine grained and micro-crystalline, argillaceous, gypsiferous, slightly weathered in upper 3 metres, no gypsum apparent in the first 0.7 metres; occasional to frequent gypsum beds/nodules, occasional selenite crystals; highly fractured to 18.5 m.bgs - mudstone conglomerate bed (40.6cm), gravel size particles interbedded within dolomitic-shale	181.30		1	8	0
18.5						
19.0				2	91	65
19.5						
20.0	- gypsum bed (15.2cm), medium to coarse crystalline, irregular upper and lower contacts		96mm Ø COREHOLE			
20.5	- gypsum bed (14cm) - gypsum (70-80%), fine to medium crystalline structure, shale inclusions, 21.6cm zone			3	83	83
21.0						
21.5	- gypsum (70%), micro to medium crystalline structure, 45.7cm zone					
22.0	- suspect fractured zone (12.8cm), 5 fractures inferred along mudstone beds			4	100	93
22.5						
23.0						
23.5				5	100	95
24.0						
24.5	- fracture					
25.0	- vuggy, partially filled with gypsum, 8.9cm zone			6	100	100
25.5	- vuggy, partially filled with selenite crystals, horizontal, 14cm zone					
26.0	- vuggy					
26.5				7	100	100

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
27.5	- gypsum bed (25.5cm), medium to coarse crystalline structure - gypsum bed (8.9cm), medium crystalline structure					
28.0				8	100	100
28.5						
29.0	- gypsum bed (78.7cm), wavy upper contact, occasional mudstone seam, medium crystalline structure		NO.2 SILICA SAND			
29.5						
30.0	- gypsum (90%) interbedded with dolostone, 10.2cm zone		51mm Ø SCH 40 PVC SCREEN	9	100	100
30.5	END OF BOREHOLE @ 30.48m BGS	168.50				
31.0						
31.5						
32.0						
32.5						
33.0						
33.5						
34.0						
34.5						
35.0						
35.5						
36.0						
36.5						

WELL DETAILS
Screened interval:
170.02 to 168.50m AMSL
28.96 to 30.48m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:
198.98 to 170.94m AMSL
0.00 to 28.04m BGS
Material: Bentonite Grout Seal
Sand Pack:
170.94 to 168.50m AMSL
28.04 to 30.48m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8S-07
DATE COMPLETED: June 19, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.83 199.67 198.98					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log OW8A-06.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 18235-2007-BEDROCK.GPJ CRA_CORP.GDT 4/15/16

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8S-07
DATE COMPLETED: June 19, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5			BENTONITE PORTLAND				
11.0							
11.5							
12.0			51mm Ø SCH 40 PVC RISER				
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							
16.5							
17.0							
17.5	END OF OVERBURDEN HOLE @ 17.68m BGS						
18.0							
18.5							
19.0							
19.5							

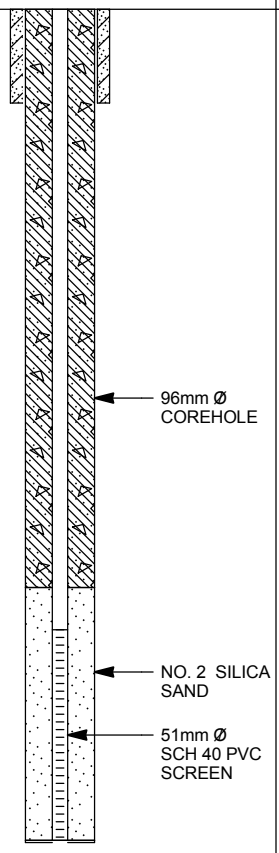
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8S-07
DATE COMPLETED: June 19, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
17.5						
	Please refer to Bedrock Stratigraphy Log OW8D-07.	181.30				
18.0						
18.5						
19.0						
19.5						
20.0						
20.5						
21.0						
21.5						
22.0						
22.5						
23.0	END OF BOREHOLE @ 23.01m BGS	175.97				
23.5						
24.0						
24.5						
25.0						
25.5						
26.0						
26.5						



WELL DETAILS
Screened interval:
177.49 to 175.97m AMSL
21.49 to 23.01m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:
198.98 to 177.80m AMSL
0.00 to 21.18m BGS
Material: Bentonite Grout Seal
Sand Pack:
177.80 to 175.97m AMSL
21.18 to 23.01m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1A-07
DATE COMPLETED: May 7, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
	TOP OF CASING 200.80 TOP OF RISER 200.67 GROUND SURFACE 199.67		Concrete					
0	FILL - CLAY, trace SILT (Disturbed), soft to firm, high plasticity, brown, damp		CONCRETE	01		29.2	4	0
1	OL/PT - SILT LOAM, trace CLAY, trace SAND, trace GRAVEL (NATIVE), soft, moderate plasticity, black, moist	198.76 198.15		02		39.6	2	0
2	CL - SILTY CLAY, firm to stiff, low plasticity, brown with grey streaking/mottling, damp; suspect mechanical fracture due to drilling - silt, with clay, stiff - no apparent streaking/mottling			03		45.8	8	0
3	- stiff to very stiff, damp		108mm Ø Borehole	04		85.4	8	0
4				05		106.3	25	0
5	CH - CLAY, trace SILT (Varved), firm, high plasticity, slow dilatency, reddish brown/grey, damp; silty varves consisting of alternating coloured bands of grey and reddish brown - 0.25cm piece of fine grained, subangular gravel, vertical deposition	195.10		06		47.9	26	0
6	- 33cm layer/zone of clay with silt, moderate plasticity, repid dilatency			07		108.3	16	0
7	CH - CLAY, trace SILT, trace GRAVEL (Till), stiff to very stiff, moderate plasticity, grey, damp; fine grained gravel - 10cm layer of fine grained gravel, moist	192.75	BENTONITE AND CONCRETE GROUT 51mm Ø SCH 40 PVC RISER PIPE	08		110.4	8	0
8	- greyish brown in colour			09		120.8	11	0
9				10		70.8	17	0
10	- soft			11		97.9	14	0
11	- 5cm layer of clay and gravel, trace silt			12		110.4	12	0
12	CH - CLAY, trace SILT (Varved), soft, high plasticity, moderate dilatency, reddish brown/grey, wet; silty varves consisting of alternating coloured bands of grey and reddish brown - piece of gravel/cobble >5cm, broken by split spoon	188.24		13		25	9	0
13	- 2.5cm piece of subangular gravel			14		87.5	6	0
14			BENTONITE GRAVEL	15		112.5	10	0
				16		125	8	0
				17		100	8	0
				18		104.2	9	0
				19		108.3	5	0
				20		106.3	8	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1A-07
DATE COMPLETED: May 7, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE P.I.D.
16	- stiff, brown, damp	183.97	#2 Silica Sand	21		108.3	6	0
	CH - SILT, trace CLAY, trace SAND, trace GRAVEL, firm, low plasticity, rapid dilatency, grey, moist		51mm Ø SCH 40 PVC WELL SCREEN					
	- firm, grey, moist	183.15		22		83.3	23	0
17	- silt and gravel, with sand, trace clay, stiff/compact, brown, moist; occasional 5cm piece of gravel	182.91		23		56.3	>50	0
	- firm, grey							
	- stiff, brown	181.96						
18	GM/GC - SAND and GRAVEL, trace FINES, compact, brown, wet; shale fragments throughout							
	Bedrock Inferred							
19	END OF BOREHOLE @ 17.68m BGS							
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								

WELL DETAILS
Screened interval:
185.04 to 181.99m ASD
14.63 to 17.68m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
199.06 to 186.41m ASD
0.61 to 13.26m BGS
Material: Bentonite and Concrete
Sand Pack:
185.65 to 181.99m ASD
14.02 to 17.68m BGS
Material: No.2 SILICA SAND

Seal:
186.41 to 185.65m ASD
13.26 to 14.02m BGS
Material: Bentonite Gravel

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1B-07
DATE COMPLETED: May 7, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.76 200.68 199.60					
1	- Please Refer to Stratigraphy Log MW1A-07.		CONCRETE 51mm Ø SCH 40 PVC RISER PIPE BENTONITE GRAVEL 108mm Ø Borehole #2 Silica Sand 51mm Ø SCH 40 PVC WELL SCREEN				
2							
3							
4							
5	END OF BOREHOLE @ 4.27m BGS						
6							
7							
8							
9							
10							
11							
12							
13							
14							

WELL DETAILS
Screened interval:
198.38 to 195.33m ASD
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
199.30 to 198.69m ASD
0.30 to 0.91m BGS
Material: Bentonite Gravel
Sand Pack:
198.69 to 195.33m ASD
0.91 to 4.27m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

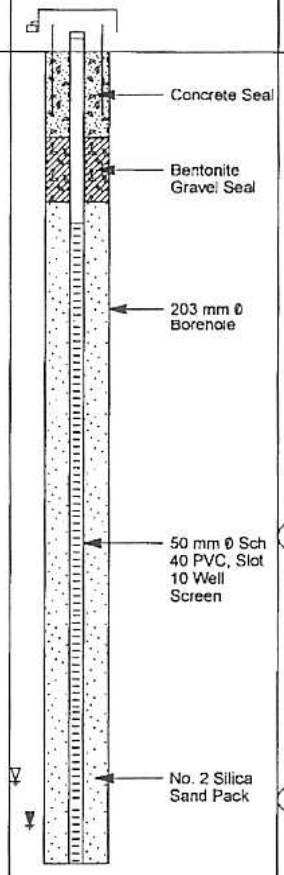
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OFF-SITE INVESTIGATION
PROJECT NUMBER: 18617
CLIENT: HALDIMAND-NORFOLK SANITARY LANDFILL INC.
LOCATION: EDWARDS LANDFILL SITE, HALDIMAND COUNTY

HOLE DESIGNATION: MW 1-03
DATE COMPLETED: September 16, 2003
DRILLING METHOD: 50 mm Geoprobe/ 108 mm ID HSA
FIELD PERSONNEL: D. Gray

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL
	TOP OF RISER	200.219
	GROUND SURFACE	199.4
0	ML-SILT (TOPSOIL) - little fine sand, trace clay, low plasticity, brown, moist, rootles	199.25
0.5	ML-SILT (FILL) - little fine sand, little to trace clay, low plasticity, dark brown, moist, rootlets	198.94
	GP-GRAVEL (FILL) - little fine sand, trace silt, medium grained, poorly graded, grey, moist	
1.0		
1.5	ML-SILT - with to little clay, trace fine sand, low plasticity, brown, moist, oxidized, mottled, some fracturing visible	197.98
2.0		
2.5		
3.0		
3.5	- with clay, medium to low plasticity, varving visible, no visible mottling or oxidation at 3.35m BGS	
4.0	ML-CLAYEY SILT - trace fine sand, low plasticity, grey, moist, varving visible, some slight oxidation	195.44
4.5	- medium plasticity, more competent, no varving visible at 4.72m BGS	
5.0	- very moist at 4.88m BGS	
5.5		
	END OF BOREHOLE @ 5.79m BGS	193.61
6.0		
6.5		
7.0		
7.5		
8.0		
8.5		

Monitoring Well



WELL DETAILS
Screened interval:
198.18 to 193.61m AMSL
1.22 to 5.79m BGS
Length: 4.57m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.79 to 198.33m AMSL
0.61 to 1.07m BGS
Material: Bentonite Gravel
Sand Pack:
198.33 to 193.61m AMSL
1.07 to 5.79m BGS
Material: No. 2 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID
1	P/S	30		0.2
2	P/S	100		0.3
3	P/S	100		1.7
4	P/S	100		0.2
5	P/S	100		1.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Sept.22 STATIC WATER LEVEL ▼ Sept.23
CHEMICAL ANALYSIS (3)

OVERBURDEN LOG 18617-2.GPJ CRA_COTP.GDT 10/1/03

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OFF-SITE INVESTIGATION
PROJECT NUMBER: 18617
CLIENT: HALDIMAND-NORFOLK SANITARY LANDFILL INC.
LOCATION: EDWARDS LANDFILL SITE, HALDIMAND COUNTY

HOLE DESIGNATION: MW 2-03
DATE COMPLETED: September 16, 2003
DRILLING METHOD: 50 mm Geoprobe/ 108 mm ID HSA
FIELD PERSONNEL: D. Gray

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID
	TOP OF RISER GROUND SURFACE	200.280 199.4						
0.0	ML-SILT (TOPSOIL) - little fine sand, trace clay, low plasticity, brown, moist, rootlets	199.25	Concrete Seal					
0.5	ML-SILT (FILL) - little clay, little to trace fine sand, trace gravel, low to medium plasticity, dark brown, moist, oxidized, wood fragments			1	P/S	80		1.7
1.0			Bentonite Gravel Seal					
1.5	- medium plasticity at 1.22m BGS	197.88						
2.0	ML-SILT - with clay, trace fine sand, low plasticity, brown, moist, oxidized, mottled, rootlets, visible fracturing, some fractures infilled with manganeese		203 mm Ø Borehole	2	P/S	100		0.9
2.5								
3.0								
3.5			50 mm Ø Sch 40 PVC, Slot 10 Well Screen	3	P/S	100		0.6
4.0	- medium plasticity, moist, some oxidation at 3.96m BGS	195.51						
4.5	ML-CLAYEY SILT - trace fine sand, low to medium plasticity, grey, moist, varving visible, some slight oxidation visible - moist to very moist, more competent, no visible varving at 4.57m BGS			(4)	P/S	60		2.4
5.0			No. 2 Silica Sand Pack					
5.5				(5)	P/S	100		1.1
6.0	END OF BOREHOLE @ 5.79m BGS	193.61						
6.5								
7.0								
7.5								
8.0								
8.5								

WELL DETAILS
Screened interval:
198.18 to 193.61m AMSL
1.22 to 5.79m BGS
Length: 4.57m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.79 to 198.33m AMSL
0.61 to 1.07m BGS
Material: Bentonite Gravel
Sand Pack:
198.33 to 193.61m AMSL
1.07 to 5.79m BGS
Material: No. 2 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Sept.22 STATIC WATER LEVEL ▼ Sept.23
CHEMICAL ANALYSIS (4) (5)

OVERBURDEN LOG 18617-2.GPJ CRA_CORP.GDT 10/14/03

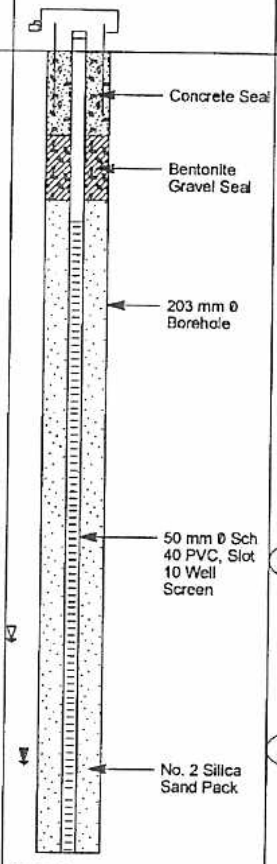
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OFF-SITE INVESTIGATION
PROJECT NUMBER: 18617
CLIENT: HALDIMAND-NORFOLK SANITARY LANDFILL INC.
LOCATION: EDWARDS LANDFILL SITE, HALDIMAND COUNTY

HOLE DESIGNATION: MW 3-03
DATE COMPLETED: September 16, 2003
DRILLING METHOD: 50 mm Geoprobe/ 108 mm ID HSA
FIELD PERSONNEL: D. Gray

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL
	TOP OF RISER	200.219
	GROUND SURFACE	199.3
0.0	ML-SILT (TOPSOIL) - little fine sand, trace clay, low plasticity, brown, moist, rootlets	199.15
0.5	ML-SILT (FILL) - little fine sand, little clay, low plasticity, brown, with some back intervals, moist, wood fragments	
1.0		198.23
1.5	MI-SILT - with to little clay, trace fine sand, low plasticity, brown, moist, rootlets, oxidized, mottled, fractured, some fractures infilled with manganeese	
2.0	- little clay, low plasticity at 1.52m BGS	
2.5		
3.0	- highly oxidized and mottled at 3.05m BGS	
3.5		
4.0	- slightly higher plasticity, some varving visible at 3.96m BGS	
4.5	ML-CLAYEY SILT - trace fine sand, medium plasticity, grey, very moist, varving visible, no evidence of oxidation, mottling of fracturing	195.03
5.0		
5.5		
6.0	END OF BOREHOLE @ 5.79m BGS	193.51
6.5		
7.0		
7.5		
8.0		
8.5		

Monitoring Well



WELL DETAILS
Screened Interval:
198.08 to 193.51m AMSL
1.22 to 5.79m BGS
Length: 4.57m
Diameter: 25mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.69 to 198.23m AMSL
0.61 to 1.07m BGS
Material: Bentonite Gravel
Sand Pack:
198.23 to 193.51m AMSL
1.07 to 5.79m BGS
Material: No. 2 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID
1	P/S	80		0.9
2	P/S	100		0.4
3	P/S	80		1.2
4	P/S	100		1.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Sept.22 STATIC WATER LEVEL ▼ Sept.23
CHEMICAL ANALYSIS (○)

OVERBURDEN LOG 18617-2.GPJ CRA_CORP.GDT 10/14/03

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HALDIMAND-NORFOLK
LOCATION: CAYUGA, ONTARIO

HOLE DESIGNATION: MW2A-01
DATE COMPLETED: October 16, 2001
DRILLING METHOD: 108mm ID HSA, and AIR ROTARY
FIELD PERSONNEL: P. SMART

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.13 200.44					
	See MW2B-01 log description		CONCRETE HOLEPLUG 203.2mm Ø Borehole BENTONITE GROUT				
12	CL-SILTY CLAY, very stiff, brown silty laminations, grey, moist	188.25		1		100	11
14	SILT AND SAND (TILL), trace clay, fine to medium sand, trace coarse sand with gravel	185.96		2		100	40

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ October 19/01

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HALDIMAND-NORFOLK
LOCATION: CAYUGA, ONTARIO

HOLE DESIGNATION: MW2A-01
DATE COMPLETED: October 16, 2001
DRILLING METHOD: 108mm ID HSA, and AIR ROTARY
FIELD PERSONNEL: P. SMART

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
16	BEDROCK, auger ground into bedrock 0.6 m, air rotary drilling, no drill returns below 15.24m BGS	185.51	HOLEPLUG 101.6mm Ø COREHOLE SAND PACK WELL SCREEN				
19	END OF BOREHOLE @ 19.20m BGS	181.24					
20	(pp) - Pocket Penetrometer Value (70) - Field Shear Vane Value s - Field Vane Sensitivity		WELL DETAILS Screened interval: 184.29 to 181.24m ASD 16.15 to 19.20m BGS Length: 3.05m Diameter: 51mm Slot Size: #10 Sand Pack: 184.59 to 181.24m ASD 15.85 to 19.20m BGS Material: SILICA SAND #2				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ October 19/01

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2B-07
DATE COMPLETED: June 4, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	201.51 201.41 200.50					
1	- Please Refer to Stratigraphy Log MW2A-01.		CONCRETE 51mm Ø SCH 40 PVC RISER PIPE BENTONITE GRAVEL 108mm Ø Borehole #2 Silica Sand 51mm Ø SCH 40 PVC WELL SCREEN				
2							
3							
4	END OF BOREHOLE @ 3.96m BGS						
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

WELL DETAILS
Screened interval:
199.58 to 196.53m ASD
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
200.19 to 199.73m ASD
0.30 to 0.76m BGS
Material: Bentonite Gravel
Sand Pack:
199.73 to 196.53m ASD
0.76 to 3.96m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HALDIMAND-NORFOLK
LOCATION: CAYUGA, ONTARIO

HOLE DESIGNATION: MW2C-01
DATE COMPLETED: October 16, 2001
DRILLING METHOD: 152mm Ø SOLID STEM AUGER
FIELD PERSONNEL: P. SMART

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.11 200.45					
	See log for MW2B-01		CONCRETE HOLEPLUG 152.4mm Ø Borehole BENTONITE GROUT HOLEPLUG SAND PACK WELL SCREEN				
12	END OF BOREHOLE @ 11.89m BGS	188.56					

(pp) - Pocket Penetrometer Value
(70) - Field Shear Vane Value
s - Field Vane Sensitivity

WELL DETAILS
Screened interval:
190.39 to 188.87m ASD
10.06 to 11.58m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: #10
Sand Pack:
190.70 to 188.56m ASD
9.75 to 11.89m BGS
Material: SILICA SAND #2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ October 19, 2001

OVERBURDEN LOG 18235.GPJ CRA_CORP.GDT 7/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW4A-09
DATE COMPLETED: June 23, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
0	FILL - SILTY SAND and GRAVEL, brown, dry; rootlets	
0.5	- silt and clay, firm, moderate to high plasticity, brown with black streaks, damp	0.30
1.0	OL - SILT, trace CLAY (MUCK), soft, low to moderate plasticity, black, damp	0.36
1.5	CL-ML - CLAY and SILT, soft, moderate plasticity, black, damp; occasional rootlets to 2.1 m BGS	
2.0		
2.5		
3.0		
3.5		
4.0		
4.5	MH - CLAYEY SILT, firm to stiff, massive, high plasticity, slow dilatency, brown, damp	4.57
5.0	- 1mm wide closed vertical fracture, infilled with grey clay	
5.5		
6.0		
6.5	CH - SILTY CLAY, trace SAND, trace GRAVEL (TILL), firm, fine to coarse grained sand, subangular fine grained gravel, brown, damp; occasional coarse grained gravel	6.53
7.0		
7.5		
8.0	- 1mm wide closed vertical fracture, infilled with grey clay	
8.5	- cobble	
9.0		
9.5	- 1mm wide closed vertical fracture, infilled with grey clay	
10.0		

Monitoring Well: PROTECTIVE CASING; CONCRETE; 108mm Ø Borehole; 51mm Ø SCH 40 PVC RISER PIPE; BENTONITE GROUT

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
01		58	9
02		90	14
03		100	22
04		100	9
05		100	8
06		92	11
07		100	9

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

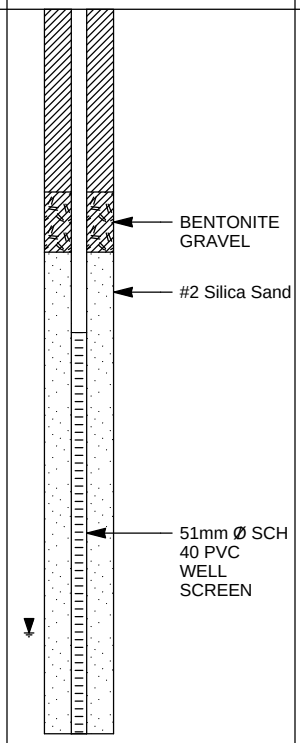
STATIC WATER LEVEL ▼ July 22, 2009

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW4A-09
DATE COMPLETED: June 23, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
		10.72
11.0	CH-MH - CLAY and SILT (VARVED), soft, horizontally stratified, high plasticity, slow dilatency, grey, damp to moist	
11.5		
12.0		
12.5		
13.0		
13.5		
		13.77
14.0	- silt, trace clay, trace sand, trace gravel, firm, massive, fine grained sand, fine to coarse grained gravel, brown, moist - wet; with fine grained sand at 13.9 m BGS	
14.5	GM - GRAVEL with SAND, trace FINES, compact, wet; occasional gypsum fragment	
15.0		
		15.49
15.5	- sand, trace SILT, trace gravel, compact, fine to medium grained, brown, wet	
	Bedrock, dolostone-shale, brown, weathered; gypsiferous	
16.0		16.00
	END OF BOREHOLE @ 16.00m BGS	
16.5		
17.0		
17.5		
18.0		
18.5		
19.0		
19.5		
20.0		
20.5		



WELL DETAILS
Screened interval:
12.95 to 16.00m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
11.89 to 12.34m BGS
Material: Bentonite Gravel
Sand Pack:
12.34 to 16.00m BGS
Material: No.2 SILICA SAND

Seal:
0.91 to 11.89m BGS
Material: Bentonite Grout

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
08		100	3
09		100	4
10		58	54
11		58	>46

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

OVERBURDEN LOG 18235-2009.GPJ CRA_CORP.GDT 3/3/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW5A-09
DATE COMPLETED: June 22, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	OL - SILT, trace CLAY, soft, dark brown, damp; rootlets, detritus	0.09
0.5	MH - SILT with CLAY, trace SAND, soft to firm, massive, high plasticity, fine grained sand, tan to light brown, damp	0.81
1.0	CL-ML - CLAY and SILT, trace SAND, firm, horizontally stratified, moderate to high plasticity, fine grained sand, dark brown, dry - damp	
1.5	- silt with clay, trace sand, firm, brown; occasional rootlets	
2.0		
2.5		
3.0		
3.5		
4.0		
4.5	MH - CLAYEY SILT (VARVED), soft - firm, high plasticity, slow dilatency, damp	4.57
5.0		
5.5		
6.0		6.15
6.5	CH - SILTY CLAY, trace SAND, trace GRAVEL (TILL), firm, fine to coarse grained sand, subangular fine grained gravel, brown, damp	
7.0		
7.5		
8.0		
8.5		
9.0		
9.5		
10.0		

Monitoring Well: PROTECTIVE CASING; CONCRETE; 108mm Ø Borehole; 51mm Ø SCH 40 PVC RISER PIPE; BENTONITE GROUT

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
01			5
02		77	22
03		100	23
04		100	16
05		100	16
06		100	21
07		100	9
08		100	9
09		100	12
10		100	12
11		100	16

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 22, 2009

OVERBURDEN LOG 18235-2009.GPJ CRA_CORP.GDT 3/3/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW5A-09
DATE COMPLETED: June 22, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
11.0	- becoming grey in colour, damp - moist			12		100	8
11.5							
12.0							
12.5				13		33	13
13.0							
13.5							
	MH-CH - CLAY and SILT (VARVED), soft - firm, high plasticity, moderate dilatency, alternating reddish brown and grey layers, damp - moist	13.72	BENTONITE GRAVEL				
14.0				14		100	6
14.5							
15.0	- wet		#2 Silica Sand				
15.5	- silt with sand and gravel, trace clay, firm/compact, fine to coarse grained, subangular, grey, wet; occasional gypsum fragment	15.54		15		100	7
16.0	GM - SAND and GRAVEL, trace FINES, compact, grey, wet		51mm Ø SCH 40 PVC WELL SCREEN				
16.5							
17.0	- gravel with sand, trace fines, compact, brown, wet - silt with sand and gravel, trace clay, firm/compact, well graded, fine to coarse grained, grey, wet			16		75	32
17.5							
	- refusal on assumed bedrock	17.78		17		56	>100
18.0	END OF BOREHOLE @ 17.78m BGS						
18.5							
19.0							
19.5							
20.0							
20.5							

WELL DETAILS
Screened interval:
14.73 to 17.78m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
0.61 to 13.26m BGS
Material: Bentonite and Concrete
Sand Pack:
14.02 to 17.68m BGS
Material: No.2 SILICA SAND

Seal:
13.26 to 14.02m BGS
Material: Bentonite Grout

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW5B-09
DATE COMPLETED: June 22, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	Please Refer to Stratigraphy Log MW5A-09.		CONCRETE; BENTONITE GRAVEL; 108mm Ø Borehole; 51mm Ø SCH 40 PVC RISER PIPE; #2 Silica Sand; 51mm Ø SCH 40 PVC WELL SCREEN				
6.0	END OF BOREHOLE @ 6.02m BGS	6.02					

WELL DETAILS
Screened interval:
1.22 to 6.02m BGS
Length: 4.8m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
0.30 to 0.91m BGS
Material: Bentonite Gravel
Sand Pack:
0.91 to 6.02m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW6A-07
DATE COMPLETED: November 20, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	
			Concrete					
0.5	SILT with GRAVEL (FILL), firm, brown, dry; rootlets		CONCRETE	01		75	19	0
1.0	CL-ML - CLAYEY SILT, trace SAND, stiff, slight plasticity, brown, very damp to dry	0.76		02		38	38	0
1.5	- clay with silt, trace sand, stiff, brown and grey			03		56	26	0
2.0								
2.5				04		35	28	0
3.0	MH - CLAYEY SILT (VARVED), stiff, moderate to high plasticity, slow dilatency, brown and grey, damp	2.74	108mm Ø Borehole					
3.5			51mm Ø SCH 40 PVC RISER PIPE	05		67	20	0
4.0				06		38	21	0
4.5	- trace gravel, firm, sub-rounded gravel, high plasticity, brown							
5.0				07		63	25	0
5.5				08		56	18	0
6.0								
6.5				09		60	17	0
7.0	CH - SILTY CLAY (TILL), trace GRAVEL, firm-stiff, sub-rounded gravel, high plasticity, slow dilatency, brownish grey, damp	7.09	BENTONITE AND CONCRETE GROUT	10		58	19	0
7.5	- soft-firm, damp-moist							
8.0				11		52	26	0
8.5				12		67	20	0
9.0								
9.5				13		73	17	0
10.0				14		65	17	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 22, 2009

OVERBURDEN LOG 18235-2007-NOVEMBER-OVERBURDEN.GPJ CRA_CORP.GDT 2/25/10

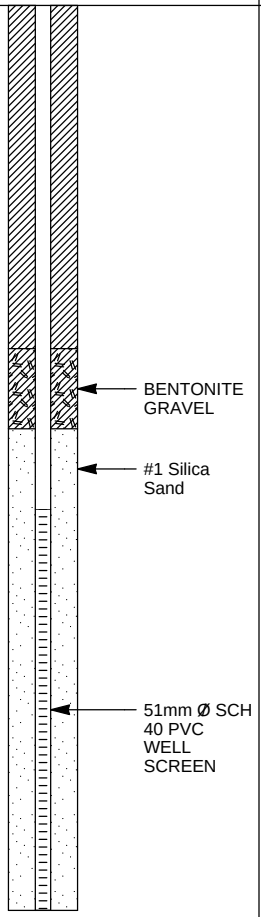
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW6A-07
DATE COMPLETED: November 20, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
		11.99
	CH-MH -CLAY and SILT, trace SAND, trace GRAVEL, soft-firm, moderate dilatency, grey, damp to moist	
		15.57
	GM - CLAYEY GRAVEL, with SAND, compact, poorly graded, subangular, fine to medium grained sand, coarse grained gravel, moist to wet	
	- sand and gravel, trace fines, dense, subangular, wet; some shale and gypsum present	16.26
	BEDROCK - Shale with Gypsum, dark grey	
		17.37
	END OF BOREHOLE @ 17.37m BGS	

Monitoring Well



WELL DETAILS
Screened interval:
14.33 to 17.37m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
12.50 to 13.11m BGS
Material: Bentonite Gravel
Sand Pack:
13.72 to 17.37m BGS
Material: No.1 SILICA SAND

Seal:
0.61 to 13.11m BGS
Material: Bentonite Grout

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	
15			NA	0
16		92	22	0
17		100	19	0
18		100	16	0
19		100	13	0
20		96	11	0
21		100	16	0
22		54	>50	0

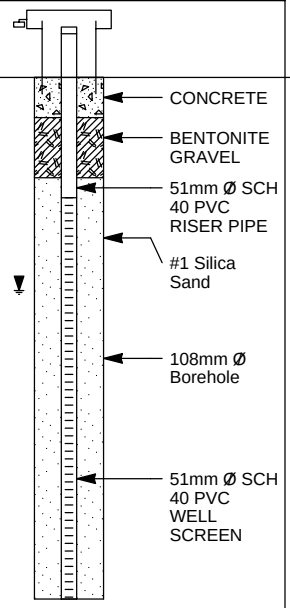
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW6B-07
DATE COMPLETED: November 20, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	Please Refer to Stratigraphy Log MW6A-07.		CONCRETE BENTONITE GRAVEL 51mm Ø SCH 40 PVC RISER PIPE #1 Silica Sand 108mm Ø Borehole 51mm Ø SCH 40 PVC WELL SCREEN				
4.0	END OF BOREHOLE @ 3.96m BGS	3.96					



WELL DETAILS
Screened interval:
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
0.30 to 0.76m BGS
Material: Bentonite Gravel
Sand Pack:
0.76 to 3.96m BGS
Material: No.1 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

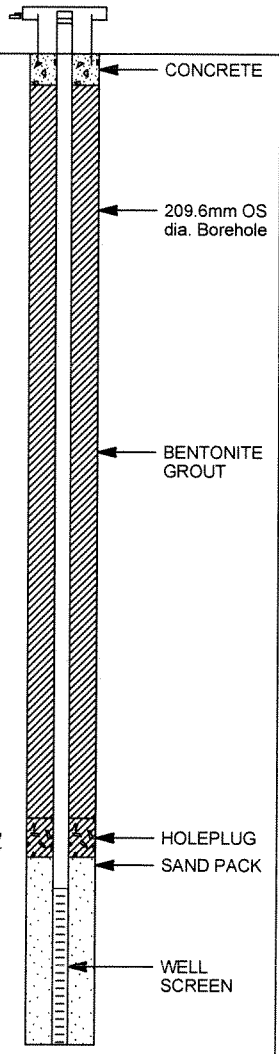
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW1A-06
DATE COMPLETED: November 23, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING	200.38
	TOP OF RISER	200.24
	GROUND SURFACE	199.47
0	SILT LOAM (Topsoil), soft, dark brown, moist, rootlets	199.42
	CI - CLAY, trace SILT, firm, brown, damp, rootlets	
2	- soft	
	- with SILT, trace GRAVEL, firm, mottled, fine grained	
	- CLAY, with SILT, dry to damp	
4		
	CH - CLAY (Varved), trace SILT, firm, dry to damp	194.90
6	- 30cm layer trace GRAVEL, fine grained	
	- 0.25cm layer CLAY, with SILT, with SAND, with GRAVEL, subangular, fine to coarse grained	192.25
8	CH - CLAY (Till), trace SILT, trace GRAVEL, firm, high plasticity, subangular gravel, damp	
	- soft to firm	
10	- soft	
12	- moist, rapid dilatency	
14		
16	- moist to wet	
18		
	GM/GC - SAND, trace GRAVEL, with FINES, dense, fine to medium grained sand, brown, wet	180.88
		180.80
	SHALE (Bedrock), with GYPSUM	180.12
20	END OF BOREHOLE @ 19.35m BGS	
22		
24		
26		

Monitoring Well



WELL DETAILS
Screened interval:
183.16 to 180.12m ASD
16.31 to 19.35m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.86 to 183.93m ASD
0.61 to 15.54m BGS
Material: Bentonite Gravel
Sand Pack:
183.77 to 180.12m ASD
15.70 to 19.35m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	100		0
03	P/S	100		0
04	P/S	100		0
05	P/S	100		0
06	P/S	100		0
07	P/S	100		0
08		100	16	0
09		100	18	0
10		100	12	0
11		100	11	0
12		100	7	0
13		100	6	0
14		100	10	0
15		100	7	0
16		95	6	0
17		95	6	0
18		50	41	0
19		100	>50	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

OVERBURDEN LOG 18235-2006-OVERBURDEN.GPJ CRA_CORP.GDT 7/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW1B-06
DATE COMPLETED: November 23, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.37 200.35 199.47					
0	- Please Refer to Stratigraphy Log OW1A-06.		CONCRETE HOLEPLUG SAND PACK WELL SCREEN 209.6mm OS dia. Borehole				
6	END OF BOREHOLE @ 5.33m BGS		WELL DETAILS Screened interval: 197.18 to 194.14m ASD 2.29 to 5.33m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 198.86 to 197.49m ASD 0.61 to 1.98m BGS Material: Bentonite Gravel Sand Pack: 197.49 to 194.14m ASD 1.98 to 5.33m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

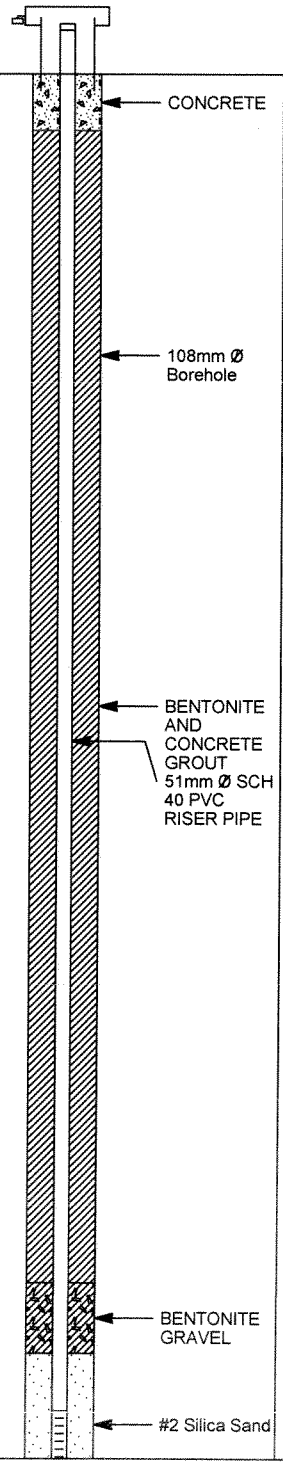
OVERBURDEN LOG 18235-2006-OVERBURDEN.GPJ CRA_CORP.GDT 7/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW3A-07
DATE COMPLETED: May 1, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.13 200.09 199.18
0	FILL - CLAY, with SILT (Disturbed), firm, high plasticity, grey/orange smearing, damp to moist - trace gravel, soft	198.87
1	OL/PT - GRAVELLY SILT LOAM, trace SAND (NATIVE), soft, dark brown, moist, fine grained subangular gravel - 7.5cm gravelly layer	197.96
2	CI - CLAY, with SILT, trace SAND, soft, moderate plasticity, grey, moist - 5cm layer, trace sand and gravel, very soft, dark grey, wet	
3	- firm, moserate plasticity, moderate dilatency - no mottling - possible 5cm long fracture, moist	195.52
4	CH - CLAY, trace SILT (Varved), firm, high plasticity, slow dilatency, reddish brown/grey, damp; silty varves consisting of alternating coloured bands of grey and reddish brown	
5	- soft to firm - 1.25cm piece of gravel, subangular, grey	
6		193.05
7	CH - CLAY, trace SAND and GRAVEL (Till), firm, high plasticity, very slow dilatency, grey, damp; coarse grained sand, fine grained subangular gravels with a predominantly vertical deposition	
8		
9	- piece of subangular gravel/cobble >5cm, broken by split spoon	
10		
11		
12	- trace silt, soft, moist	186.99
13	CH - CLAY, trace SILT (Varved), soft, high plasticity, slow dilatency, reddish brown/grey, damp to moist; silty varves consisting of alternating coloured bands of grey and reddish brown	
14	- 0.25cm piece of subangular gravel	



SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01		41.5	5	0
02		89.5	6	0
03		58.5	8	0
04		0		0
05		58.5	14	0
06		66.5	16	0
07		62.5	15	0
08		62.5	15	0
09		79	3	0
10		100	8	0
11		8.5	15	0
12		98	20	0
13		33.5	8	0
14		108.5	8	0
15		116.5	6	0
16		108.5	8	0
17		116.5	9	0
18		112.5	7	0
19		100	6	0
20		110.5	14	0
21		114.5	6	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW3A-07
DATE COMPLETED: May 1, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE P.I.D.
16	- 6.4cm layer of silty clay, moderate plasticity, moderate dilatency - 0.25cm piece of subangular gravel - 0.5cm piece of subangular gravel, vertical deposition	183.12	51mm Ø SCH 40 PVC WELL SCREEN	22		110.5	12	0
17	- 0.25cm piece of subangular gravel GM/GC - SANDY GRAVEL, with FINES, compact, well graded, brown, wet; fine to coarse sand, fine subangular gravel, shale fragments throughout	182.78		23		37.5	>50	0
18	Bedrock Inferred END OF BOREHOLE @ 16.46m BGS	182.72						
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								

WELL DETAILS
Screened interval:
184.70 to 181.65m ASD
14.48 to 17.53m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.57 to 186.07m ASD
0.61 to 13.11m BGS
Material: Bentonite and Concrete
Sand Pack:
185.31 to 181.65m ASD
13.87 to 17.53m BGS
Material: No.2 SILICA SAND

Seal:
186.07 to 185.31m ASD
13.11 to 13.87m BGS
Material: Bentonite Gravel

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW3B-07
DATE COMPLETED: May 2, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.11 199.99 199.12					
1 2 3 4 5 6 7 8 9 10 11 12 13 14	- Please Refer to Stratigraphy Log OW3A-07. END OF BOREHOLE @ 3.96m BGS		CONCRETE 51mm Ø SCH 40 PVC RISER PIPE BENTONITE GRAVEL 108mm Ø Borehole #2 Silica Sand 51mm Ø SCH 40 PVC WELL SCREEN WELL DETAILS Screened interval: 198.21 to 195.16m ASD 0.91 to 3.96m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 198.51 to 198.21m ASD 0.61 to 0.91m BGS Material: Bentonite Gravel Sand Pack: 198.21 to 195.16m ASD 0.91 to 3.96m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

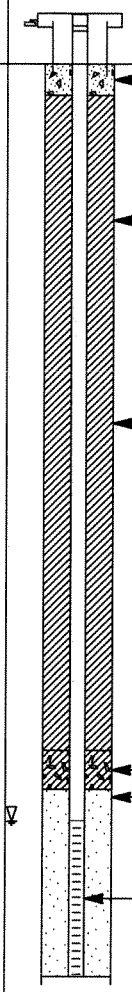
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW5A-06
DATE COMPLETED: November 27, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.84 199.72 198.72
0	CL/CI - CLAY and SILT, firm, low to moderate plasticity, brown, damp, rootlets	
		197.50
2	CI - Clay with SILT, firm, moderate plasticity, brown, damp	
		195.68
4	CH - CLAY (Varved), soft, high plasticity, brown, moist	
	- trace SILT, trace SAND, trace GRAVEL	
6	- 30cm gap in varving	
	- 5cm layer of CLAY and GRAVEL, trace SAND, fine to coarse grained gravel, reddish colour	
	- piece of coarse grained gravel	
8	CH - CLAY (Till), trace SILT, trace SAND, trace GRAVEL, soft, high plasticity, brown, moist	
10		
12		
	- piece of subangular coarse grained gravel	
14		
		182.95
16	GC - SAND and GRAVEL, with CLAY, dense, fine grained subangular gravel, brown, wet	182.87
	SHALE (Weathered Bedrock), brown, wet	
	- SHALE (Bedrock), with GYPSUM	
18	END OF BOREHOLE @ 17.98m BGS	180.59
20		
22		
24		
26		

Monitoring Well



WELL DETAILS
Screened interval:
183.94 to 180.89m ASD
14.78 to 17.83m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.11 to 184.70m ASD
0.61 to 14.02m BGS
Material: Bentonite Gravel
Sand Pack:
184.55 to 180.89m ASD
14.17 to 17.83m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	95		0
03	P/S	100		0
04	P/S	100		0
05	P/S	90		0
06	P/S	100		0
07	P/S	100		0
08	P/S	100		0
09		100	9	0
10		100	5	0
11		100	7	0
12		100	7	0
13		100	7	0
14		25	23	0
15		33	20	0
16		50	30	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW5B-06
DATE COMPLETED: November 27, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.83 199.67 198.72					
	- Please Refer to Stratigraphy Log OW5A-06.		CONCRETE HOLEPLUG SAND PACK WELL SCREEN 209.6mm OS dia. Borehole				
	END OF BOREHOLE @ 4.72m BGS		WELL DETAILS Screened interval: 197.12 to 194.08m ASD 1.60 to 4.65m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 198.11 to 197.43m ASD 0.61 to 1.30m BGS Material: Bentonite Gravel Sand Pack: 197.43 to 194.08m ASD 1.30 to 4.65m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 11, 2006

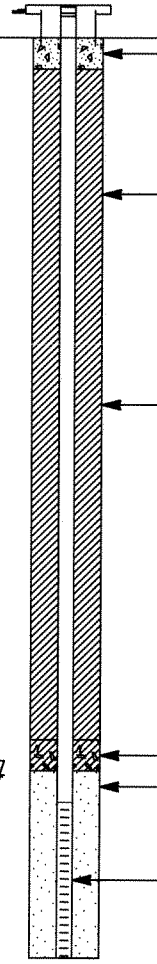
OVERBURDEN LOG 18235-2006-OVERBURDEN.GPJ CRA_CORP.GDT 7/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8A-06
DATE COMPLETED: November 21, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING	199.40
	TOP OF RISER	199.33
	GROUND SURFACE	198.29
0	CH - CLAY (Disturbed), firm, high plasticity, brown, damp to moist	
		196.46
2	CH - CLAY (Native), firm, high plasticity, brown, trace grey colour, damp	
4	- possible 9cm long fracture	
		192.95
6	CH - CLAY (Varved), trace SILT, firm, brown, damp	
	- 2.5cm layer of trace SAND, fine grained, grey	
	- CLAY, trace GRAVEL	191.06
8	CH - CLAY (Till), trace SILT, trace SAND, trace GRAVEL, firm, fine grained subangular gravel, coarse grained sand, damp	
	- possible 12.5cm long fracture	
10	- 7.6cm layer of trace SAND and GRAVEL, fine grained	
	- 2.5cm layer of GRAVEL, fine grained	
	- piece of GRAVEL, coarse grained, subangular	
12	- 7.6cm layer of trace SAND and GRAVEL, medium grained sand, fine grained gravel, sand is yellow in colour, gravel is subangular	186.32
	- soft, moist	
	- piece of GRAVEL, coarse grained, subangular	
14	CH - CLAY (Varved), soft, moist	
	- very soft, rapid dilatency	
	- possible fractures noted at two of the varves	
16	- piece of GRAVEL (Granite), coarse grained	182.28
	GM/GP - GRAVELLY SAND, trace FINES, compact, poorly graded, brown	182.13
	SHALE (Bedrock), brown	181.13
18	END OF BOREHOLE @ 17.98m BGS	
20		
22		
24		
26		



WELL DETAILS
Screened interval:
183.35 to 180.30m ASD
14.94 to 17.98m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
197.68 to 184.27m ASD
0.61 to 14.02m BGS
Material: Bentonite Gravel
Sand Pack:
183.96 to 180.30m ASD
14.33 to 17.98m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	100		0
03	P/S	100		0
04	P/S	100		0
05	P/S	100		0
06	P/S	95		0
07	P/S	100		0
08	P/S	100		0
09	P/S	100		0
10		75	11	0
11		50	40	0
12		100	>50	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 11, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8B-06
DATE COMPLETED: November 21, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.44 199.33 198.29					
	- Please Refer to Stratigraphy Log OW8A-06.		CONCRETE HOLEPLUG SAND PACK WELL SCREEN 209.6mm OS dia. Borehole				
	END OF BOREHOLE @ 5.03m BGS		WELL DETAILS Screened interval: 196.30 to 193.26m ASD 1.98 to 5.03m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 197.68 to 195.54m ASD 0.61 to 2.74m BGS Material: Bentonite Gravel Sand Pack: 196.61 to 193.26m ASD 1.68 to 5.03m BGS Material: No.2 SILICA SAND				

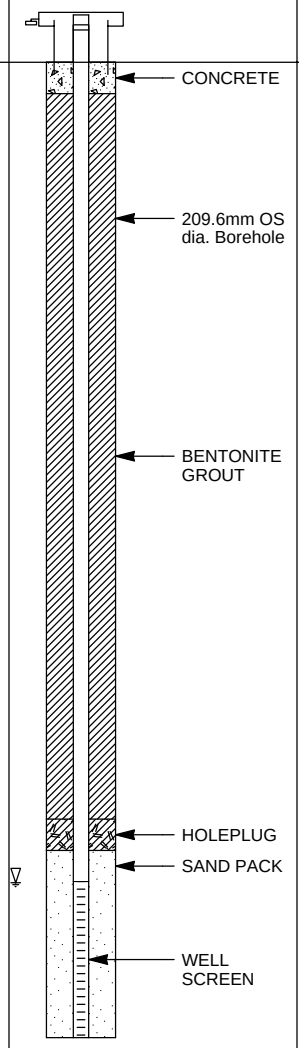
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 11, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW9A-06
DATE COMPLETED: November 29, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF RISER	201.08
	GROUND SURFACE	200.07
0	SILT LOAM (Topsoil), with CLAY, trace SAND, trace GRAVEL, roots, very soft, dark brown, damp	199.84
	CI - CLAY (Native), with SILT, firm, moderate plasticity, brown, trace grey colour, dry to damp	
2	- roots	
	- soft to firm, damp	
	- wet	
4		195.50
	CH - CLAY, soft to firm, high plasticity, slow dilatency, dry to damp	
	- possible 7.6cm long fractures, moist to wet	194.43
6	- soft, damp to moist	
	CH - CLAY (Till), trace GRAVEL, soft, fine grained, subangular, damp to moist	
		192.45
8	CH - CLAY (Varved), soft, high plasticity, damp to moist	
	- trace GRAVEL, fine grained, subangular	
	- trace SILT, oxidised, redish brown colour	
10	- CLAY, trace GRAVEL, not varved	
	- piece of GRAVEL, subrounded, vertical deposition	
	- piece of GRAVEL, subrounded, vertical deposition	
	- CLAY, varved, high plasticity, rapid dilatency	
12	- Piece of COBBLE, subangular, ~10cm diameter	
	- 2.5cm layer of trace SAND	
	- trace SILT, trace SAND, firm/compact, damp, subangular gravel	186.96
14	CH - CLAY (Till), with GRAVEL, firm, damp	
		184.83
	COBBLE/BOULDER, dry, limestone/dolomite	
16		
		182.54
	SM/SC - SAND (Alluvium), trace FINES, loose to compact, coarse grained, dark grey, wet, parent material is predominantly Shale	182.51
18		182.39
	GM/GC - GRAVEL (Alluvium), trace FINES, trace SAND, loose to compact, fine grained, dark grey, wet, parent material is predominantly Shale	181.93
20	SHALE (Bedrock)	
	END OF BOREHOLE @ 19.05m BGS	
22		
24		
26		



WELL DETAILS
Screened interval:
184.07 to 181.02m ASD
16.00 to 19.05m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
199.46 to 184.68m ASD
0.61 to 15.39m BGS
Material: Bentonite Gravel
Sand Pack:
184.68 to 181.02m ASD
15.39 to 19.05m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	100		0
03	P/S	100		0
04	P/S	90		0
05	P/S	90		0
06	P/S	90		0
07		100	19	0
09		100	7	0
10		100	7	0
11				
12		100	9	0
13		33	50	0
14		60	28	0
15				
16		20	>50	0
17		20	>50	0
18		25	>50	0
19		50	>50	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

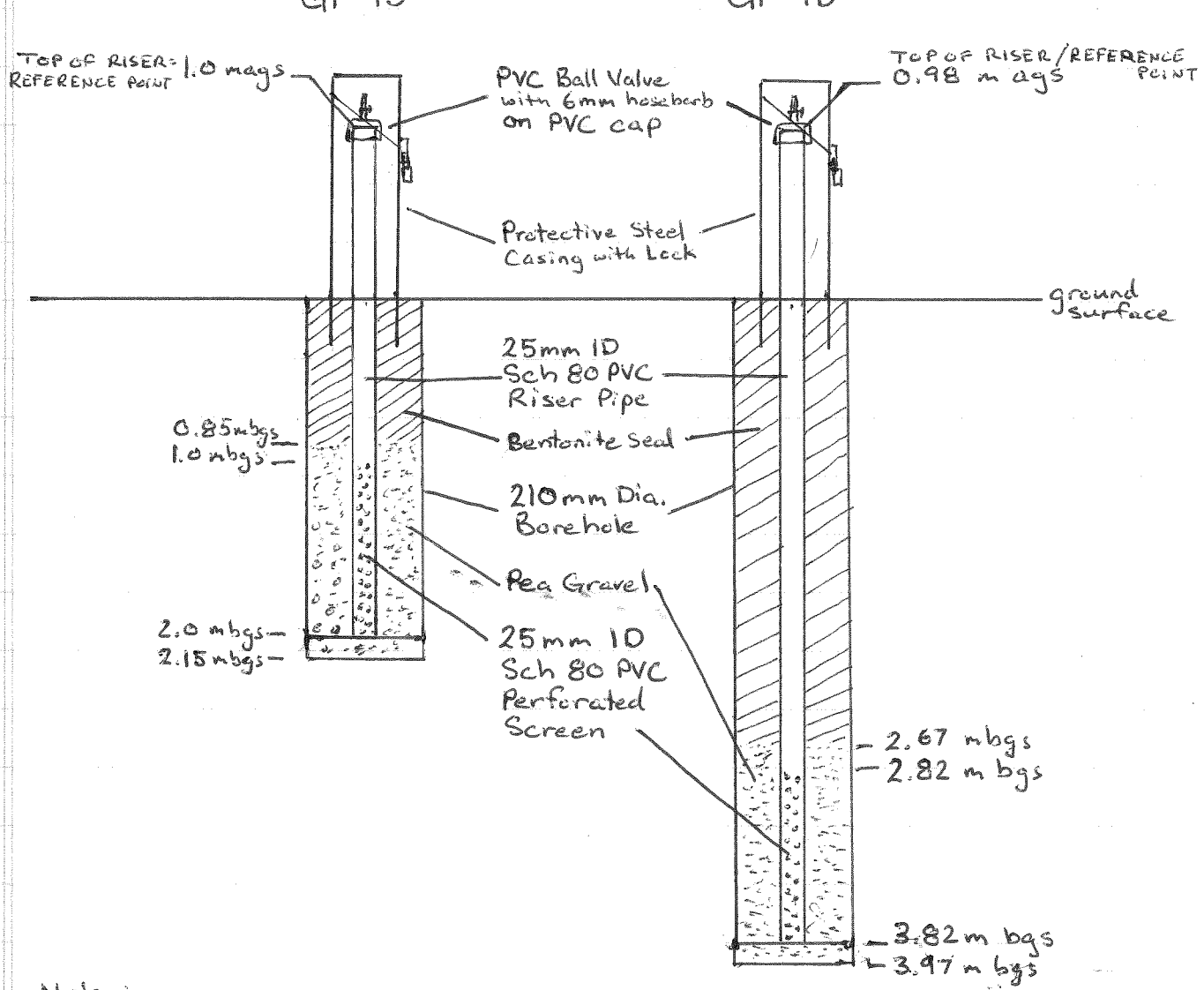
PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW9B-06
DATE COMPLETED: November 29, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.18 200.07					
	- Please Refer to Stratigraphy Log OW9A-06.		CONCRETE HOLEPLUG SAND PACK 209.6mm OS dia. Borehole WELL SCREEN				
6	END OF BOREHOLE @ 5.79m BGS		WELL DETAILS Screened interval: 197.33 to 194.28m ASD 2.74 to 5.79m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 199.46 to 197.63m ASD 0.61 to 2.44m BGS Material: Bentonite Gravel Sand Pack: 197.63 to 194.28m ASD 2.44 to 5.79m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

Gas Probe Construction Details
Brooks Road Landfill Site



Notes:

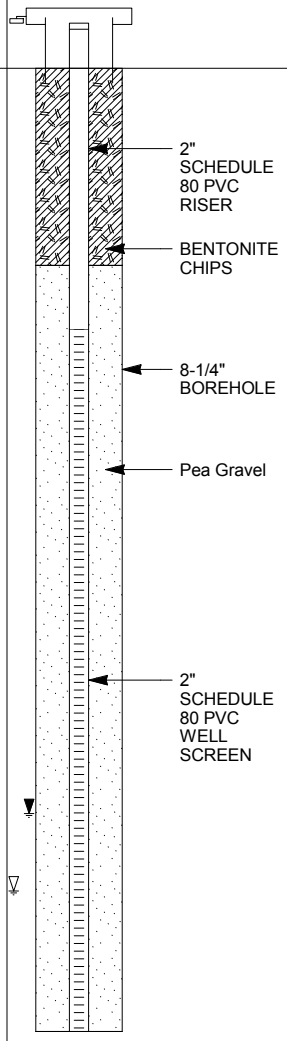
- gas probes installed in February 2017.
- m bgs = metres below ground surface.
- m ags = metres above ground surface.
- details based on information provided by BRE.

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: LW1-17
DATE COMPLETED: 10 October 2017
DRILLING METHOD: 4-1/4" ID HSA
FIELD PERSONNEL: A. Mailloux

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	LEACHATE WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	209.35 208.45					
	LANDFILL COVER - CLAY, soft to firm, brown changing to black and dark grey; no refuse observed						
	LANDFILLED MATERIAL - CLAY, dark grey to black	206.93					
4	- black clay, firm, wood debris, plastic, small pieces of brick, sulphur odour at 4.27m BGS						
6	- brick, plastics at 6.71m BGS						
8	- hydrogen sulphide reading of 17.0 ppm inside augers at 7.62m BGS						
10	- pieces of plastic, cloth, and metal at 10.67m BGS						
12	- wood, black at 13.11m BGS						
14	- wet at 14.02m BGS						
	END OF BOREHOLE @ 14.63m BGS	193.82					



WELL DETAILS
Screened interval:
204.49 to 193.82m
3.96 to 14.63m BGS
Length: 10.67m
Diameter: 51mm
Slot Size: 0.010
Material: SCH 80 PVC
Seal:
208.45 to 205.45m
0.00 to 3.00m BGS
Material: BENTONITE CHIPS
Sand Pack:
205.45 to 193.82m
3.00 to 14.63m BGS
Material: Pea Gravel

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 10/10/2017 STATIC WATER LEVEL ▼ 12/19/2017

OVERBURDEN LOG 018235-WA-20180423.GPJ CRA_CORP.GDT 24/4/18

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW10A-18
DATE COMPLETED: 27 June 2018
DRILLING METHOD: 4-1/4 ID HSA
FIELD PERSONNEL: A. Mollenhuis

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	202.04 201.13						
0	FILL - SILT AND CLAY, low to medium plasticity, little dilatancy, brown, dry			1				0.0
1			25.4 mm Ø SCHEDULE 40 PVC RISER					
2	- mottled, dark brown to grey, moist at 1.52m BGS			2		22	13	0.0
3				3				0.0
4				4		79	10	0.0
		197.48						
4	CL/ML - SILTY CLAY, dense, moderate plasticity, little dilatancy, blocky/massive, grey, moist			5				0.0
5			209.6 mm Ø BOREHOLE	6		33	14	0.0
		195.65						
6	CH - CLAY, with silt, high plasticity, soft to firm, laminated, grey, moist			7				0.0
7				8		58	9	0.0
				9				0.0
7	- soft at 7.62m BGS		BENTONITE GROUT	10		58	5	0.0
8				11				0.0
9		191.99						
9	CL - CLAY, with to silty (TILL), trace gravel, stiff, moderate plasticity, fine grained gravel, grey, moist			12		58	11	0.0
10				13				0.0
10	- stiff to hard at 10.67m BGS		209.6 mm Ø BOREHOLE	14		63	18	0.0
11				15				0.0
12				16		83	22	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 6/27/2018

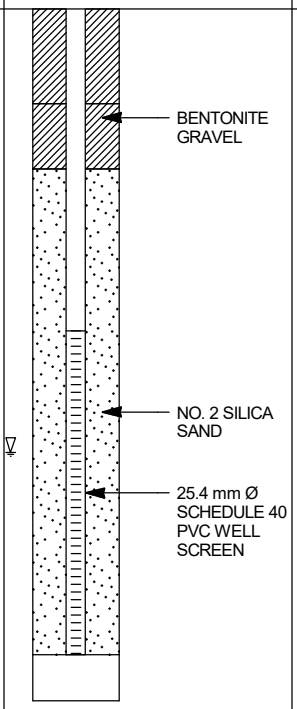
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW10A-18
DATE COMPLETED: 27 June 2018
DRILLING METHOD: 4-1/4 ID HSA
FIELD PERSONNEL: A. Mollenhuis

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
17	ML/SM - SILT/SAND, with gravel (TILL), dense, fine grained sand, fine to medium grained gravel, mottled, brown/grey, dry to moist - wet at 17.37m BGS - cobble at 18.29m BGS	184.06
19	Bedrock END OF BOREHOLE @ 19.08m BGS	182.08 181.63

MONITORING WELL



WELL DETAILS
Screened interval:
185.11 to 182.06m
16.03 to 19.08m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
187.24 to 186.63m
13.89 to 14.50m BGS
Material: BENTONITE GRAVEL
Sand Pack:
186.63 to 182.06m
14.50 to 19.08m BGS
Material: NO. 2 SILICA SAND

Seal:
200.52 to 187.24m
0.61 to 13.89m BGS
Material: BENTONITE GROUT

SAMPLE

NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
17				0.0
18		100	7	0.0
19				0.0
20		100	11	0.0
21				0.0
22		92	55	0.0
23				0.0
24		50	>50	0.0
25				0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 6/27/2018

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW10B-18
DATE COMPLETED: 27 June 2018
DRILLING METHOD: 4-1/4 ID HSA
FIELD PERSONNEL: A. Mollenhuis

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.99 201.09					
0	For stratigraphic description please refer to MW10A-18 log.		209.6 mm Ø BOREHOLE 25.4 mm Ø SCHEDULE 40 PVC RISER BENTONITE GRAVEL NO. 2 SILICA SAND 25.4 mm Ø SCHEDULE 40 PVC WELL SCREEN				
8	END OF BOREHOLE @ 8.08m BGS	193.01					

WELL DETAILS
Screened interval:
196.06 to 193.01m
5.03 to 8.08m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
200.48 to 196.06m
0.61 to 5.03m BGS
Material: BENTONITE GRAVEL
Sand Pack:
196.06 to 193.01m
5.03 to 8.08m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: GP-5
DATE COMPLETED: 30 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: H. MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	GAS PROBE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	FILL - clay, silty, trace fine grained sand, loose to compact, medium to high plasticity, dark brown/ black, dry, no odour		CONCRETE				
	- grey, mottled with rusty brown and black, loose, medium plasticity at 0.61m BGS		12.7mm DIA. SCH. 40 PVC RISER PIPE BENTONITE GRAVEL	1		75	
1.0	FILL - clay, trace fine grained sand, very loose to loose, medium plasticity, black, grey streaks occasionally, wet; slight sewage odour, wood/rootlets buried under fill	0.91	#2 SILICA SANDPACK	2		100	
			12.7mm DIA. SCH. 40 PVC SCREEN 203mm Ø BOREHOLE				
1.5	CI - CLAY, no to trace silt, compact, medium plasticity, brownish grey with mottled brown and rusty red marks, dry	1.22		3		100	
			NATURAL COLLAPSE				
2.0	END OF BOREHOLE @ 1.83m BGS	1.83					
2.5			WELL DETAILS Screened interval: 0.61 to 1.52m BGS Length: 0.91m Diameter: 25mm Slot Size: 0.030 Material: SCH 40 PVC Seal: 0.30 to 0.61m BGS Material: BENTONITE GRAVEL Sand Pack: 0.61 to 1.52m BGS Material: NO. 2 SILICA SAND				
3.0							
3.5							
4.0							
4.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: GP-6
DATE COMPLETED: 30 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: H. MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	GAS PROBE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	FILL - silt and clay, trace fine grained sand and gravel, compact, low to medium plasticity, low dilatancy, light brown, dry		CONCRETE; 12.7mm DIA. SCH. 40 PVC RISER PIPE; BENTONITE GRAVEL	1		50	
1.0			#2 SILICA SANDPACK	2		10	
		1.22	12.7mm DIA. SCH. 40 PVC SCREEN				
1.5	CH - CLAY, trace gravel, very loose to loose, high plasticity, dark grey, wet		203mm Ø BOREHOLE	3		0	
2.0	- Solvent odour at 1.83m BGS		NATURAL COLLAPSE	4		100	
2.5	END OF BOREHOLE @ 2.44m BGS	2.44					
3.0							
3.5							
4.0							
4.5							

WELL DETAILS
Screened interval:
0.61 to 1.83m BGS
Length: 1.22m
Diameter: 25mm
Slot Size: 0.030
Material: SCH 40 PVC
Seal:
0.30 to 0.61m BGS
Material: BENTONITE GRAVEL
Sand Pack:
0.61 to 1.83m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: GP-7
DATE COMPLETED: 30 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: H. MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	GAS PROBE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	FILL - silt and clay, stiff, medium plasticity, light brown, dry		CONCRETE; 12.7mm DIA. SCH. 40 PVC RISER PIPE; BENTONITE GRAVEL	1		40	
1.0			#2 SILICA SANDPACK	2		0	
1.5	CH - CLAY, few silt, trace gravel, firm to stiff, high plasticity, grey, moist, no odour	1.22	12.7mm DIA. SCH. 40 PVC SCREEN; 203mm Ø BOREHOLE	3		100	
2.0	CH - CLAY, with silt, very stiff, medium plasticity, grey, moist	1.68					
2.5	END OF BOREHOLE @ 1.83m BGS	1.83					
3.0							
3.5							
4.0							
4.5							

WELL DETAILS
Screened interval:
0.61 to 1.83m BGS
Length: 1.22m
Diameter: 25mm
Slot Size: 0.030
Material: SCH 40 PVC
Seal:
0.30 to 0.61m BGS
Material: BENTONITE GRAVEL
Sand Pack:
0.61 to 1.83m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: GP-8
DATE COMPLETED: 30 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: H. MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	GAS PROBE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	FILL - clay, with silt and gravel, firm, medium to high plasticity, greyish brown, dry		CONCRETE; 12.7mm DIA. SCH. 40 PVC RISER PIPE; BENTONITE GRAVEL	1		40	
0.5							
1.0	- dry to moist at 0.91m BGS		#2 SILICA SANDPACK	2		40	
1.5			12.7mm DIA. SCH. 40 PVC SCREEN; 203mm Ø BOREHOLE	3		0	
1.83	END OF BOREHOLE @ 1.83m BGS	1.83					
2.0							
2.5							
3.0							
3.5							
4.0							
4.5							

WELL DETAILS
Screened interval:
0.61 to 1.83m BGS
Length: 1.22m
Diameter: 25mm
Slot Size: 0.030
Material: SCH 40 PVC
Seal:
0.30 to 0.61m BGS
Material: BENTONITE GRAVEL
Sand Pack:
0.61 to 1.83m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW11A-19
DATE COMPLETED: 29 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	FILL - clayey silt, stiff, medium plasticity, grey, moist		CONCRETE				
1				1		0	14
2	- clay, trace sand and gravel, very loose, high plasticity, blackish grey, moist at 1.52m BGS			2		10	4
3				3		15	5
4	- clay, silty, medium plasticity, loose at 3.35m BGS			4		80	4
	- wood debris, bottom of fill at 3.66m BGS	3.81					
4	ML - SILT, trace clay, compact, no to low plasticity, grey and brown, moist			5		10	15
5				6		60	12
6				7		10	26
7				8		85	29
	CH - CLAY, silty to with silt, very stiff, high plasticity, varved, mottled grey/brown, moist; breaks on sub mm silt seams	6.86		9		50	24
8			203mm Ø BOREHOLE	10		50	17
9				11		90	22
	- grey seam, odour present; likely slough at 9.30m BGS		51mm DIA. SCH. 40 PVC RISER PIPE	12		95	21
10				13		80	13
	- grey at 10.67m BGS		BENTONITE GROUT				
11				14		90	13
	- poor recovery (rock from slough) from 11.43 to 12.04m BGS			15		35	9
12	- no to trace silt at 12.19m BGS			16		75	11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW11A-19
DATE COMPLETED: 29 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
14	- poor recovery (rock from slough) from 13.72 to 14.33m BGS			17		100	10
				18		5	11
15	- poor recovery (rock from slough) from 14.48 to 15.09m BGS			19		50	14
	- no recovery (rock from slough) from 15.24 to 15.85m BGS			20		0	8
16				21		100	9
17				22		100	9
18				23		100	7
19				24		100	10
20			#2 SILICA SANDPACK 51mm DIA. SCH. 40 PVC SCREEN	25		100	6
	SW - SILTY, GRAVELLY SAND (BASAL TILL), dense, fine to coarse grained, fine gravel to cobbles, grey, wet; broken rock, dolostone, some gypsum	20.27 20.42		26		100	10
21	DOLOSTONE, very fractured, weathered, microcrystalline, grey, wet	21.34					
	END OF BOREHOLE @ 21.34m BGS						
22							
23							
24							
25							

WELL DETAILS
Screened interval:
19.20 to 22.25m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
0.61 to 17.68m BGS
Material: BENTONITE GRAVEL
Sand Pack:
17.68 to 22.25m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW11B-19
DATE COMPLETED: 29 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	See MW11A-19		CONCRETE BENTONITE GRAVEL 203mm Ø BOREHOLE 51mm DIA. SCH. 40 PVC RISER PIPE #2 SILICA SANDPACK 51mm DIA. SCH. 40 PVC SCREEN	1			
	END OF BOREHOLE @ 11.28m BGS	11.28					

WELL DETAILS
Screened interval:
8.23 to 11.28m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
0.61 to 6.71m BGS
Material: BENTONITE GRAVEL
Sand Pack:
6.71 to 11.28m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW12A-19
DATE COMPLETED: 26 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	Topsoil		CONCRETE				
		0.61					
1	CH - CLAY, with to silty, with sand, compact, high plasticity, varved, light brown, dry; trace rootlets	1.07		1		100	19
	CH - CLAY, with to silty, compact, high plasticity, brownish grey, varved, dry						
2	- grey, dry to moist at 1.52m BGS			2		50	24
	- with to trace silt, grey, moist at 2.44m BGS			3		100	15
3				4		50	17
	- no to trace silt, occasional medium sand and very fine gravel at 3.81m BGS			5		100	14
4			203mm Ø BOREHOLE				
5				6		75	10
				7		100	11
6	- with silt seam at 6.49m BGS			8		90	14
	- trace to no silt at 6.71m BGS			9		25	28
7			51mm DIA. SCH. 40 PVC RISER PIPE				
8				10		50	18
	- grey, saturated with little water at 8.53m BGS			11		100	19
9				12		50	19
10				13		100	20
			BENTONITE GROUT				
11				14		50	16
	- wet at 11.43m BGS			15		100	14
12				16		100	/

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW12A-19
DATE COMPLETED: 26 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
14				17		100	5
				18		100	3
15	- 2.5cm cobble, dark grey, angular at 14.84m BGS	14.78		19		100	24
	SW - SILTY, GRAVELLY SAND (BASAL TILL), dense, fine to coarse grained, fine gravel to cobbles, grey, wet; broken rock, dolostone, some gypsum			20		100	17
16	- poor recovery (rock in spoon) from 15.24 to 15.85m BGS		#2 SILICA SANDPACK	21		50	20
	- weathered rock, with clay and silt at 16.76m BGS		51mm DIA. SCH. 40 PVC SCREEN	22		0	56
17	DOLOSTONE, very fractured, weathered, microcrystalline, grey, wet	17.37					
18	END OF BOREHOLE @ 18.29m BGS	18.29					
19			WELL DETAILS Screened interval: 15.24 to 18.29m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: SCH 40 PVC Seal: 0.61 to 13.72m BGS Material: BENTONITE GRAVEL Sand Pack: 13.72 to 18.29m BGS Material: NO. 2 SILICA SAND				
20							
21							
22							
23							
24							
25							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW12B-19
DATE COMPLETED: 26 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	See MW12A-19		CONCRETE; 51mm DIA. SCH. 40 PVC RISER PIPE; BENTONITE GRAVEL; 203mm Ø BOREHOLE; #2 SILICA SANDPACK; 51mm DIA. SCH. 40 PVC SCREEN	1			
6	END OF BOREHOLE @ 6.10m BGS	6.10					

WELL DETAILS
Screened interval:
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
0.61 to 2.44m BGS
Material: BENTONITE GRAVEL
Sand Pack:
2.44 to 6.10m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

Appendix D

Groundwater and Surface Water Sampling Protocols and 2020 Monitoring Program Specifications

Appendix D1

Groundwater and Surface Water Sampling Protocols

Groundwater and surface water samples were collected by GHD personnel following standard sample collection protocols that are designed to ensure representative water quality samples are obtained during monitoring events. During the monitoring events, field water level information, purging information, and field measured parameters were recorded.

The following groundwater sampling protocols were adhered to during the monitoring events:

- Dedicated polyethylene tubing and a Waterra™ foot valve were installed in each monitoring well to reduce the opportunity for cross contamination between wells.
- Prior to groundwater sample collection, each well was purged of the standing volume of stagnant water. The objective of purging is to pump groundwater from the well until a representative sample of the groundwater is obtained. This is generally achieved by removing the three to five times the volume of standing water in the well (USEPA Convention). All groundwater wells were purged a minimum of three well volumes and then sampled, unless the well was purged dry, in which case the groundwater samples were collected the same day after allowing the well to recover for up to several hours. Purging is considered complete once sediment free groundwater is obtained and the temperature, conductivity, and pH of the groundwater stabilizes. Groundwater stabilization has occurred if three consecutive well volume measurements of temperature and conductivity are approximately plus or minus 10 percent and if the pH values are within 1.0 pH unit of the last three value averages.
- Groundwater samples were collected in the appropriate laboratory-supplied sample containers and preserved as required. Groundwater samples designated for dissolved metals and selected general chemistry parameters were field filtered using 0.45 μm in-line disposable filters to remove all silt and the majority of clay-sized particles from the samples.
- The sample containers were packaged in a cooler, stored between 0°C and 10°C, and delivered to the laboratory within a 24-hour period for analysis.
- Groundwater monitoring wells were sampled in the following order, if possible, to limit the potential for monitoring well cross-contamination:

Sample No.	Well No.	Sample No.	Well No.	Sample No.	Well No.
1	MW5A-09	13	MW2D-07	25	MW10A-18
2	MW5B-09	14	MW2S-07	26	MW10B-18
3	MW6A-07	15	MW2A-01	27	OW8D-07
4	MW6B-07	16	MW2B-07	28	OW8S-07
5	MW1D-07	17	MW12A-19	29	OW8A-06
6	MW1S-07	18	MW12B-19	30	OW8B-06
7	MW1A-13	19	OW5B-06	31	MW4A-09
8	MW1B-13	20	OW5A-06	32	MW2-03
9	OW3A-13	21	OW1A-06	33	MW3-03
10	OW3B-13	22	OW1B-06	34	MW1-03
11	OW9A-06	23	MW11A-19		
12	OW9B-06	24	MW11B-19		

Groundwater samples were submitted under chain-of-custody protocol to ALS Laboratory Group in Waterloo, Ontario, for analysis.

In order to avoid cross contamination during groundwater sampling activities, the following stringent decontamination procedure was followed. It is necessary that all equipment be decontaminated prior to commencing work on-Site and prior to leaving the Site at the end of each day. Furthermore, any equipment that contacts well water must be decontaminated between wells as follows:

- Wash with clean potable water and laboratory detergent (Alconox or similar solution) using a soft bristled brush if necessary to remove any sediment, particles or surface films. For equipment that cannot be adequately cleaned with a brush such as internal mechanisms or piping, the decontamination solutions shall be circulated through the equipment.
- Rinse thoroughly with de-ionized water and allow to air dry.
- Wrap equipment with aluminum foil (shiny side out), if applicable.
- The water level probe must be decontaminated as per the procedures described above between each well location.
- New gloves should be worn when performing a new task. Furthermore, new gloves must be worn prior to sample collection.

The following surface water sampling protocols were adhered to during the monitoring events:

- An attempt to collect surface water samples during or immediately following a precipitation event, if possible.
- When the surface water samples were collected, the laboratory-supplied sample containers were inverted and submersed to the desired sample depth and then the opening of the bottled was tilted to fill. When possible samples were collected approximately 6 inches (15 cm) below the surface with the sample baffles completely submerged to prevent floating debris from entering the sample bottles. Floating debris could result in unrepresentative analytical data.
- Wading in the water was avoided to reduce agitating bottom sediment deposits in the sample, which could result in a biased sample.
- If the bottles contained preservative, a pre-cleaned unpreserved bottle was used to collect the sample before transferring the water sample to the appropriate preserved bottles.
- The sample containers were packaged in a cooler, stored between 0°C and 10°C and delivered to the laboratory within a 24-hour period for analysis.

Surface water samples were submitted under chain-of-custody protocol to ALS Laboratory Group in Waterloo, Ontario, for analysis.

GHD
2021 SITE MONITORING SPECIFICATIONS

PROJECT:	Brooks Road Landfill Site
PROJECT NO.:	018235
PROJECT MANAGER:	Ryan Loveday
PROJECT COORDINATOR:	Brian Packer

MONITORING STAFF:	**RESPONSIBILITY**
Patrick Whittier	GHD Field Technician
Stephanie Berton	Coordinator/Chemist QA/QC

LABORATORIES USED: ALS Canada Ltd.

AUTHORIZATION:	**MONITORING EVENT**	**SIGNATURE**	**DATE**
	March		
	May		
	August		
	November		

MONITORING DESCRIPTION

A. GROUNDWATER MONITORING
B. SURFACE WATER MONITORING
C. LEACHATE QUALITY MONITORING
D. LEACHATE MOUNDING
E. LANDFILL GAS MONITORING

SPECIAL INSTRUCTIONS:

- Measure Gas Pressure, % LEL, and CH3 concentration at MW2A-01
- On the chain of custody, indicate in the comments section which parameter list the samples are to be analyzed for (i.e., List A - F)
- Document integrity and deficiencies of all monitoring wells
- MW2C-01 is no longer sampled
- Sample Bedrock Wells (D/S) – August only
- Leachate levels are to be recorded in March, May, August, and November from LCS and LW1-17
- Sample Leachate Collection System in August only
- Identify on the COC which sample is the Leachate Sample and request the lab to attempt to lower the detection limits for PAHs and VOCs

A) GROUNDWATER MONITORING

i) Field Technician: Dan Daum

ii) Monitoring Locations: A total of 34 sampling locations as indicated below:

MW5A-09	MW2D-07**	MW10A-18
MW5B-09	MW2S-07**	MW10B-18
MW6A-07	MW2A-01	OW8D-07**
MW6B-07	MW2B-07	OW8S-07**
MW1D-07**	MW12A-19	OW8A-06
MW1S-07**	MW12B-19	OW8B-06
MW1A-13	OW5B-06	MW4A-09*
MW1B-13	OW5A-06	MW2-03*
OW3A-13	OW1A-06	MW3-03*
OW3B-13	OW1B-06	MW1-03*
OW9A-06	MW11A-19	
OW9B-06	MW11B-19	

Notes:

* - Indicates water level only
** - Indicates water level only in November, sample in May

iii) Monitoring Frequency:

Groundwater Levels: May and November
Groundwater Quality: Annually in August
Groundwater Quality: Semi-Annually in November
Selected Wells (Table 1)

iv) Sampling Parameters:

Field

pH, conductivity, and temperature

Selected Wells (Table 1) – May and November
pH, conductivity, and temperature

Laboratory

Selected Wells (Table 1) – May
Inorganic Chemistry, Metals, PAHs, and VOCs – Table 2, List B

Selected Wells (Table 1) – November
Indicator Parameters (groundwater) – Table 2, List A

B) SURFACE WATER MONITORING

i) Field Technician: Dan Daum

ii) Monitoring Locations: A total of 10 sampling locations as indicated below:

SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
PSWMS Pond

iii) Monitoring Frequency:

Surface Water Flow and Surface Water Levels (According to Table 1)

Quarterly in March, May, August, and November

Surface Water Quality

Semi-annually in March and August – List C/F – Tables 1 and 2
Semi-annually in May and November – List D – Tables 1 and 2

iv) Sampling Parameters:

Field

pH, conductivity, dissolved oxygen, and temperature

Laboratory

List C (March and August)

Indicator Parameters (Surface Water) – Table 2, List C

List D (May and November)

Inorganic chemistry, Metals, PAHs, and VOCs – Table 2, List B

List F (March, May, August, November)

PSWMS Pond Parameters - Table 2, List D

C) LEACHATE QUALITY MONITORING

i) Field Technician: Dan Daum

ii) Monitoring Locations:

Leachate Collection System
Leachate Well

iii) Monitoring Frequency:

Leachate Collection System – sampled annually in May
Leachate Collection System and LW1-17 – liquid levels measured quarterly in March, May, August, November

iv) Sampling Parameters:

Field

Leachate Collection System – May
pH, conductivity, and temperature
Leachate Storage Tank – March, May, August, November
pH, conductivity, temperature, and dissolved oxygen

Laboratory

Leachate Collection System – May
Inorganic chemistry, Metals, PAHs, and VOCs – Table 2, list D
Leachate Storage Tank – March, May, August, November
Inorganic chemistry, Metals, PAHs, and VOCs – Table 2, list D

D) LEACHATE MOUNDING

i) Field Technician: Dan Daum

ii) Monitoring Locations:

Within deposited waste
Leachate Collection System (Leachate Collection System Riser Pipe)

iii) Monitoring Frequency:

Quarterly

iv) Sampling Parameters:

Field

Elevation of leachate mound

E) LANDFILL GAS MONITORING

i) Field Technician: Dan Daum

ii) Monitoring Locations: A total of 12 sampling locations as indicated below:

Locations

GP-1S
GP-1D
GP-2S
GP-2D
GP-3S
GP-3D
GP-4S
GP-4D
GP5-19
GP6-19
GP7-19
GP8-19

iii) Monitoring Frequency:

Monthly – between December 1 and April 30

Quarterly – between May 1 and November 30

iv) Sampling Parameters:

Field

% Lower Explosive Limit (LEL)
Methane Concentration (CH_4)
Carbon dioxide (CO_2)
Oxygen (O_2)
Pressure

Table D.1

Environmental Monitoring Program
2021 Environmental Monitoring Program
Brooks Road Landfill Site
Haldimand County, Ontario

	Location	March	May	August	November
Groundwater [1]	OW1A-06		B		A
	OW1B-06		B		A
	OW3A-13		B		A
	OW3B-13		B		A
	OW5A-06		B		A
	OW5B-06		B		A
	OW8A-06		B		A
	OW8B-06		B		A
	OW8D-07 (Gypsum Mine)		B		WL-only
	OW8S-07 (Gypsum Mine)		B		WL-only
	OW9A-06		B		A
	OW9B-06		B		A
	MW1-03		WL-only		WL-only
	MW1A-13		B		A
	MW1B-13		B		A
	MW1D-07 (Gypsum Mine)		B		WL-only
	MW1S-07 (Gypsum Mine)		B		WL-only
	MW2-03		WL-only		WL-only
	MW2A-01		B		A
	MW2B-07		B		A
	MW2C-01				
	MW2D-07 (Gypsum Mine)		B		WL-only
	MW2S-07 (Gypsum Mine)		B		WL-only
	MW3-03		WL-only		WL-only
	MW4A-09		WL-only		WL-only
	MW5A-09		B		A
	MW5B-09		B		A
	MW6A-07		B		A
	MW6B-07		B		A
	MW10A-18		B		A
	MW10B-18		B		A
	MW11A-19		B		A
	MW11B-19		B		A
	MW12A-19		B		A
	MW12B-19		B		A
Surface Water [2]	SW1	C	B	C	B
	SW2	C	B	C	B
	SW3	C	B	C	B
	SW4	C	B	C	B
	SW5	C	B	C	B
	SW6	C	B	C	B
	SW7	C	B	C	B
	SW8	C	B	C	B
	SW9	C	B	C	B
	SWMS Pond [3]	D	D	D	D
LCS	Leachate Collection System	WL-only	B	WL-only	WL-only
LW	LW1-17	WL-only	WL-only	WL-only	WL-only
QA/QC	Groundwater Duplicate		B		A
	Surface Water Duplicate	C	B	C	B
	Field Blank	C	B	C	B

Notes:

[1] Groundwater levels will be measured at all monitoring wells during the May and November sampling events

[2] Surface water levels and flows will be measured during all surface water sampling events at all surface water locations

[3] List E - Trigger Parameter samples are collected and reviewed prior to discharging water from the SWMS Pond

Refer to Table 2 for the list of parameters

List A - indicator parameters (groundwater)

List B - inorganic chemistry, metals, PAHs, VOCs

List C - indicator parameters (surface water)

List D - TDS Pond Parameters

List E - Effluent Discharge Parameters

Table D.2

Environmental Monitoring Program
2021 List of Analytical Parameters
Brooks Road Landfill Site
Haldimand County, Ontario

List (s)	Analytical Group	Analytical Parameters
A	Indicator Parameters (groundwater)	alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, DOC, turbidity
B	Inorganic Chemistry	alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulfate, DOC, TDS, suspended solids, phenol, BOD_5, COD, pH, total phosphorus, conductivity, turbidity
B	Metals	arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, nickel, potassium, calcium, aluminum
B	PAHs	naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene,
B	VOCs	chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, acetone, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, methyl-t-butyl ether, 1,1-dichloroethane, methyl ethyl ketone, cis-1,2-dichloroethene, chloroform, 1,2-dichloroethane, 1,1,1-trichloroethane, carbon tetrachloride, benzene, 1,2-dichloropropane, trichloroethene, bromodichloromethane, cis-1,3-dichloropropene, methyl isobutyl ketone, trans-1,3-dichloropropene, 1,1,2-trichloroethane, toluene, 2-hexanone, dibromochloromethane, 1,2-dibromoethane, tetrachloroethene, 1,1,1,2-tetrachloroethane, chlorobenzene, ethylbenzene, m,p,o-xylenes, bromoform, styrene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene
C	Indicator Parameters (surface water)	alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, pH, total phosphorus, TDS, suspended solids, sulphate, BOD5, COD, phenol, turbidity, temperature (field), and dissolved oxygen (field)
D	PSWMS Pond Parameters	General Chemistry: alkalinity, conductivity, hardness, pH, chloride, sulphate, nitrite, nitrate, ammonia, TSS, TDS, COD, total phosphorus, TKN, BOD_5, phenols Metals: arsenic, barium, boron, cadmium, chromium, copper, iron, lead, mercury, zinc Organics: ethylbenzene, naphthalene, benzo(a)pyrene Field Parameters: conductivity, dissolved oxygen, pH, temperature
E	PSWMS Pond Trigger Parameters	TSS, pH, un-ionized ammonia, iron, total phosphorus, zinc, boron, toluene, fluorene, napthalene Field Parameters: conductivity, dissolved oxygen, pH, temperature

Appendix E

QA/QC Data Validation Memorandum

Technical Memorandum

February 24, 2022

To	Brian Packer	**Tel**	519-340-3926
Copy to		**Email**	Stephanie.Berton@ghd.com
From	Stephanie Berton/an/118	**Ref. No.**	018235
Subject	Analytical Data Verification Groundwater, Leachate and Surface Water Sampling Events Brooks Road Landfill Cayuga, Ontario March to November 2021		

1. Introduction

This document details a reduced validation of analytical results for groundwater, leachate and surface water samples collected from the Brooks Road Landfill Site in Cayuga, Ontario from March to November 2021. The samples were submitted to ALS Canada Ltd. (ALS) located in Waterloo, Ontario. A sample collection and analysis summary is presented in Table 1. A summary of the analytical methodology is presented in Table 2.

Standard GHD report deliverables were submitted by the laboratory. The final results and supporting quality assurance/quality control (QA/QC) data were assessed. Evaluation of the data was based on information obtained from the chain of custody forms, finished report forms, method blank data, duplicate data, recovery data from surrogate spikes/laboratory control samples (LCS)/matrix spikes (MS).

The QA/QC criteria by which these data have been assessed are outlined in the analytical methods referenced in Table 3 and applicable guidance from the documents entitled:

1. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", United States Environmental Protection Agency (USEPA) 540/R-99-008, September 2016.
2. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", USEPA 540/R-94-013, September 2016.

Items 1 and 2 will subsequently be referred to as the “Guidelines” in this Memorandum.

2. Sample Holding Time and Preservation

The sample holding time criteria for the analyses are summarized in Table 2. Sample chain of custody documents and analytical reports were used to determine sample holding times. Most samples were prepared and analyzed within the required holding times. Results obtained outside of the recommended holding time have been qualified as estimated (See Table 3).

All samples were properly preserved and delivered on ice and received by the laboratory at the required temperature (<10°C).

3. Laboratory Method Blank Analyses

Method blanks are prepared from a purified matrix and analyzed with investigative samples to determine the existence and magnitude of sample contamination introduced during the analytical procedures.

For this study, laboratory method blanks were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

All method blank results were non-detect, indicating that laboratory contamination was not a factor for this investigation.

4. Surrogate Spike Recoveries

In accordance with the methods employed, all samples, blanks, and QC samples analyzed for organics are spiked with surrogate compounds prior to sample extraction and/or analysis. Surrogate recoveries provide a means to evaluate the effects of laboratory performance on individual sample matrices.

All samples submitted for volatile organic compound (VOC) and polycyclic aromatic hydrocarbon (PAHs) determinations were spiked with the appropriate number of surrogate compounds prior to sample analysis.

Surrogate recoveries were assessed against laboratory control limits. All surrogate recoveries were within the laboratory control limits.

5. Laboratory Control Sample Analyses

LCS are prepared and analyzed as samples to assess the analytical efficiencies of the methods employed, independent of sample matrix effects.

For this study, LCS were analyzed at a minimum frequency of one per 20 investigative samples and/or one per analytical batch.

Organic Analyses

The LCS contained all compounds of interest. All LCS recoveries were within the laboratory control limits, demonstrating acceptable analytical accuracy.

Inorganic Analyses

The LCS contained all compounds of interest. LCS recoveries were assessed per the "Guidelines". All LCS recoveries were within the control limits, demonstrating acceptable analytical accuracy.

6. Matrix Spike Analyses

To evaluate the effects of sample matrices on the extraction or digestion process, measurement procedures, and accuracy of a particular analysis, samples are spiked with a known concentration of the analyte of concern and analyzed as MS samples. If the original sample concentration is significantly greater than the spike concentration, the recovery is not assessed.

The MS samples were spiked with the analytes of interest, and the results were evaluated using the "Guidelines". All percent recoveries were within the control limits, demonstrating acceptable analytical accuracy.

7. Duplicate Sample Analyses

Analytical precision is evaluated based on the analysis of laboratory duplicate samples. For this study, duplicate samples were prepared and analyzed by the laboratory. The laboratory performed additional site-specific duplicate analyses internally. The relative percent differences (RPDs) associated with these duplicate samples must be less than 20 percent for water samples. If the reported concentration in either the investigative sample or its duplicate is less than five times the reporting limit (RL), the evaluation criteria is a difference of one times the RL value for water samples. All duplicate analyses performed were acceptable, demonstrating acceptable analytical precision.

8. Hardness Calculated from Total Calcium and Magnesium Concentrations

Hardness results were flagged by the laboratory because the values were calculated using total calcium and magnesium concentrations. The associated sample results have been qualified as estimated as the results may be biased high (see Table 4).

9. Ion Abundance Ratio

One chrysene result was flagged by the laboratory because the ion abundance ratio did not meet acceptance criteria. The associated sample result has been qualified as estimated as the result is considered an estimated maximum concentration (see Table 5).

10. Field QA/QC Samples

The field QA/QC consisted of two field blanks and nine field duplicate sample sets.

Field Blank Sample Analysis

To evaluate contamination sample collection, transportation, storage, and analytical activities, two field blanks were collected and submitted "blind" to the laboratory for analyses as outlined in Table 1. Most field blank results were non-detect for the compounds of interest. Various metals and general chemistry parameters were detected in the field blanks. Associated sample concentrations that were similar to the blank concentrations were qualified as non-detect or estimated (see Table 6). The remaining associated concentrations were not qualified as results were either non-detect or greater than ten times the blank value.

Field Duplicate Sample Analysis

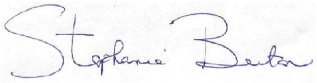
To assess the analytical and sampling protocol precision, nine field duplicate sample sets were collected and submitted "blind" to the laboratory, as specified in Table 1. The RPDs associated with these duplicate samples must be less than 50 percent for water samples. If the reported concentration in either the investigative sample or its duplicate is less than five times the RL, the evaluation criteria is a difference of one times the RL value for water samples.

Most field duplicate results were within acceptable agreement, demonstrating acceptable sampling and analytical precision. Results which showed variability have been qualified as estimated (see Table 7).

11. Conclusion

Based on the assessment detailed in the foregoing, the data are acceptable with the specific qualifications noted herein.

Regards



Stephanie Berton
Data Management - Data Validator

Table 1

Sample Collection and Analysis Summary
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Sample Identification	Location	Matrix	Collection Date (mm/dd/yyyy)	Analytical Parameters: Hardness	pH	Total Kjeldahl Nitrogen	Anions (Chloride, Nitrite-N, Nitrate-N, Sulphate)	Alkalinity	Ammonia-N	Conductivity	Total Dissolved Solids	Total Suspended Solids	Total Phosphorus	Biological Oxygen Demand	Chemical Oxygen Demand	Dissolved Organic Carbon	Metals, total	Metals, dissolved	Mercury, dissolved	Volatile Organic Compounds	Polycyclic Aromatic Hydrocarbons	Phenols	Comments
L2570974	SW-18235-0321-DD-001	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-002	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	FD(SW-18235-0321-DD-001)
L2570974	SW-18235-0321-DD-003	SW9	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-004	SW2	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-005	SW6	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-006	SW3	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-007	SW7	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-008	SW8	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-009	SW4	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-010	SW5	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	POND-18235-0321-DD-001	SWMS-POND	Surface Water	03/26/2021	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	X	X	X	
L2596376	LST-18235-0521-DD-001	Leachate	Leachate Storage Tank	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	
L2596376	SW-18235-0521-DD-001	SW9	Surface Water	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	
L2596376	SW-18235-0521-DD-002	SW3	Surface Water	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	
L2596376	SW-18235-0521-DD-004	SW7	Surface Water	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	
L2596376	SW-18235-0521-DD-005	SW7	Surface Water	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	FD(SW-18235-0521-DD-004)
L2596376	SW-18235-0521-DD-008	SW6	Surface Water	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	
L2596376	POND-18235-0521-DD-011	SWMS-POND	Surface Water	06/01/2021	-	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	
L2596389	GW-18235-0521-DD-001	OW9A-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-002	OW9A-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	FD(GW-18235-0521-DD-001)
L2596389	GW-18235-0521-DD-003	OW9B-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-004	OW5B-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-005	OW8A-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-006	MW10A-18	Groundwater	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-007	OW5A-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-008	OW1B-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-009	OW8B-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-010	OW8A-06	Groundwater	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	FD(GW-18235-0521-DD-005)
L2596389	GW-18235-0521-DD-011	MW10B-18	Groundwater	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-012	MW1A-13	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-013	MW1D-07	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-014	MW1S-07	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-015	MW1B-13	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-016	MW11B-19	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-017	OW3A-13	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-018	OW3B-13	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	

Table 1

Sample Collection and Analysis Summary
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Sample Identification	Location	Matrix	Collection Date (mm/dd/yyyy)	Analytical Parameters: Hardness	pH	Total Kjeldahl Nitrogen	Anions (Chloride, Nitrite-N, Nitrate-N, Sulphate)	Alkalinity	Ammonia-N	Conductivity	Total Dissolved Solids	Total Suspended Solids	Total Phosphorus	Biological Oxygen Demand	Chemical Oxygen Demand	Dissolved Organic Carbon	Metals, total	Metals, dissolved	Mercury, dissolved	Volatile Organic Compounds	Polycyclic Aromatic Hydrocarbons	Phenols	Comments
L2570974	SW-18235-0321-DD-001	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-002	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	FD(SW-18235-0321-DD-001)
L2570974	SW-18235-0321-DD-003	SW9	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-004	SW2	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-005	SW6	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-006	SW3	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-007	SW7	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-008	SW8	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-009	SW4	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-010	SW5	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	POND-18235-0321-DD-001	SWMS-POND	Surface Water	03/26/2021	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	X	X	X	
L2596389	GW-18235-0521-DD-019	-	Water	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	Field Blank
L2596389	GW-18235-0521-DD-020	OW1A-06	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-021	MW2S-07	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-022	MW2D-07	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-023	MW2B-07	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-024	MW2A-01	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-025	OW8D-07	Groundwater	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-026	OW8S-07	Groundwater	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-027	MW2D-07	Groundwater	06/02/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	FD(GW-18235-0521-DD-022)
L2596389	GW-18235-0521-DD-028	MW5B-09	Groundwater	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-029	MW11A-19	Groundwater	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-030	MW5A-09	Groundwater	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-031	MW6A-07	Groundwater	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-032	MW6B-07	Groundwater	06/01/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2596389	GW-18235-0521-DD-033	Leachate	Leachate Storage Tank	06/03/2021	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	
L2634072	SW-18235-0821-DD-002	SW2	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2634072	SW-18235-0821-DD-003	SW1	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2634072	SW-18235-0821-DD-004	SW4	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2634072	SW-18235-0821-DD-005	SW5	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2634072	SW-18235-0821-DD-006	SW6	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2634072	SW-18235-0821-DD-007	SW7	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2634072	SW-18235-0821-DD-009	SW9	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2634072	SW-18235-0821-DD-010	SW9	Surface Water	08/31/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	FD(SW-18235-0821-DD-009)
L2634072	POND-18235-0821-DD-001	SWMS-POND	Surface Water	08/31/2021	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	X	X	X	
L2661838	GW-18235-1121-BK-001	OW9B-06	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	

Table 1

Sample Collection and Analysis Summary
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Sample Identification	Location	Matrix	Collection Date (mm/dd/yyyy)	Analytical Parameters: Hardness	pH	Total Kjeldahl Nitrogen	Anions (Chloride, Nitrite-N, Nitrate-N, Sulphate)	Alkalinity	Ammonia-N	Conductivity	Total Dissolved Solids	Total Suspended Solids	Total Phosphorus	Biological Oxygen Demand	Chemical Oxygen Demand	Dissolved Organic Carbon	Metals, total	Metals, dissolved	Mercury, dissolved	Volatile Organic Compounds	Polycyclic Aromatic Hydrocarbons	Phenols	Comments
L2570974	SW-18235-0321-DD-001	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-002	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	FD(SW-18235-0321-DD-001)
L2570974	SW-18235-0321-DD-003	SW9	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-004	SW2	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-005	SW6	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-006	SW3	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-007	SW7	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-008	SW8	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-009	SW4	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-010	SW5	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	POND-18235-0321-DD-001	SWMS-POND	Surface Water	03/26/2021	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	X	X	X	
L2661838	GW-18235-1121-BK-002	OW9A-06	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-003	OW5B-06	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-004	OW5A-06	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-005	OW1B-06	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-006	OW1A-06	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-007	MW11A-19	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-008	MW11B-19	Groundwater	11/08/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-009	MW10A-18	Groundwater	11/09/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-010	MW1A-13	Groundwater	11/09/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-011	MW1A-13	Groundwater	11/09/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	FD(GW-18235-1121-BK-010)
L2661838	GW-18235-1121-BK-012	MW1B-13	Groundwater	11/09/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-013	OW3A-13	Groundwater	11/09/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-014	OW3B-13	Groundwater	11/09/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-015	MW2A-01	Groundwater	11/10/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-016	MW12A-19	Groundwater	11/10/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-017	OW8A-06	Groundwater	11/10/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-018	OW8B-06	Groundwater	11/10/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-019	MW6B-07	Groundwater	11/10/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-020	MW6A-07	Groundwater	11/10/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	
L2661838	GW-18235-1121-BK-021	MW6A-07	Groundwater	11/10/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	FD(GW-18235-1121-BK-020)
L2662206	SW-18235-1121-BK-01	SW1	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	
L2662206	SW-18235-1121-BK-011	SW4	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	FD(SW-18235-1121-BK-04)
L2662206	SW-18235-1121-BK-02	SW2	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	
L2662206	SW-18235-1121-BK-04	SW4	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	
L2662206	SW-18235-1121-BK-05	SW5	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	
L2662206	SW-18235-1121-BK-06	SW6	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	

Table 1

Sample Collection and Analysis Summary
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Sample Identification	Location	Matrix	Collection Date (mm/dd/yyyy)	Analytical Parameters: Hardness	pH	Total Kjeldahl Nitrogen	Anions (Chloride, Nitrite-N, Nitrate-N, Sulphate)	Alkalinity	Ammonia-N	Conductivity	Total Dissolved Solids	Total Suspended Solids	Total Phosphorus	Biological Oxygen Demand	Chemical Oxygen Demand	Dissolved Organic Carbon	Metals, total	Metals, dissolved	Mercury, dissolved	Volatile Organic Compounds	Polycyclic Aromatic Hydrocarbons	Phenols	Comments
L2570974	SW-18235-0321-DD-001	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-002	SW1	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	FD(SW-18235-0321-DD-001)
L2570974	SW-18235-0321-DD-003	SW9	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-004	SW2	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-005	SW6	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-006	SW3	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-007	SW7	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-008	SW8	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-009	SW4	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	SW-18235-0321-DD-010	SW5	Surface Water	03/26/2021	-	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	
L2570974	POND-18235-0321-DD-001	SWMS-POND	Surface Water	03/26/2021	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	X	X	X	
L2662206	SW-18235-1121-BK-07	SW7	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	
L2662206	SW-18235-1121-BK-09	SW9	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	
L2662206	SW-18235-1121-BK-FB	-	Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	Field Blank
L2662206	POND-18235-1121-BK-SWMS	SWMS-POND	Surface Water	11/12/2021	-	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	X	X	X	
L2662221	GW-18235-1121-BK-022	MW10B-18	Groundwater	11/12/2021	-	X	-	X	X	X	X	X	-	-	-	X	X	-	X	-	-	-	-	

Notes:
"-" - Not applicable
FD - Field Duplicate Sample of Sample in Parentheses
N - Nitrogen

Analytical Method and Holding Time Criteria
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Parameters	Methodology [1]	Holding Time Criteria[2] Water (days)
Hardness	Calculation	NA
pH	SM 4500H+	28 days
Total Kjeldahl Nitrogen	SM 4500-N	28 days
Anions (Nitrite-N, Nitrate-N)	SM4110B	7 days
Anions (Sulphate, Chloride)	SM4110B	28 days
Alkalinity	SM 2320B	14 days
Ammonia-N	SM 4500NH3	28 days
Conductivity	SM 2510B	30 days
Total Dissolved Solids	SM 2540C	7 days
Total Suspended Solids	SM 2540D - Gravimetric	7 days
Total Phosphorus	SM 4500PD	28 days
Biological Oxygen Demand	SM5210B	4 days[3]
Chemical Oxygen Demand	SM 5220B	28 days
Dissolved Organic Carbon	SM 5310C	3 days unpreserved/28 days preserved
Metals, total and dissolved	EPA 200.8	60 days
Mercury, dissolved	SW-846 7470	28 days
Volatile Organic Compounds	SW846 8260	14 days
Polycyclic Aromatic Hydrocarbons	SW846 8270	14 days
Phenols	SM 5530D	7 days unpreserved/28 days preserved

Notes:

(1) Methods referenced from the following:
SW846 - "Test Method for Evaluating Solid Waste Physical/Chemical Methods", EPA, November 1986 with promulgated updates
SM - Standard Methods for the Examination of Water and Wastewater", 21st Ed., APHA, September 2005
EPA - "Methods for Chemical Analysis of Water and Wastes", EPA 600/4 79 020, Revised March 1983

(2) Holding times differing from those defined in the indicated methodology were obtained from the O. Reg. 153 Analytical Protocols

N - Nitrogen

4 days[3] - 4 days from sample collection to incubation

NA - Not Applicable

Table 3

Qualified Sample Results Due to Holding Time Exceedance
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Parameter	Sample ID	Holding Time (days)	Holding Time Criteria (days)	Analyte	Qualified Sample Results	Units
L2634072	Gen Chem	SW-18235-0821-DD-006	8	4	Biochemical oxygen demand (BOD)	124 J	mg/L
L2662206	Gen Chem	POND-18235-1121-BK-SWMS	5	3	Dissolved organic carbon (DOC)	4.98 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-01	5	3	Dissolved organic carbon (DOC)	28.7 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-011	5	3	Dissolved organic carbon (DOC)	12.5 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-02	5	3	Dissolved organic carbon (DOC)	6.00 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-04	5	3	Dissolved organic carbon (DOC)	12.5 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-05	5	3	Dissolved organic carbon (DOC)	26.1 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-06	5	3	Dissolved organic carbon (DOC)	20.1 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-07	5	3	Dissolved organic carbon (DOC)	4.66 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-09	5	3	Dissolved organic carbon (DOC)	16.5 J	mg/L
L2596389	Gen Chem	GW-18235-0521-DD-033	8	7	Phenolics (total)	0.021 J	mg/L
L2662206	Gen Chem	SW-18235-1121-BK-05	10	7	Total dissolved solids (TDS)	330 J	mg/L

Notes:
J - Estimated concentration
Gen Chem - General chemistry

Summary of Qualified Sample Data Due to Biased High Hardness
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Parameter	Sample ID	Analyte	Qualified Result		Units
L2570974	Gen Chem	POND-18235-0321-DD-001	Hardness	380	J+	mg/L
L2596376	Gen Chem	LST-18235-0521-DD-001	Hardness	1640	J+	mg/L
L2596376	Gen Chem	SW-18235-0521-DD-001	Hardness	415	J+	mg/L
L2596376	Gen Chem	SW-18235-0521-DD-002	Hardness	336	J+	mg/L
L2596376	Gen Chem	SW-18235-0521-DD-004	Hardness	217	J+	mg/L
L2596376	Gen Chem	SW-18235-0521-DD-005	Hardness	219	J+	mg/L
L2596376	Gen Chem	SW-18235-0521-DD-008	Hardness	574	J+	mg/L
L2634072	Gen Chem	POND-18235-0821-DD-001	Hardness	286	J+	mg/L

Notes:
J+ - The result is an estimated quantity, but the result may be biased high
Gen Chem - General Chemistry

Qualified Sample Data Due To Outlying Ion Abundance Ratios
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Parameter	Associated Sample ID	Analyte	Qualified Result		Units
L2596389	PAHs	GW-18235-0521-DD-028	Chrysene	0.028	J+	mg/L

Notes:
J+ - The result is an estimated quantity, but the result may be biased high
PAHs - Polyaromatic Hydrocarbons

Table 6

Qualified Sample Data Due to Analyte Concentrations in the Field Blanks
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Parameter	Analyte	Blank Result	Associated Sample ID	Qualified Result	Units
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-006	0.052 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-008	0.026 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-009	0.010 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-011	0.057 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-015	0.038 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-017	0.033 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-018	0.032 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-023	0.011 U	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-024	0.084 J+	mg/L
L2596389	Gen Chem	Ammonia-N	0.013	GW-18235-0521-DD-027	0.055 U	mg/L
L2596389	Metals	Barium, dissolved	0.00042	GW-18235-0521-DD-021	0.0037 J+	mg/L
L2596389	Metals	Barium, dissolved	0.00042	GW-18235-0521-DD-024	0.0041 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-001	3.86 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-002	3.30 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-003	4.55 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-005	4.62 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-006	2.69 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-007	4.08 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-008	4.90 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-012	4.87 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-013	2.93 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-014	2.84 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-017	2.53 U	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-018	4.80 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-020	2.96 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-022	2.98 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-026	2.69 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-027	2.51 U	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-028	5.9 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-029	4.35 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-031	3.47 J+	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC)	0.51	GW-18235-0521-DD-032	4.32 J+	mg/L
L2596389	Metals	Molybdenum, dissolved	0.000131	GW-18235-0521-DD-011	0.00097 J+	mg/L
L2596389	Metals	Molybdenum, dissolved	0.000131	GW-18235-0521-DD-032	0.00103 J+	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-001	0.0071 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-002	0.0024 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-003	0.0049 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-004	0.0027 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-005	0.0031 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-006	0.0051 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-007	0.0028 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-008	0.0029 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-009	0.0058 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-010	0.0015 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-011	0.0042 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-012	0.0042 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-013	0.0050 U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-014	0.0072 U	mg/L

Table 6

Qualified Sample Data Due to Analyte Concentrations in the Field Blanks
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Parameter	Analyte	Blank Result	Associated Sample ID	Qualified Result		Units
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-015	0.0023	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-016	0.0025	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-017	0.0068	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-018	0.0055	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-020	0.0049	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-021	0.0046	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-022	0.0017	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-023	0.0067	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-024	0.0181	J+	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-026	0.0021	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-027	0.0037	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-028	0.0030	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-029	0.0068	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-030	0.0030	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-031	0.0063	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-032	0.0030	U	mg/L
L2596389	Gen Chem	Phenolics	0.003	GW-18235-0521-DD-033	0.021	J+	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-01	0.000166	U	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-011	0.000701	U	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-02	0.00201	U	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-04	0.000776	U	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-05	0.000248	U	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-06	0.000303	U	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-07	0.00103	U	mg/L
L2662206	Metals	Molybdenum, total	0.00109	SW-18235-1121-BK-09	0.000364	U	mg/L
L2662206	Gen Chem	Phenolics	0.0099	SW-18235-1121-BK-04	0.0036	U	mg/L

Notes:
U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit
J+ - The result is an estimated quantity, but the result may be biased high
Gen Chem - General Chemistry
N - Nitrogen

Qualified Sample Data Due To Variability In Field Duplicate Results
Groundwater, Leachate and Surface Water Sampling Events
Brooks Road Landfill
Cayuga, Ontario
March to November 2021

Lab Report #	Parameter	Analyte	RPD/Diff	Sample ID	Qualified Result	Field Duplicate Sample ID	Qualified Result	Units
L2570974	Gen Chem	Nitrate (as N)	>1xRL	SW-18235-0321-DD-001	0.020 UJ	SW-18235-0321-DD-002	0.042 J	mg/L
L2596376	Metals	Lead	>1xRL	SW-18235-0521-DD-004	0.000182 J	SW-18235-0521-DD-005	0.000096 J	mg/L
L2596389	Gen Chem	Ammonia-N	109%	GW-18235-0521-DD-022	0.186 J	GW-18235-0521-DD-027	0.055 UJ	mg/L
L2596389	Metals	Barium (dissolved)	77%	GW-18235-0521-DD-022	0.0057 J	GW-18235-0521-DD-027	0.0128 J	mg/L
L2596389	Metals	Cobalt (dissolved)	67%	GW-18235-0521-DD-022	0.0024 J	GW-18235-0521-DD-027	0.0012 J	mg/L
L2596389	Metals	Iron (dissolved)	86%	GW-18235-0521-DD-022	0.25 J	GW-18235-0521-DD-027	0.10 UJ	mg/L
L2596389	Metals	Manganese (dissolved)	63%	GW-18235-0521-DD-022	0.167 J	GW-18235-0521-DD-027	0.322 J	mg/L
L2596389	Gen Chem	Phosphorus	180%	GW-18235-0521-DD-022	0.0575 J	GW-18235-0521-DD-027	1.09 J	mg/L
L2596389	Gen Chem	Total kjeldahl nitrogen (TKN)	73%	GW-18235-0521-DD-022	0.280 J	GW-18235-0521-DD-027	0.60 J	mg/L
L2596389	Gen Chem	Total suspended solids (TSS)	199%	GW-18235-0521-DD-022	57.8 J	GW-18235-0521-DD-027	20100 J	mg/L
L2596389	Gen Chem	Dissolved organic carbon (DOC) (dissolved)	52%	GW-18235-0521-DD-005	4.62 J	GW-18235-0521-DD-010	7.86 J	mg/L
L2596389	Gen Chem	Phosphorus	56%	GW-18235-0521-DD-005	0.0353 J	GW-18235-0521-DD-010	0.0198 J	mg/L
L2634072	Gen Chem	Biochemical oxygen demand (BOD)	>1xRL	SW-18235-0821-DD-009	47.8 J	SW-18235-0821-DD-010	3.7 J	mg/L
L2634072	Gen Chem	Phenolics (total)	>1xRL	SW-18235-0821-DD-009	0.0017 J	SW-18235-0821-DD-010	0.0031 J	mg/L
L2662206	Metals	Cadmium	>1xRL	SW-18235-1121-BK-04	0.0000216 J	SW-18235-1121-BK-011	0.0000441 J	mg/L
L2662206	Metals	Manganese	119%	SW-18235-1121-BK-04	0.0431 J	SW-18235-1121-BK-011	0.171 J	mg/L

Notes:
RPD - Relative Percent Difference
Diff - Difference (i.e., >1x RL for water samples)
RL - Reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
Gen Chem - General Chemistry
N - Nitrogen

Appendix F

Hydrographs

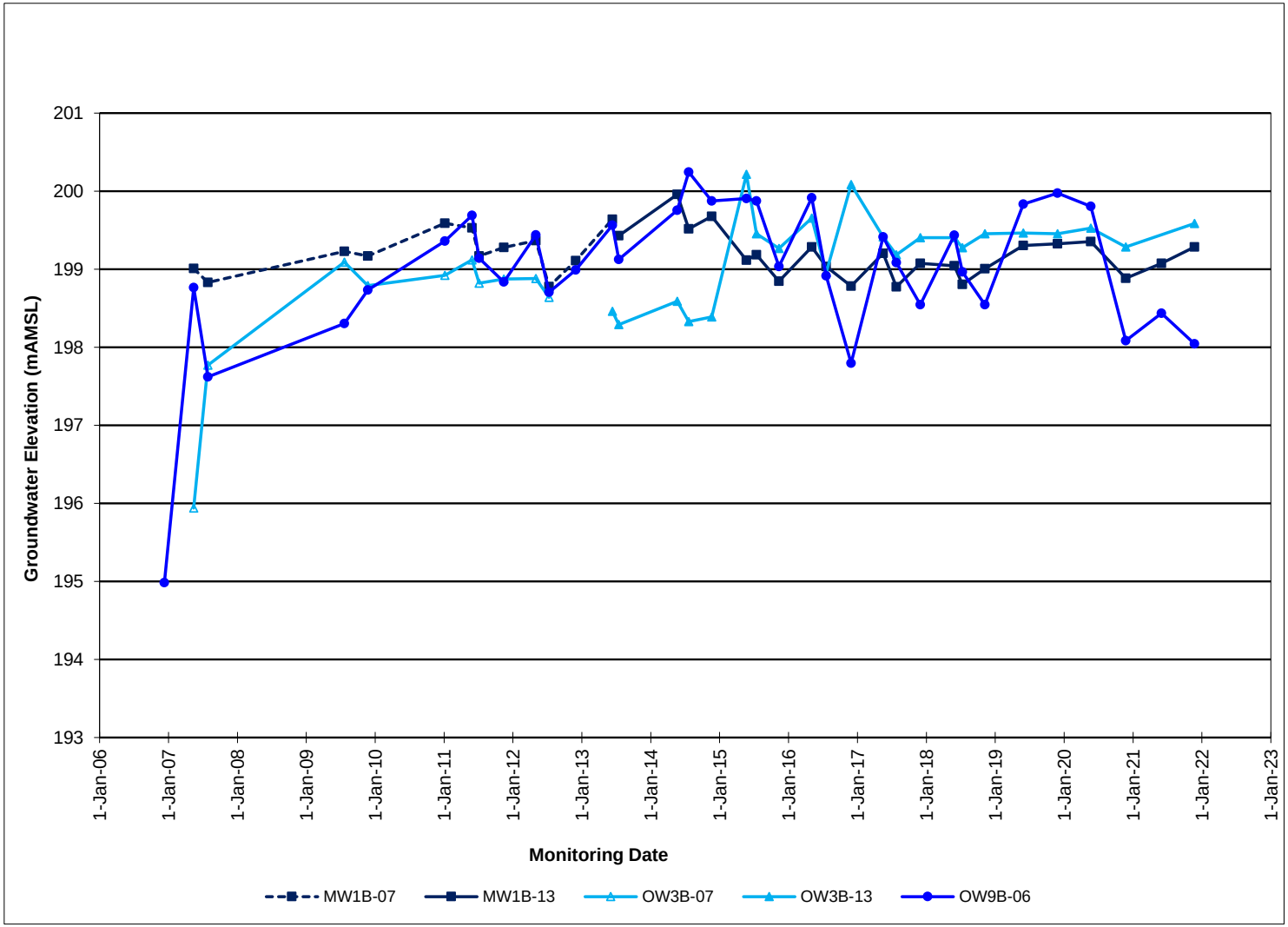


figure 1A
SHALLOW OVERBURDEN AQUIFER UNIT HYDROGRAPH
NORTHERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

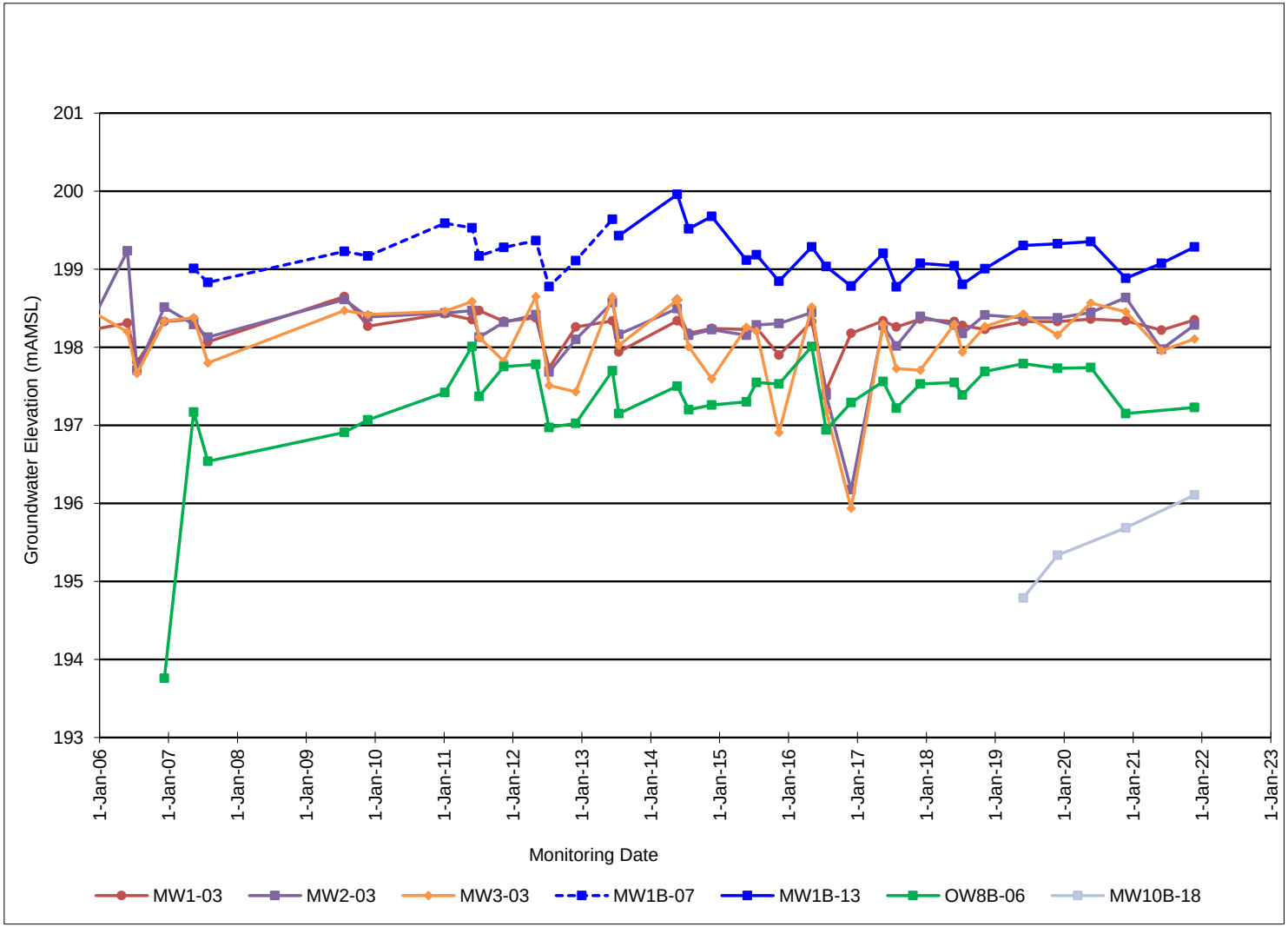


figure 1B

SHALLOW OVERBURDEN AQUIFER UNIT HYDROGRAPH
WESTERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

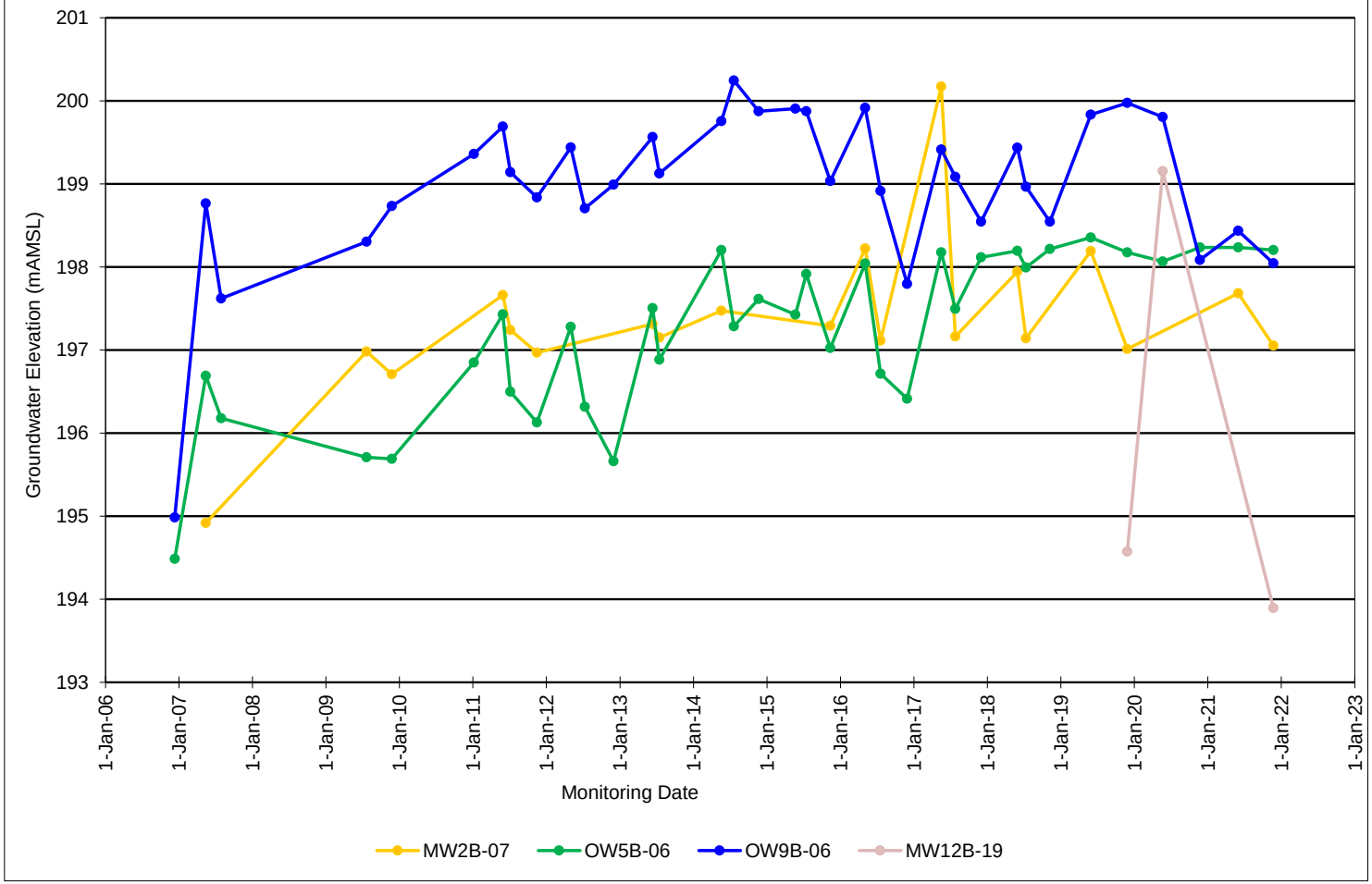


figure 1C
SHALLOW OVERBURDEN AQUIFER UNIT HYDROGRAPH
EASTERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

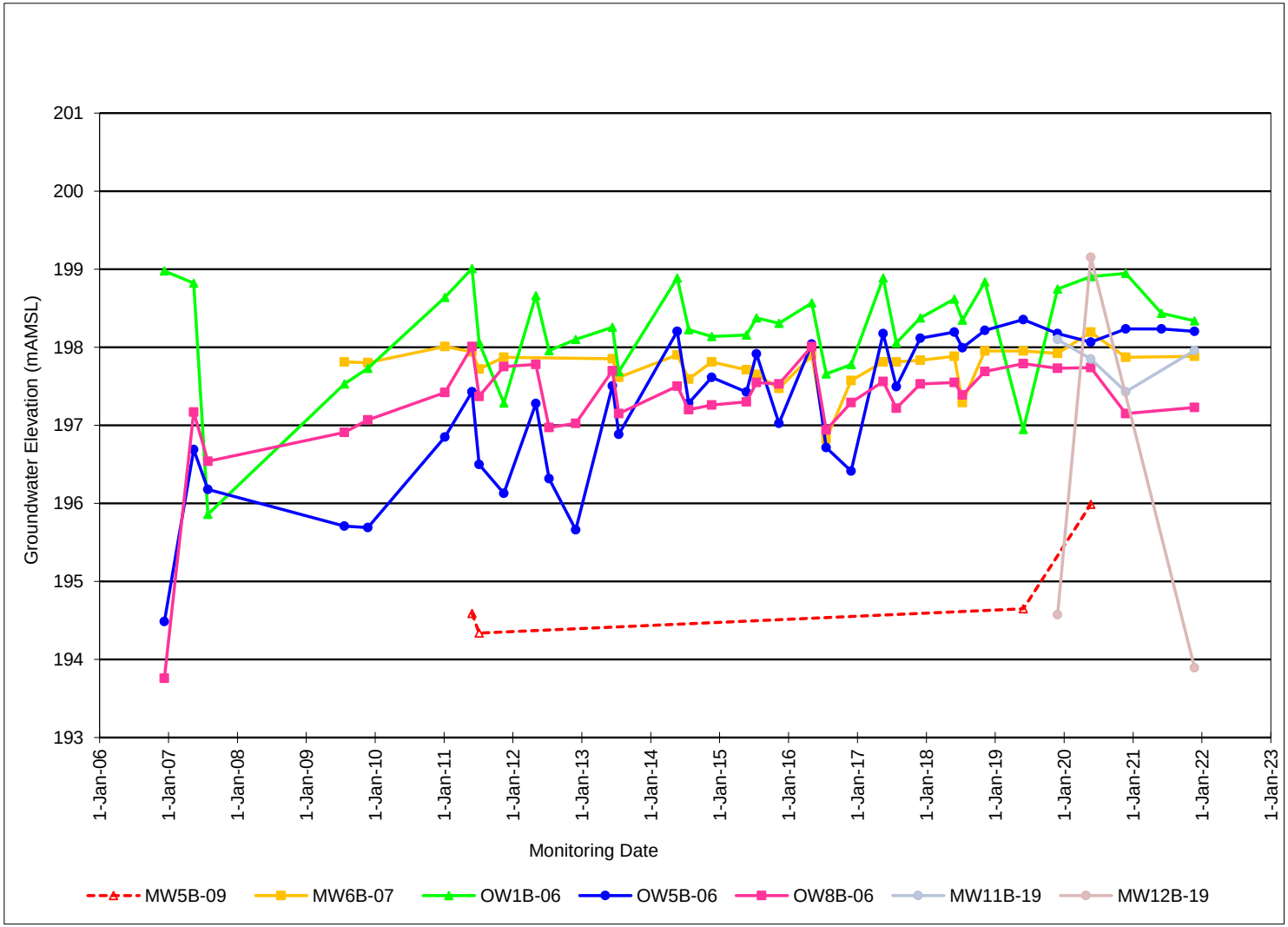


figure 1D
SHALLOW OVERBURDEN AQUIFER UNIT HYDROGRAPH
SOUTHERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

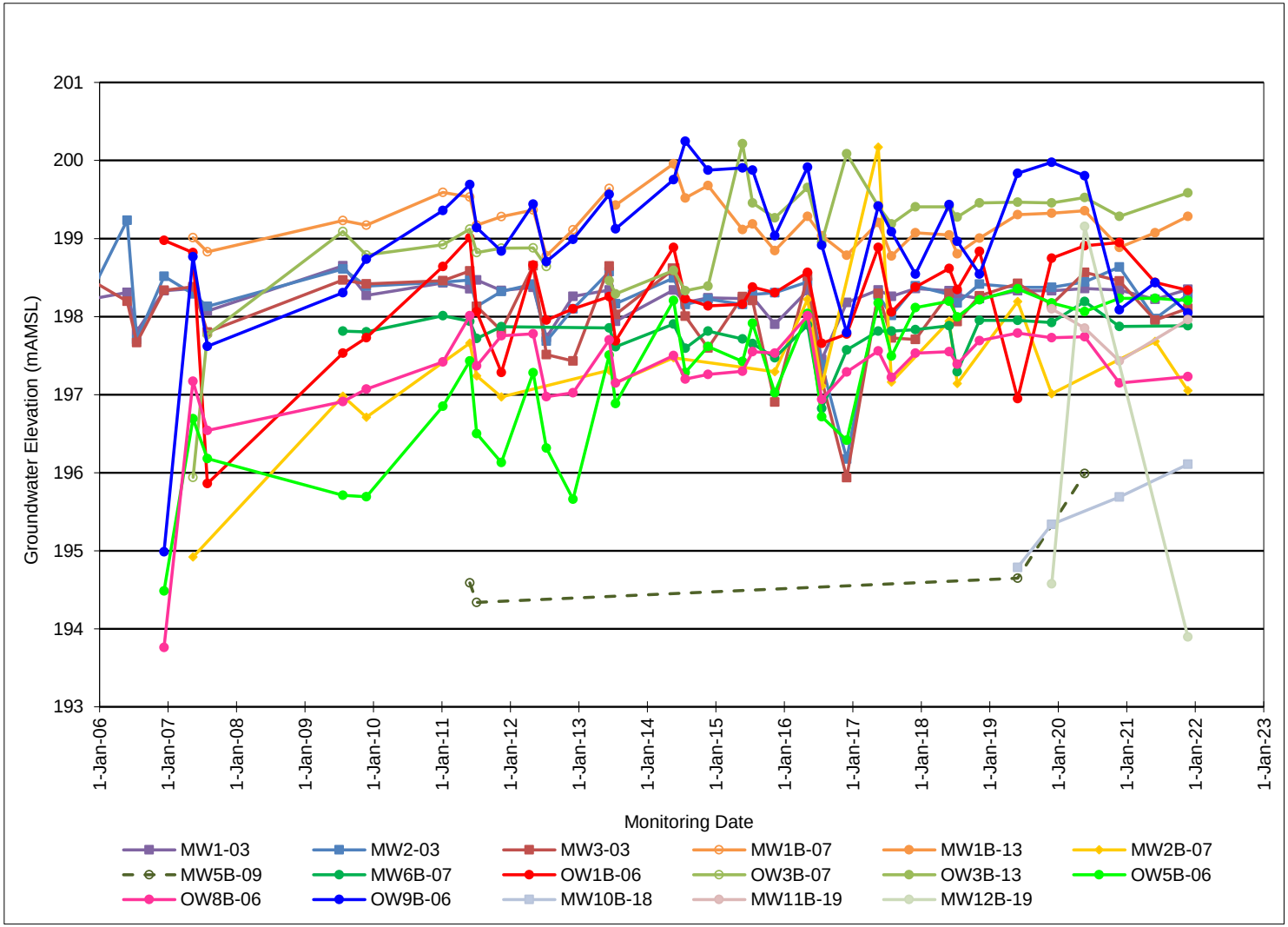


figure 1E
SHALLOW OVERBURDEN AQUIFER UNIT HYDROGRAPH
ALL LOCATIONS
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

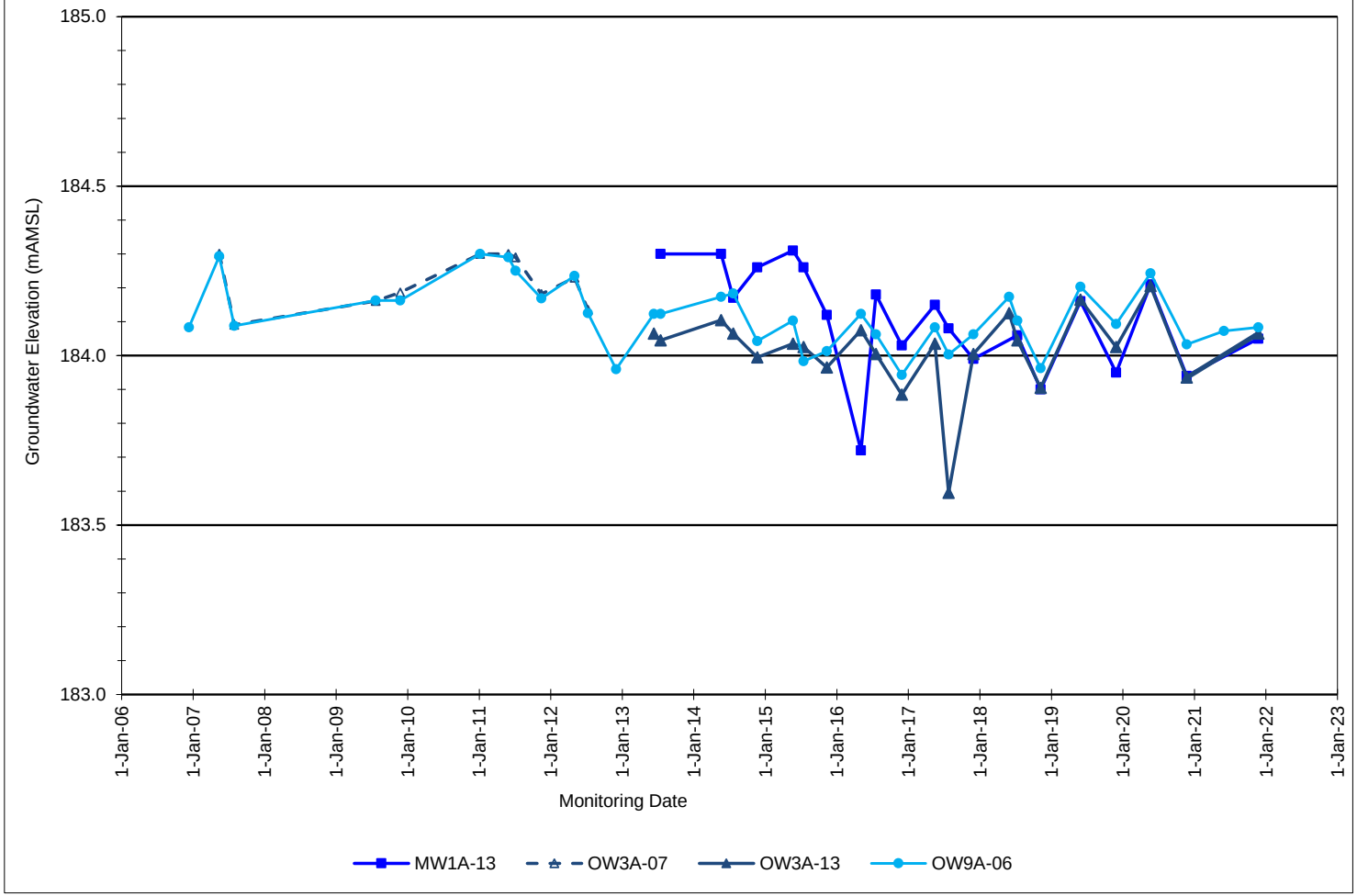


figure 2A

BASAL OVERBURDEN/SHALLOW BEDROCK AQUIFER UNIT HYDROGRAPH
NORTHERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

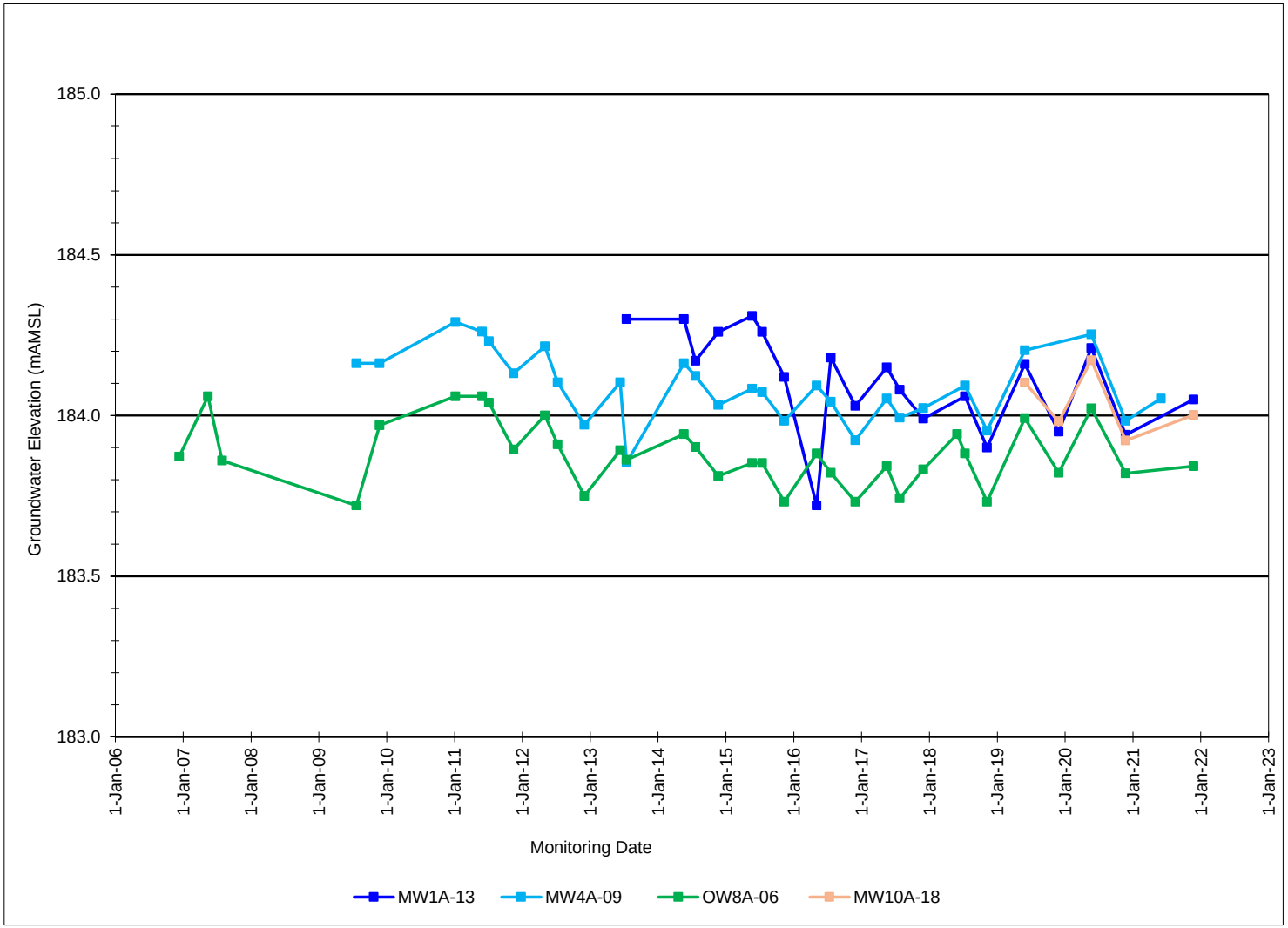


figure 2B

BASAL OVERBURDEN/SHALLOW BEDROCK AQUIFER UNIT HYDROGRAPH
WESTERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

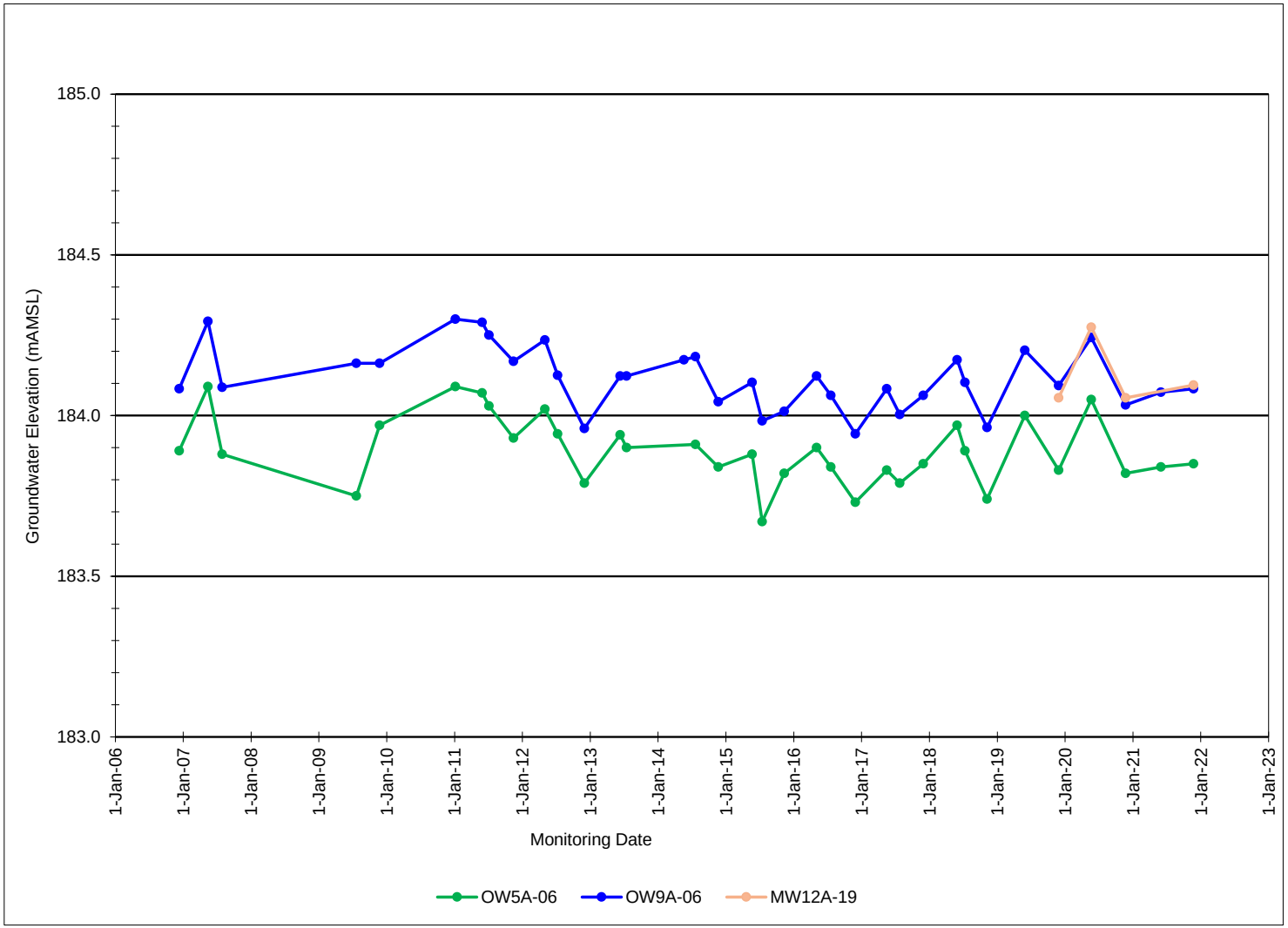


figure 2C

BASAL OVERBURDEN/SHALLOW BEDROCK AQUIFER UNIT HYDROGRAPH
EASTERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

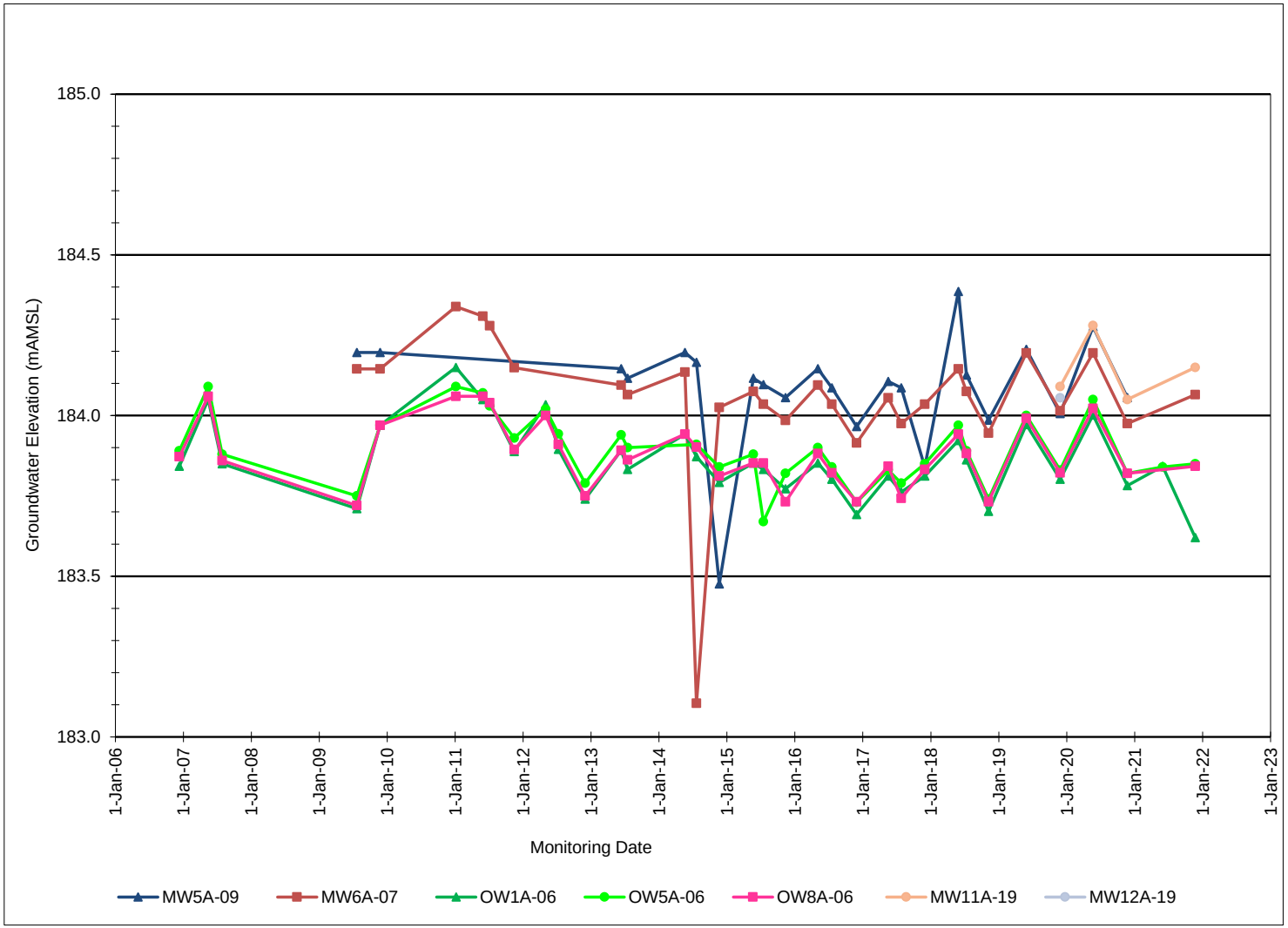


figure 2D

BASAL OVERBURDEN/SHALLOW BEDROCK AQUIFER UNIT HYDROGRAPH
SOUTHERN PROPERTY BOUNDARY
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

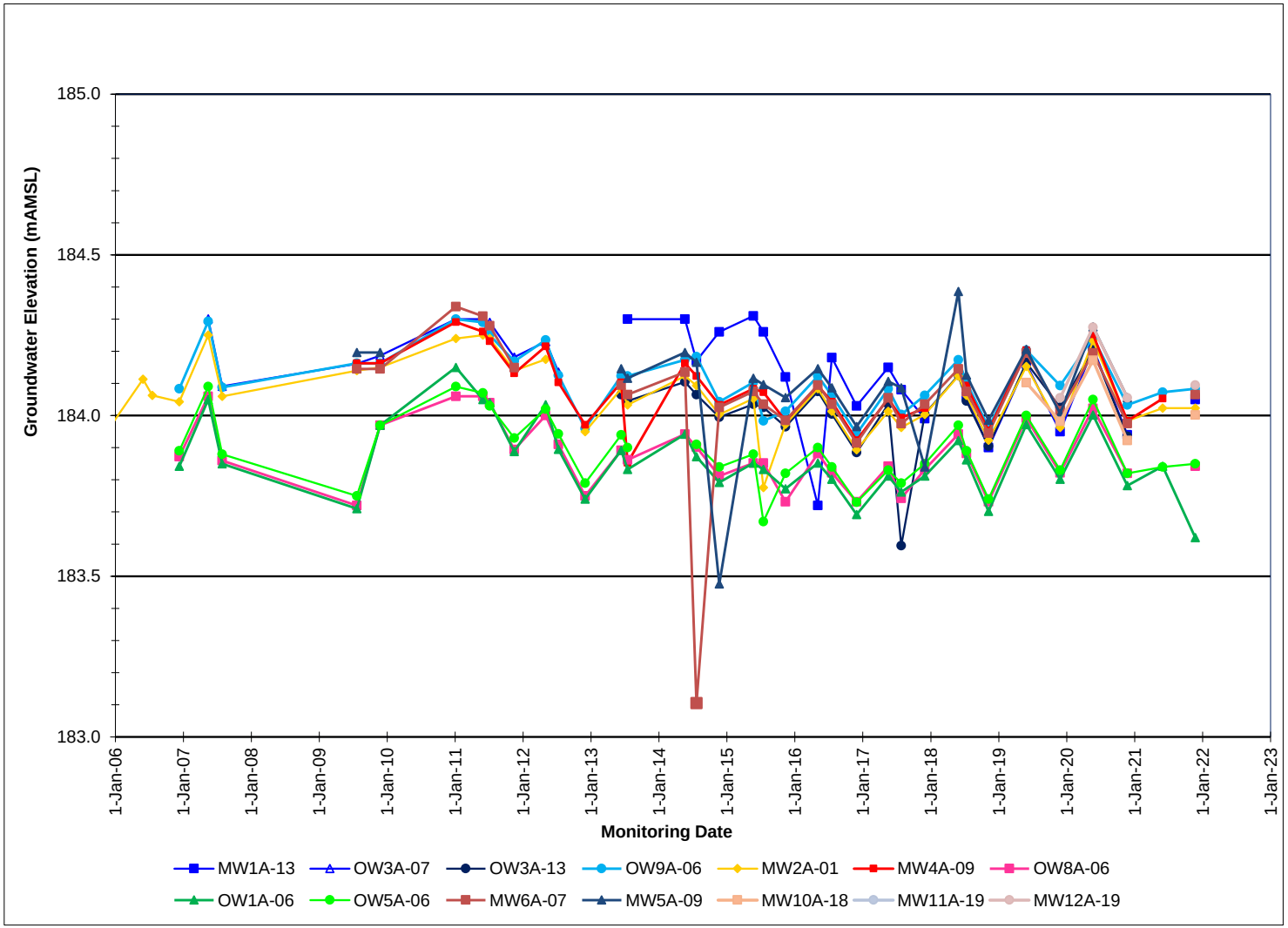


figure 2E

BASAL OVERBURDEN/SHALLOW BEDROCK AQUIFER UNIT HYDROGRAPH
ALL LOCATIONS
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

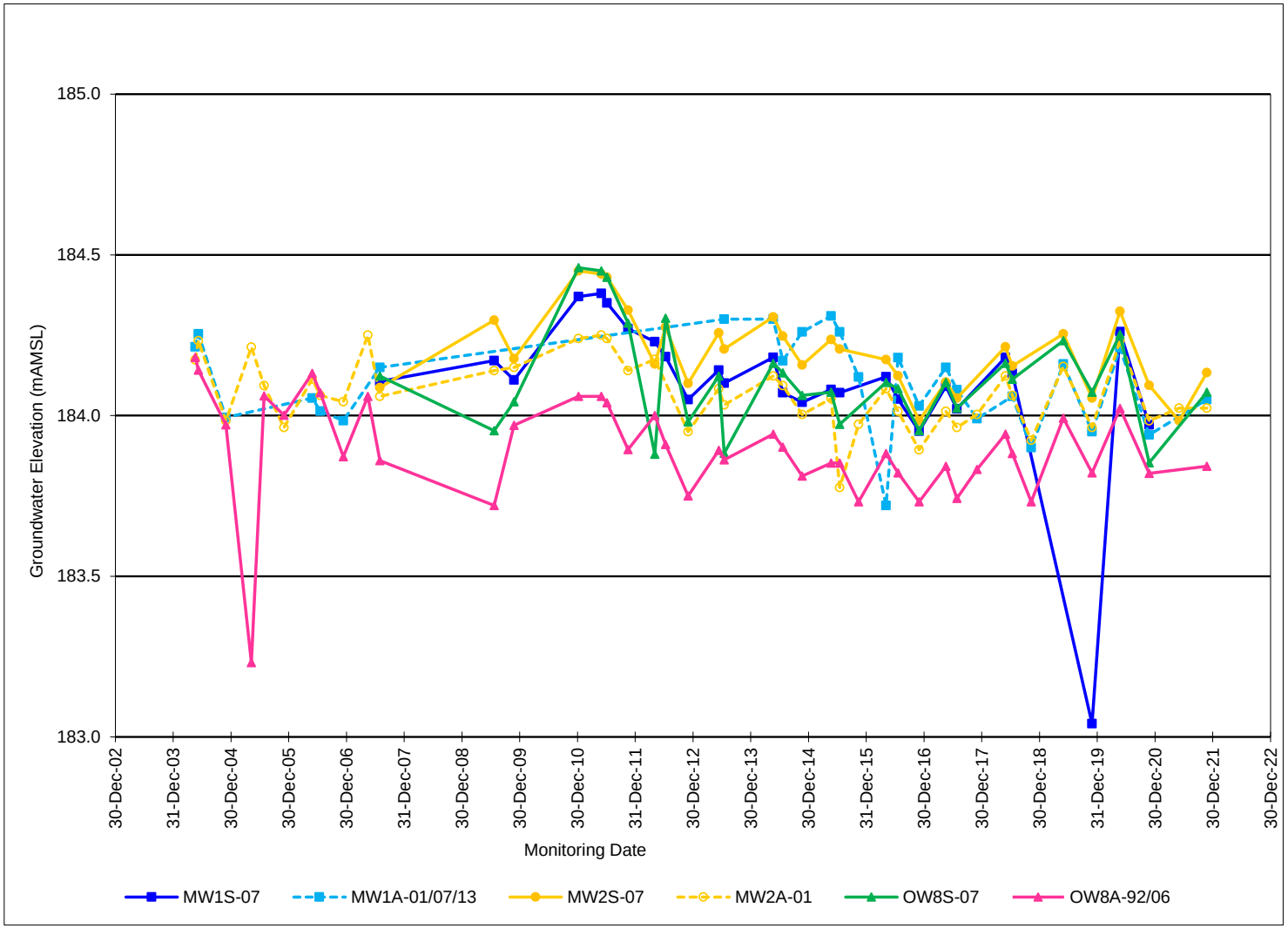


figure 3A
BEDROCK AQUIFER UNIT HYDROGRAPH
S-SERIES BEDROCK WELLS
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

figure 3B
BEDROCK AQUIFER UNIT HYDROGRAPH
D-SERIES BEDROCK WELLS
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

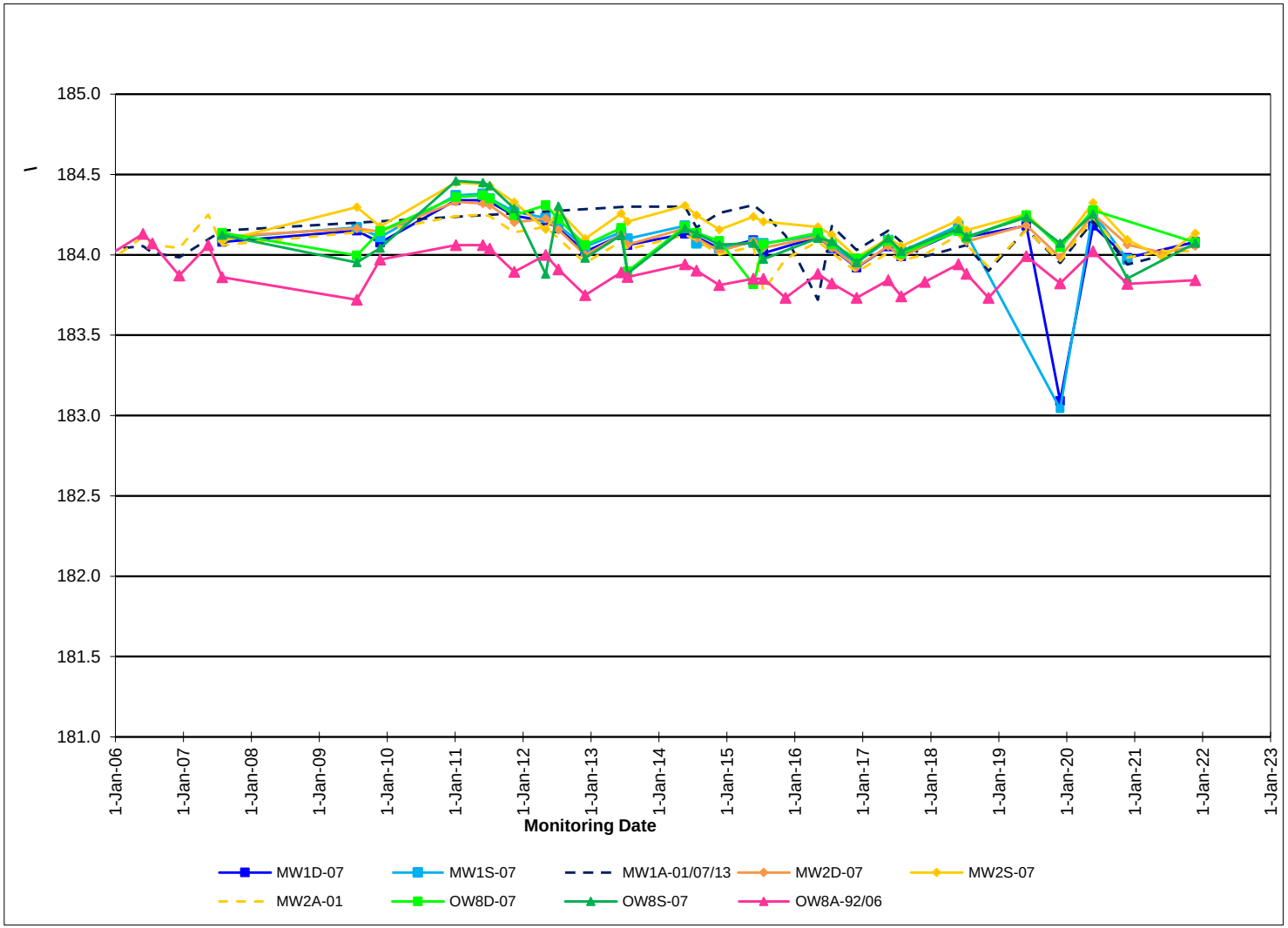


figure 3C
BEDROCK AQUIFER UNIT HYDROGRAPH
ALL LOCATIONS
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

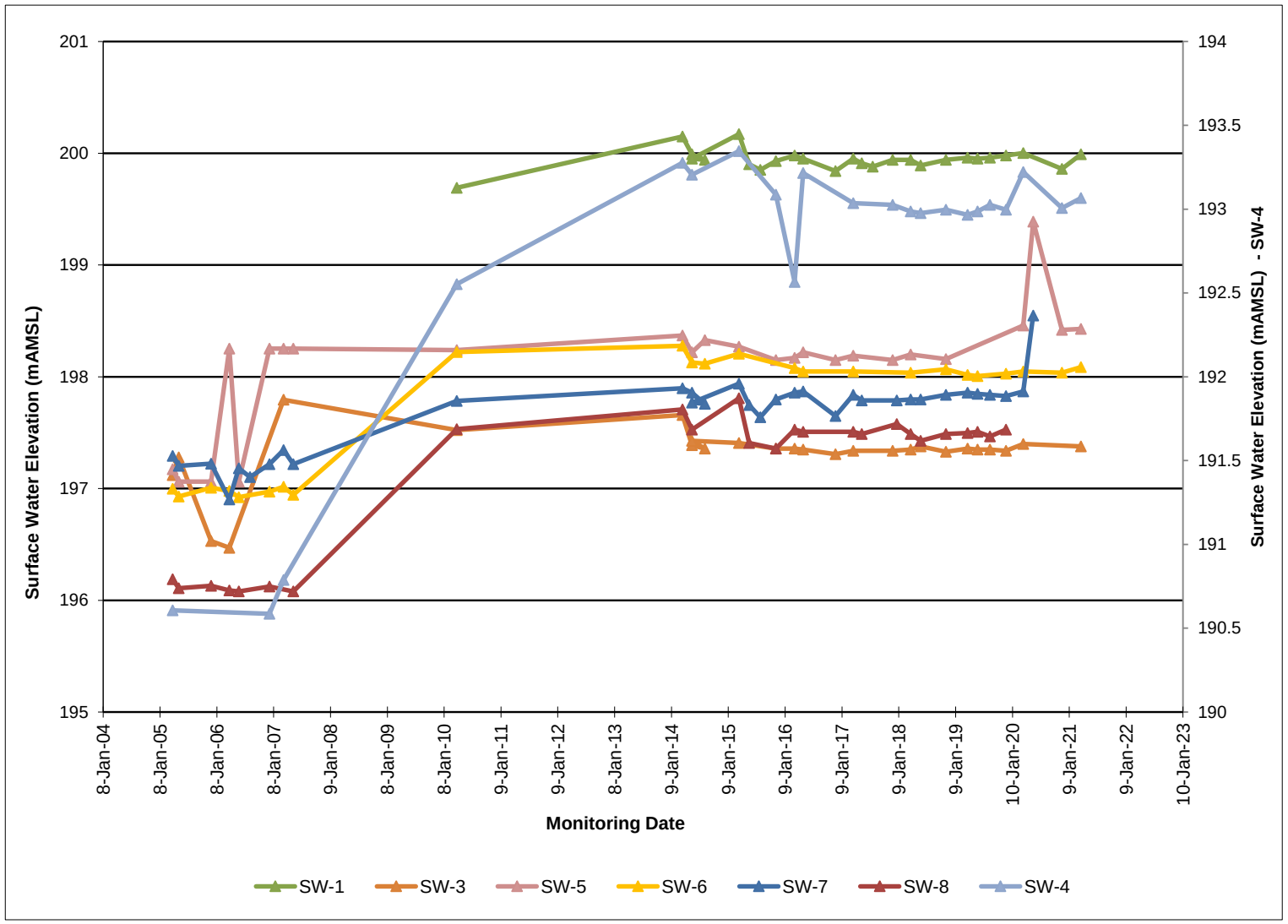


figure 4
SURFACE WATER HYDROGRAPH
2021 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
Haldimand County, Ontario

Appendix G

Appendix G.1

Historical Analytical Data

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03
			Sampling Date	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2006/12/12	2006/12/12	2007/05/16	2007/07/31	2009/04/30	2009/07/23	2009/11/25
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Indicator	Lab Replicate	GW Indicator	GW VOC + GW PAH	MOE	GW VOC + GW PAH	GW PAH
Field Parameters																	
Conductivity			µS/cm														
pH	6.5-8.5	OG															
Temperature			°C														
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	537	528	509	483	520	516	528	534	529	490		373		
Ammonia (as N)			mg/L	0.09	0.08	0.05	0.12	0.13	0.08	0.05	0.13		<0.05		<0.05		
Biological Oxygen Demand (BOD_5)			mg/L	<3			<2			<2							
Calcium (Ca)			mg/L	180	210	200	190	200	180	190	190		180		187		
Chemical Oxygen Demand (COD)			mg/L	25	24	19	22	18	15	15	18		11		16		
Chloride (Cl)	250	AO	mg/L	28.6	16.3	16.1	15.7	16	28	27	21		24		140		
Conductivity			µS/cm	1180	1260	1250	1130	1220	1230	1270	1230	1220	1210		1390		
Dissolved Organic Carbon (DOC)	5	AO	mg/L	9.2	7	6	5.3	5.5	5.3	4.7	5.3		4.7		6.4		
Hardness ($CaCO_3$)	80-100	OG	mg/L	623			655			700					702		
Nitrate (as N)	10	MAC	mg/L	<1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1		<0.1		<0.15		
Nitrite (as N)	1	MAC	mg/L	<0.1			<0.3			<0.3					<0.005		
pH	6.5-8.5	OG		7.72	8.00	7.86	8.05	8.11	8.00	7.9	8.1	8.1	7.80		7.68		
Phenol 4AAP			mg/L	<0.001			<0.001			<0.001					<0.0002		
Potassium (K)			mg/L	4.7			3.5			3					2.21		
Sulphates (SO_4)	500	AO	mg/L	188	208	186	204	190	190	184	195		183		196		
Total Dissolved Solids (TDS)	500	AO	mg/L	762	864	859	724	826	800	855	786		712		916		
Total Kjeldahl Nitrogen (TKN)			mg/L	1.1			0.6			0.3					0.36		
Total Phosphorus (P)			mg/L	0.12			0.113			0.043					<0.02		
Total Suspended Solids (TSS)			mg/L	203			140			59					94.6		
Metals																	
Arsenic	0.025	IMAC	mg/L	<0.0014	0.0032		0.0017			<0.001					<0.001		
Barium	1	MAC	mg/L	0.073	0.068	0.091	0.09	0.092	0.082	0.077	0.01		0.089		0.077		
Beryllium			mg/L	<0.0014	<0.0014		<0.0005			<0.0005					<0.001		
Boron	5	IMAC	mg/L	0.061	0.065	0.05	0.053	0.069	0.052	0.05	0.061		0.045		<0.03		
Cadmium	0.005	MAC	mg/L	<0.001	<0.001		<0.0001			<0.0001					<0.001		
Chromium	0.05	MAC	mg/L	<0.0016	0.0018		<0.005			<0.005					<0.002		
Cobalt			mg/L	0.002	0.002		0.0021			<0.0005					<0.001		
Copper	1	AO	mg/L	<0.003	<0.003		<0.001			<0.004					<0.001		
Iron	0.3	AO	mg/L	3.4	2.1	0.6	0.56	<0.05	<0.05	<0.05	0.23		<0.05		<0.005		
Lead	0.01	MAC	mg/L	<0.0022	<0.0022		0.0005			<0.0005					<0.005		
Magnesium			mg/L	59	66	60	56	63	110	58			53		61.9		
Manganese	0.05	AO	mg/L	0.33	0.39		0.31			0.035					0.02		
Mercury	0.001	MAC	mg/L	<0.0001	<0.0001		<0.0001			<0.0001					<0.02		
Molybdenum			mg/L	0.0035	0.004		0.0028			0.002					<0.005		
Nickel			mg/L	0.002	0.002		0.0036			<0.002					<0.006		
Silver			mg/L	<0.0006	<0.0006		<0.0005			<0.0001					<0.003		
Sodium	200	AO	mg/L	28	31	30	27	34	72	30	34		29		43.9		
Thallium			mg/L	<0.001	<0.001		<0.00005			<0.00005							
Vanadium			mg/L	<0.001	<0.001		<0.001			<0.001					<0.001		
Zinc	5	AO	mg/L	0.073	<0.005		0.0097			0.005					<0.006		
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
1,1,1-Trichloroethane	200		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
1,1,2,2-Tetrachloroethane	1		µg/L	<1			<0.1			<0.1				<0.1	<0.2	<0.5	
1,1,2-Trichloroethane	5		µg/L	<0.5			<0.2			<0.2				<0.2	<0.2	<0.5	
1,1-Dichloroethane	70		µg/L	<0.4			<0.1			<0.1				<0.1	<0.2	<0.5	
1,1-Dichloroethylene	14		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
1,2-Dibromoethane (EDB)	1		µg/L	<0.5			<0.2			<0.2				<0.2	<0.2	<0.5	
1,2-Dichlorobenzene	3		µg/L	<0.5			<0.1			<0.2				<0.2	<0.2	<0.5	
1,2-Dichloroethane	5		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
1,2-Dichloropropane	5		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
1,3-Dichlorobenzene	630		µg/L	<0.5			<0.1			<0.2				<0.2	<0.2	<0.5	
1,4-Dichlorobenzene	5		µg/L	<0.5			<0.1			<0.2				<0.2	<0.2	<0.5	
2-Hexanone			µg/L	<10			<5			<5				<5		<20	
Acetone	3 000		µg/L	<10			<10			<10				<10		<20	
Benzene	5		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Bromodichloromethane	5		µg/L	<0.2			<0.1			<0.1				<0.1	<0.2	<0.5	
Bromoform	5		µg/L	<0.2			<0.2			<0.2				<0.2	<0.2	<0.5	
Bromomethane	10		µg/L	<3			<0.5			<0.5				<0.5	<0.5	3.41	
Carbon Tetrachloride	5		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Chlorobenzene	30		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Chloroethane			µg/L	<1			<0.2			<0.2				<0.2	<0.2	<1	
Chloroform	5		µg/L	<0.2			<0.1			<0.1				<0.1	<0.2	<0.5	
Chloromethane			µg/L	<2			<0.5			<0.5				<0.5	<0.5	<1	
cis-1,2-Dichloroethylene	70		µg/L	<1			<0.1			<0.1				<0.1	<0.2	<0.5	
cis-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2			<0.2				<0.2	<0.2	<0.5	
Dibromochloromethane	5		µg/L	<0.2			<0.2			<0.2				<0.2	<0.2	<0.5	
Dichlorodifluoromethane			µg/L													<1	
Dichloromethane(Methylene Chloride)	50		µg/L	<1			<0.5			<0.5				<0.5	<0.2	<0.5	
Ethylbenzene	2.4		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Methyl isobutyl ketone	350		µg/L	<10			<5			<5				<5		<20	
Methyl t-butyl ether (MTBE)	700		µg/L	<2			<0.2			<0.2				<0.2		<0.5	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<15			<5			<5				<5		<20	
Styrene	100		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Tetrachloroethylene	30		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Toluene	24		µg/L	<0.5			<0.2			<0.2				<0.2	<0.2	<0.5	
trans-1,2-Dichloroethylene	100		µg/L	<1			<0.1			<0.1				<0.1	<0.2	<0.5	
trans-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2			<0.2				<0.2	<0.2	<0.5	
Trichloroethylene	5		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Trichlorofluoromethane (FREON 11)			µg/L	<2			<0.2							<0.2		<1	
Vinyl Chloride	2		µg/L	<0.2			<0.2			<0.2				<0.2		<0.5	
Xylene, *o*-	300		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<0.5	
Xylene, *p*- + *m*-	300		µg/L	<0.5			<0.1			<0.1				<0.1	<0.2	<1	
Xylenes (total)	300		µg/L	<1			<0.1			<0.1				<0.1	<0.2	<1.5	
PAHs																	
2-Methylnaphthalene			µg/L												<0.2	<0.02	<0.02
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05				<0.05	<0.2	<0.02	<0.02
Acenaphthylene	1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05				<0.05	<0.2	<0.02	<0.02
Anthracene	2.4	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05				<0.05	<0.2	<0.02	<0.02
Benzo(a)anthracene	1	Table 2	µg/L	<0.05			<0.05	0.1		<0.05				<0.05	<0.2	<0.02	<0.02
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01			<0.01	0.04		<0.01				0.01	<0.2	<0.005	<0.005
Benzo(b)fluoranthene	0.1	Table 2	µg/L												<0.2	<0.02	<0.02
Benzo(b,j)fluoranthene			µg/L	<0.05			<0.05			<0.05				<0.05			
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1				<0.1	<0.2	<0.02	<0.02
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05				<0.05	<0.2	<0.02	<0.02
Chrysene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05				<0.05	<0.2	<0.02	<0.02
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1				<0.1	<0.5	<0.02	<0.02
Fluoranthene	0.41	Table 2	µg/L	0.14			<0.05	0.1		<0.05				<0.05	<0.2	<0.02	<0.02
Fluorene	120	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05				<0.05	<0.2	<0.02	<0.02
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1				<0.1	<0.5	<0.02	<0.02
Naphthalene	11	Table 2	µg/L	<0.05			<0.05	<0.05		0.18				0.05	<0.2	<0.02	<0.02
Phenanthrene	1	Table 2	µg/L	0.15			<0.05	0.07		<0.05				<0.05	<0.2	<0.02	<0.02
Pyrene	4.1	Table 2	µg/L	<0.05			<0.05	0.08		<0.05				<0.05	<0.2	<0.02	<0.02

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1-03	MW1B-01	MW1B-01	MW1B-01	MW1B-01
			Sampling Date	2009/12/03	2011/01/10	2011/05/30	2011/05/30	2011/05/30	2011/07/05	2011/07/05	2011/07/05	2011/11/16	2004/06/07	2004/11/29	2005/05/09	2005/12/01
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	MOE	GW Indicator	GW Indicator	Lab Replicate	QA/QC Check	GW Comprehensive	Lab Replicate	QA/QC Check	GW Indicator	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Indicator + GW PAH
Field Parameters																
Conductivity			µS/cm			1245			1420			1370				
pH	6.5-8.5	OG				7.11			7.09			6.89				
Temperature			°C			9.5			12.6			12.6				
General																
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	379	447	420	422	0.48	419			416	444	395	401	414
Ammonia (as N)			mg/L	<0.05	<0.02	<0.02	<0.02	0.00	<0.02			0.033	<0.05	<0.05	<0.05	0.07
Biological Oxygen Demand (BOD_5)			mg/L						<5				<3			
Calcium (Ca)			mg/L	174	198	186			173	161	7.19	171	180	190	180	190
Chemical Oxygen Demand (COD)			mg/L	13	10	<5			9.8			<5	11	19	4	51
Chloride (Cl)	250	AO	mg/L	48.1	84.5	96.2			101			66.2	26.1	7.42	8.8	9
Conductivity			µS/cm	1140	1330	1250	1250	0.00	1330			1310	1280	1210	1270	1240
Dissolved Organic Carbon (DOC)	5	AO	mg/L	4.4	17.6	15.8			4.8			7.6	2.9	3	3.2	3.2
Hardness ($CaCO_3$)	80-100	OG	mg/L	663					640				693			
Nitrate (as N)	10	MAC	mg/L	<0.005	<0.05	<0.05			<0.05			<0.25	<1	<0.1	<1	<0.1
Nitrite (as N)	1	MAC	mg/L	<0.05					<0.05				<0.1			
pH	6.5-8.5	OG		7.9	7.67	7.62	7.72	1.30	8.03			8.02	7.84	8.03	7.92	8.08
Phenol 4AAP			mg/L	<0.2					<0.001				<0.001			
Potassium (K)			mg/L	2.87					2.53	2.47	2.40	2.97	3.6			
Sulphates (SO_4)	500	AO	mg/L	209	264	261			232			229	398	313	321	278
Total Dissolved Solids (TDS)	500	AO	mg/L	883	926	902			920			852	886	943	1180	1400
Total Kjeldahl Nitrogen (TKN)			mg/L	<0.17					0.18	0.2	0.02		1.4			
Total Phosphorus (P)			mg/L	<0.02					0.102				1.01			
Total Suspended Solids (TSS)			mg/L	75.6					154				1220			
Metals																
Arsenic	0.025	IMAC	mg/L	<0.0005					<0.003				<0.0014	<0.0014		
Barium	1	MAC	mg/L	0.094	0.074	0.0755	0.0752	0.40	0.0897			0.0851	0.017	0.018	0.017	0.02
Beryllium			mg/L	<0.001					<0.001				<0.0014	<0.0014		
Boron	5	IMAC	mg/L	<0.04	0.041	0.0421	0.0432	0.0011	0.0395			0.0598	0.049	0.053	0.04	0.042
Cadmium	0.005	MAC	mg/L	<0.001					<0.0001				<0.001	<0.001		
Chromium	0.05	MAC	mg/L	<0.005					<0.003				<0.0016	0.006		
Cobalt			mg/L	<0.001					<0.0005				0.001	0.001		
Copper	1	AO	mg/L	<0.001					0.00216				<0.003	0.003		
Iron	0.3	AO	mg/L	0.062	<0.010	<0.01	<0.01	0.00	<0.01			0.238	1	0.96	0.18	<0.050
Lead	0.01	MAC	mg/L	<0.005					<0.001				0.0026	<0.0022		
Magnesium			mg/L	60.9	58.3	55.5			50.5	48.5	4.04	49.3	75	76	65	71
Manganese	0.05	AO	mg/L	0.09					0.0036				0.2	0.14		
Mercury	0.001	MAC	mg/L	<0.02					<0.00005				<0.0001	<0.0001		
Molybdenum			mg/L	<0.005					<0.002				<0.0014	<0.0014		
Nickel			mg/L	<0.006					<0.003				<0.001	0.002		
Silver			mg/L	<0.003					<0.0001				<0.0006	<0.0006		
Sodium	200	AO	mg/L	31.4	42.9	43.4			45.4	39.9	12.90	39.3	32	25	34	32
Thallium			mg/L						<0.0003				<0.001	<0.001		
Vanadium			mg/L	<0.001					<0.002				<0.001	0.002		
Zinc	5	AO	mg/L	<0.006					0.0424				0.02	<0.005		
VOCs																
1,1,1,2-Tetrachloroethane	5		µg/L	<0.2					<0.10				<0.5			
1,1,1-Trichloroethane	200		µg/L	<0.2					<0.30				<0.5			
1,1,2,2-Tetrachloroethane	1		µg/L	<0.2					<0.10				<1			
1,1,2-Trichloroethane	5		µg/L	<0.2					<0.20				<0.5			
1,1-Dichloroethane	70		µg/L	<0.2					<0.30				<0.4			
1,1-Dichloroethylene	14		µg/L	<0.2					<0.30				<0.5			
1,2-Dibromoethane (EDB)	1		µg/L	<0.2									<0.5			
1,2-Dichlorobenzene	3		µg/L	<0.2					<0.10				<0.5			
1,2-Dichloroethane	5		µg/L	<0.2					<0.20				<0.5			
1,2-Dichloropropane	5		µg/L	<0.2					<0.20				<0.5			
1,3-Dichlorobenzene	630		µg/L	<0.2					<0.10				<0.5			
1,4-Dichlorobenzene	5		µg/L	<0.2					<0.10				<0.5			
2-Hexanone			µg/L						<0.30				<10			
Acetone	3 000		µg/L						<1.0				<10			
Benzene	5		µg/L	<0.2					<0.20				<0.5			
Bromodichloromethane	5		µg/L	<0.2					<0.20				<0.2			
Bromoform	5		µg/L	<0.2					<0.10				<0.2			
Bromomethane	10		µg/L	<0.5					<0.20				<3			
Carbon Tetrachloride	5		µg/L	<0.2					<0.20				<0.5			
Chlorobenzene	30		µg/L	<0.2					<0.10				<0.5			
Chloroethane			µg/L	<0.5					<0.20				<1			
Chloroform	5		µg/L	<0.2					<0.20				<0.2			
Chloromethane			µg/L	<0.5					<0.40				<2			
cis-1,2-Dichloroethylene	70		µg/L	<0.2									<1			
cis-1,3-Dichloropropene	1.4		µg/L	<0.2					<0.20				<0.14			
Dibromochloromethane	5		µg/L	<0.2					<0.10				<0.2			
Dichlorodifluoromethane			µg/L	<0.5					<0.20							
Dichloromethane(Methylene Chloride)	50		µg/L	<0.2									<1			
Ethylbenzene	2.4		µg/L	<0.2					<0.10				<0.5			
Methyl isobutyl ketone	350		µg/L										<10			
Methyl t-butyl ether (MTBE)	700		µg/L										<2			
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L										<15			
Styrene	100		µg/L	<0.2					<0.10				<0.5			
Tetrachloroethylene	30		µg/L	<0.2					<0.20				<0.5			
Toluene	24		µg/L	<0.2					<0.20				<0.5			
trans-1,2-Dichloroethylene	100		µg/L	<0.2					<0.20				<1			
trans-1,3-Dichloropropene	1.4		µg/L	<0.2					<0.30				<0.14			
Trichloroethylene	5		µg/L	<0.2					<0.20				<0.5			
Trichlorofluoromethane (FREON 11)			µg/L	<0.5									<2			
Vinyl Chloride	2		µg/L						<0.17				<0.2			
Xylene, *o*-	300		µg/L	<0.2					<0.10				<0.5			
Xylene, *p*- + *m*-	300		µg/L	<0.2					<0.20				<0.5			
Xylenes (total)	300		µg/L	<0.2					<0.20				<1			
PAHs																
2-Methylnaphthalene			µg/L	<0.2												
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L						<0.20							
Acenaphthene	4.1	Table 2	µg/L	<0.2					<0.10				<0.05	<0.05		
Acenaphthylene	1	Table 2	µg/L	<0.2					<0.11				<0.05	<0.05		
Anthracene	2.4	Table 2	µg/L	<0.2					<0.05				<0.05	<0.05		
Benzo(a)anthracene	1	Table 2	µg/L	<0.2					<0.08				<0.05	<0.05		
Benzo(a)pyrene	0.01	MAC	µg/L	<0.2					<0.01				<0.01	<0.01		
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.2												
Benzo(b,j)fluoranthene			µg/L										<0.05	<0.05		
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.2					<0.06				<0.1	<0.1		
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L													
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.2					<0.05				<0.05	<0.05		
Chrysene	0.1	Table 2	µg/L	<0.2					<0.05				<0.05	<0.05		
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.5					<0.09				<0.1	<0.1		
Fluoranthene	0.41	Table 2	µg/L	<0.2					<0.12				<0.05	<0.05		
Fluorene	120	Table 2	µg/L	<0.2					<0.09				<0.05	<0.05		
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.5					<0.06				<0.1	<0.1		
Naphthalene	11	Table 2	µg/L	<0.2					<0.12				<0.05	0.07		
Phenanthrene	1	Table 2	µg/L	<0.2					<0.10				<0.05	0.1		
Pyrene	4.1	Table 2	µg/L	<0.2					<0.05				<0.05	<0.05		

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW1B-01	MW1B-01	MW1B-07	MW1B-07	MW1B-07	MW1B-07	MW1B-07	MW1B-07	MW1B-07	MW1B-07	MW1B-07	MW1B-07	MW1B-07
			Sampling Date	2006/07/19	2006/12/12	2007/05/16	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/04	2011/01/10	2011/05/30	2011/05/30	2011/05/30	2011/07/06
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Comprehensive	GW Indicator	GW Indicator	GW Comprehensive	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	Lab Replicate	QA/QC Check	GW Comprehensive
Field Parameters																
Conductivity			µS/cm										1470			1530
pH	6.5-8.5	OG											7.33			7.4
Temperature			°C										10.7			11.9
General																
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	440	454	530	576	526	607	641	737	606	560			655
Ammonia (as N)			mg/L	0.29	0.13	<0.05	0.15	<0.07	0.457	0.222	0.18	0.03	0.071			<0.02
Biological Oxygen Demand (BOD_5)			mg/L	<2			<2		<6.0							<5
Calcium (Ca)			mg/L	190	190	130	190	120	134	151	147	133	140			141
Chemical Oxygen Demand (COD)			mg/L	77	62	33	<4	69	29	35	38	<5	<5			21
Chloride (Cl)	250	AO	mg/L	12	9	28	26	14.5	<20	13.5	11.7	10.7	8.14			12.8
Conductivity			µS/cm	1330	1320	1580	1360	1470	1480	1510	1490	1270	1220	1220	0.00	1460
Dissolved Organic Carbon (DOC)	5	AO	mg/L	8.2	5.2	11.8	5.9	4.9	10.7	7.9	9.8	7.9	6.2			1.5
Hardness ($CaCO_3$)	80-100	OG	mg/L	730			880	733	857		814					805
Nitrate (as N)	10	MAC	mg/L	<0.1	<0.1	<0.1	<0.1	<0.05	<1.0	<0.10	<0.05	<0.05	<0.05			<0.1
Nitrite (as N)	1	MAC	mg/L	0.02			<0.01	<0.005	<1.0		<0.019					<0.1
pH	6.5-8.5	OG		7.8	8	7.9	8.10	7.85	7.79	7.79	7.82	8.00	8.1	8.06	0.50	8.07
Phenol 4AAP			mg/L	<0.001			<0.001	<0.0002	0.0062		<0.0004					<0.001
Potassium (K)			mg/L	2.8			13	3.38	<10		3.76					2.72
Sulphates (SO_4)	500	AO	mg/L	273	362	325	252	320	271	250	195	235	291			264
Total Dissolved Solids (TDS)	500	AO	mg/L	960	900	935	829	1050	980	1020	1100	906	980			536
Total Kjeldahl Nitrogen (TKN)			mg/L	0.6			2	1.83	0.56		1.08					0.28
Total Phosphorus (P)			mg/L	2.1			1.6	2.43	1.39		0.48					0.207
Total Suspended Solids (TSS)			mg/L	3700			2100	4610	2270		533					1450
Metals																
Arsenic	0.025	IMAC	mg/L	0.001			0.004	<0.002	<0.010		<0.0005					<0.003
Barium	1	MAC	mg/L	0.043	0.027	0.027	0.026	0.074	<0.10	0.076	0.069	0.04	0.0475			0.0569
Beryllium			mg/L	<0.0005			<0.0005	<0.001	<0.010		<0.001					<0.001
Boron	5	IMAC	mg/L	0.25	0.06	0.027	0.026	<0.025	<0.50	0.062	<0.040	0.05	0.0433			0.0554
Cadmium	0.005	MAC	mg/L	<0.0001			<0.0001	<0.001	<0.0010		<0.001					<0.0001
Chromium	0.05	MAC	mg/L	<0.005			<0.005	<0.002	<0.010		<0.002					<0.003
Cobalt			mg/L	0.0013			0.0012	<0.002	<0.0080		<0.001					0.00229
Copper	1	AO	mg/L	0.003			<0.001	<0.001	<0.010		<0.005					0.00145
Iron	0.3	AO	mg/L	1.7	0.11	0.088	1.5	0.128	<0.50	<0.050	<0.005	0.088	0.513			0.687
Lead	0.01	MAC	mg/L	<0.0005			<0.0005	<0.005	<0.010		<0.005					<0.001
Magnesium			mg/L	64	73	140	140	118	127	117	113	102	91			110
Manganese	0.05	AO	mg/L	0.51			0.35	0.269	0.267		0.392					0.531
Mercury	0.001	MAC	mg/L	<0.0001			<0.0001	<0.04	<0.00010		<0.02					<0.00005
Molybdenum			mg/L	<0.001			0.011	<0.007	<0.010		<0.005					0.0022
Nickel			mg/L	0.002			0.001	<0.006	<0.020		<0.006					0.0033
Silver			mg/L	<0.0001			<0.0001	<0.003	<0.0010		<0.003					<0.0001
Sodium	200	AO	mg/L	37	43	48	50	79.2	71.5	60.7	65.3	59.3	60.1			57
Thallium			mg/L	<0.00005			<0.00005		<0.0030							<0.0003
Vanadium			mg/L	<0.001			0.001	<0.001	<0.010		<0.001					<0.002
Zinc	5	AO	mg/L	0.011			<0.005	<0.003	<0.030		<0.005					0.0262
VOCs																
1,1,1,2-Tetrachloroethane	5		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.10
1,1,1-Trichloroethane	200		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.30
1,1,2,2-Tetrachloroethane	1		µg/L	<0.1			<0.2	<0.2	<0.5		<0.2					<0.10
1,1,2-Trichloroethane	5		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.20
1,1-Dichloroethane	70		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.30
1,1-Dichloroethylene	14		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.30
1,2-Dibromoethane (EDB)	1		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.20
1,2-Dichlorobenzene	3		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.10
1,2-Dichloroethane	5		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
1,2-Dichloropropane	5		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
1,3-Dichlorobenzene	630		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.10
1,4-Dichlorobenzene	5		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.10
2-Hexanone			µg/L	<5			<5		<20							<0.30
Acetone	3 000		µg/L	<10			18		<20							<1.0
Benzene	5		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
Bromodichloromethane	5		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
Bromoform	5		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.10
Bromomethane	10		µg/L	<0.5			<0.5	<0.5	1.73		<0.5					<0.20
Carbon Tetrachloride	5		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
Chlorobenzene	30		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.10
Chloroethane			µg/L	<0.2			<0.2	<0.5	<1		<0.5					<0.20
Chloroform	5		µg/L	0.1			<0.1	<0.2	<0.5		<0.2					<0.20
Chloromethane			µg/L	<0.5			<0.5	<0.5	<1		<0.5					<0.40
cis-1,2-Dichloroethylene	70		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
cis-1,3-Dichloropropene	1.4		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.20
Dibromochloromethane	5		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.10
Dichlorodifluoromethane			µg/L						<1		<0.5					<0.20
Dichloromethane(Methylene Chloride)	50		µg/L	<0.5			<0.5	<0.2	<0.5		<0.2					<0.30
Ethylbenzene	2.4		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.10
Methyl isobutyl ketone	350		µg/L	<5			<5		<20							<1.0
Methyl t-butyl ether (MTBE)	700		µg/L	<0.2			<0.2		<0.5							<0.20
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<5			<5		<20							<1.0
Styrene	100		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.10
Tetrachloroethylene	30		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
Toluene	24		µg/L	<0.2			<0.2	0.4	<0.5		<0.2					<0.20
trans-1,2-Dichloroethylene	100		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
trans-1,3-Dichloropropene	1.4		µg/L	<0.2			<0.2	<0.2	<0.5		<0.2					<0.30
Trichloroethylene	5		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.20
Trichlorofluoromethane (FREON 11)			µg/L				<0.2	<0.5	<1		<0.5					<0.40
Vinyl Chloride	2		µg/L	<0.2			<0.2		<0.5							<0.17
Xylene, *o*-	300		µg/L	<0.1			<0.1	<0.2	<0.5		<0.2					<0.10
Xylene, *p*- + *m*-	300		µg/L	<0.1			<0.1	<0.2	<1		<0.2					<0.20
Xylenes (total)	300		µg/L	<0.1			<0.1	<0.2	<1.5		<0.2					<0.20
PAHs																
2-Methylnaphthalene			µg/L					<0.2	<0.02	<0.02	<0.2					
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L													<0.20
Acenaphthene	4.1	Table 2	µg/L	<0.05			<0.05	<0.2	<0.02	<0.02	<0.2					<0.10
Acenaphthylene	1	Table 2	µg/L	<0.05			<0.05	<0.2	<0.02	<0.02	<0.2					<0.11
Anthracene	2.4	Table 2	µg/L	<0.05			<0.05	<0.2	<0.02	<0.02	<0.2					<0.05
Benzo(a)anthracene	1	Table 2	µg/L	<0.05			<0.05	<0.2	<0.02	<0.02	<0.2					<0.08
Benzo(a)pyrene	0.01	MAC	µg/L	0.01			0.01	<0.2	<0.005	<0.005	<0.2					<0.01
Benzo(b)fluoranthene	0.1	Table 2	µg/L					<0.2	<0.02	<0.02	<0.2					<0.05
Benzo(b,j)fluoranthene			µg/L	<0.05			<0.05									
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1			<0.1	<0.2	<0.02	<0.02	<0.2					<0.06
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L													
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05			<0.05	<0.2	<0.02	<0.02	<0.2					<0.05
Chrysene	0.1	Table 2	µg/L	<0.05			<0.05	<0.2	0.035	0.021	<0.2					<0.05
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1			<0.1	<0.5	<0.02	<0.02	<0.5					<0.09
Fluoranthene	0.41	Table 2	µg/L	<0.05			0.07	<0.2	0.022	<0.02	<0.2					<0.12
Fluorene	120	Table 2	µg/L	<0.05			<0.05	<0.2	<0.02	<0.02	<0.2					<0.09
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1			<0.1	<0.5	<0.02	<0.02	<0.5					<0.06
Naphthalene	11	Table 2	µg/L	<0.05			0.07	<0.2	<0.02	<0.02	<0.2					<0.12
Phenanthrene	1	Table 2	µg/L	0.05			0.5	<0.8	0.086	0.028	<0.2					<0.10
Pyrene	4.1	Table 2	µg/L	<0.05			0.05	<0.2	<0.02	<0.02	<0.2					<0.05

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW1B-07	MW1B-07	MW1B-07	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03
			Sampling Date	2011/07/06	2011/07/06	2011/11/14	2004/06/07	2004/11/29	2004/11/29	2005/05/09	2005/07/28	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2006/07/19	2006/12/12
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	Lab Replicate	QA/QC Check	GW Indicator	GW Comprehensive	GW Indicator + Metals	Field Duplicate	GW Indicator	GW Comprehensive	Field Duplicate	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	Lab Replicate	GW Indicator
Field Parameters																	
Conductivity			µS/cm			1580											
pH	6.5-8.5	OG				7.1											
Temperature			°C			12.6											
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L			662	429	431	413	399	410	407	396	408	428	425	442
Ammonia (as N)			mg/L			0.21	<0.05	0.12	0.11	<0.05	0.09	0.12	0.11	<0.05	0.09		0.1
Biological Oxygen Demand (BOD_5)			mg/L				<3				<2	<2			<2		
Calcium (Ca)			mg/L	141	0.00	143	220	250	250	240	230	230	200	210	210		190
Chemical Oxygen Demand (COD)			mg/L			13	28	17	28	22	29	30	20	38	25		25
Chloride (Cl)	250	AO	mg/L			10.9	33.1	21.9	18.8	19.9	22.3	22.8	52	70	65		57
Conductivity			µS/cm			1520	1290	1340	1310	1350	1280	1260	1360	1230	1260	1260	1210
Dissolved Organic Carbon (DOC)	5	AO	mg/L			7.9	8.5	9.7	8	6	5.6	5.3	6.4	8.5	7.8		8.2
Hardness ($CaCO_3$)	80-100	OG	mg/L				720				685	666			700		
Nitrate (as N)	10	MAC	mg/L			<0.25	<1	<0.10	<0.10	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1		<0.1
Nitrite (as N)	1	MAC	mg/L				<0.1				<0.3	<0.3			<0.3		
pH	6.5-8.5	OG				8.07	7.70	8.05	7.99	7.86	7.94	7.97	8.08	8.1	7.90	7.9	8.1
Phenol 4AAP			mg/L				<0.001				<0.001	<0.001			<0.001		
Potassium (K)			mg/L	2.72	0.00	2.24	4.1				3	3			2.6		
Sulphates (SO_4)	500	AO	mg/L			245	389	335	259	351	385	381	273	191	189		184
Total Dissolved Solids (TDS)	500	AO	mg/L			884	861	1060	986	1000	122	934	996	800	879		795
Total Kjeldahl Nitrogen (TKN)			mg/L				0.7				0.8	0.8			0.4		
Total Phosphorus (P)			mg/L				0.24				0.27	0.268			0.075		
Total Suspended Solids (TSS)			mg/L				443				3	650			170		
Metals																	
Arsenic	0.025	IMAC	mg/L				<0.0014	0.0049	0.0052		0.0017	0.0016			0.002		
Barium	1	MAC	mg/L			0.0427	0.033	0.038	0.04	0.035	0.042	0.034	0.04	0.032	0.037		0.041
Beryllium			mg/L				<0.0014	<0.0014	<0.0014		<0.0005	<0.0005			<0.0005		
Boron	5	IMAC	mg/L			0.0531	0.04	0.056	0.056	0.04	0.036	0.032	0.06	0.035	0.031		0.043
Cadmium	0.005	MAC	mg/L				<0.001	<0.001	<0.001		<0.0001	<0.0001			<0.0001		
Chromium	0.05	MAC	mg/L				0.0018	0.005	0.0055		<0.005	<0.005			<0.005		
Cobalt			mg/L				0.002	0.002	0.003		0.0017	0.0017			0.0018		
Copper	1	AO	mg/L				<0.003	<0.003	<0.003		<0.001	<0.001			0.002		
Iron	0.3	AO	mg/L			0.854	2.9	4.6	5.3	1.9	1.2	1.4	<0.05	0.32	1.7		<0.05
Lead	0.01	MAC	mg/L				<0.0022	<0.0022	<0.0022		<0.0002	<0.0002			<0.0005		
Magnesium			mg/L	110	0.00	99	54	53	56	52	52	52	47	48	44		45
Manganese	0.05	AO	mg/L				0.4	0.39	0.4		0.31	0.3			0.22		
Mercury	0.001	MAC	mg/L				<0.0001	<0.0001	<0.0001		<0.0001	<0.0001			<0.0001		
Molybdenum			mg/L				0.0073	0.0059	0.0067		0.004	0.0042			0.003		
Nickel			mg/L				<0.001	0.001	0.002		0.005	0.0042			0.002		
Silver			mg/L				<0.0006	<0.0006	<0.0006		<0.0005	<0.0005			0.0002		
Sodium	200	AO	mg/L	57	0.00	53.9	20	20	21	19	21	20	23	24	22		32
Thallium			mg/L				<0.001	<0.001	<0.001		<0.00005	<0.00005			<0.00005		
Vanadium			mg/L				<0.001	<0.001	<0.001		<0.001	<0.001			<0.001		
Zinc	5	AO	mg/L				0.012	0.014	0.019		0.012	<0.005			0.007		
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L				<0.5				<0.1	<0.1			<0.1		
1,1,1-Trichloroethane	200		µg/L				<0.5				<0.1	<0.1			<0.1		
1,1,2,2-Tetrachloroethane	1		µg/L				<1				<0.1	<0.1			<0.1		
1,1,2-Trichloroethane	5		µg/L				<0.5				<0.2	<0.2			<0.2		
1,1-Dichloroethane	70		µg/L				<0.4				<0.1	<0.1			<0.1		
1,1-Dichloroethylene	14		µg/L				<0.5				<0.1	<0.1			<0.1		
1,2-Dibromoethane (EDB)	1		µg/L				<0.5				<0.2	<0.2			<0.2		
1,2-Dichlorobenzene	3		µg/L				<0.5				<0.1	<0.1			<0.2		
1,2-Dichloroethane	5		µg/L				<0.5				<0.1	<0.1			<0.1		
1,2-Dichloropropane	5		µg/L				<0.5				<0.1	<0.1			<0.1		
1,3-Dichlorobenzene	630		µg/L				<0.5				<0.1	<0.1			<0.2		
1,4-Dichlorobenzene	5		µg/L				<0.5				<0.1	<0.1			<0.2		
2-Hexanone			µg/L				<10				<5	<5			<5		
Acetone	3 000		µg/L				<10				<10	<10			<10		
Benzene	5		µg/L				<0.5				<0.1	<0.1			<0.1		
Bromodichloromethane	5		µg/L				<0.2				<0.1	<0.1			<0.1		
Bromoform	5		µg/L				<0.2				<0.2	<0.2			<0.2		
Bromomethane	10		µg/L				<3				<0.5	<0.5			<0.5		
Carbon Tetrachloride	5		µg/L				<0.5				<0.1	<0.1			<0.1		
Chlorobenzene	30		µg/L				<0.5				<0.1	<0.1			<0.1		
Chloroethane			µg/L				<1				<0.2	<0.2			<0.2		
Chloroform	5		µg/L				<0.2				<0.1	<0.1			<0.1		
Chloromethane			µg/L				<2				<0.5	<0.5			<0.5		
cis-1,2-Dichloroethylene	70		µg/L				<1				<0.1	<0.1			<0.1		
cis-1,3-Dichloropropene	1.4		µg/L				<0.14				<0.2	<0.2			<0.2		
Dibromochloromethane	5		µg/L				<0.2				<0.2	<0.2			<0.2		
Dichlorodifluoromethane			µg/L														
Dichloromethane(Methylene Chloride)	50		µg/L				<1				<0.5	<0.5			<0.5		
Ethylbenzene	2.4		µg/L				<0.5				<0.1	<0.1			<0.1		
Methyl isobutyl ketone	350		µg/L				<10				<5	<5			<5		
Methyl t-butyl ether (MTBE)	700		µg/L				<2				<0.2	<0.2			<0.2		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L				<15				<5	<5			<5		
Styrene	100		µg/L				<0.5				<0.1	<0.1			<0.1		
Tetrachloroethylene	30		µg/L				<0.5				<0.1	<0.1			<0.1		
Toluene	24		µg/L				<0.5				<0.2	<0.2			<0.2		
trans-1,2-Dichloroethylene	100		µg/L				<1				<0.1	<0.1			<0.1		
trans-1,3-Dichloropropene	1.4		µg/L				<0.14				<0.2	<0.2			<0.2		
Trichloroethylene	5		µg/L				<0.5				<0.1	<0.1			<0.1		
Trichlorofluoromethane (FREON 11)			µg/L				<2				<0.2	<0.2					
Vinyl Chloride	2		µg/L				<0.2				<0.2	<0.2			<0.2		
Xylene, *o*-	300		µg/L				<0.5				<0.1	<0.1			<0.1		
Xylene, *p*- + *m*-	300		µg/L				<0.5				<0.1	<0.1			<0.1		
Xylenes (total)	300		µg/L				<1				<0.1	<0.1			<0.1		
PAHs																	
2-Methylnaphthalene			µg/L														
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	
Acenaphthylene	1	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	
Anthracene	2.4	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	
Benzo(a)anthracene	1	Table 2	µg/L				<0.05				<0.05	0.08	<0.05		<0.05	<0.05	
Benzo(a)pyrene	0.01	MAC	µg/L				<0.01				0.01	0.01	<0.01		<0.01	<0.01	
Benzo(b)fluoranthene	0.1	Table 2	µg/L														
Benzo(b,j)fluoranthene			µg/L				<0.05				<0.05	<0.05			<0.05	<0.05	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L				<0.1				<0.1	<0.1	<0.1		<0.1	<0.1	
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	
Chrysene	0.1	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L				<0.1				<0.1	<0.1	<0.1		<0.1	<0.1	
Fluoranthene	0.41	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	
Fluorene	120	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L				<0.1				<0.1	<0.1	<0.1		<0.1	<0.1	
Naphthalene	11	Table 2	µg/L				<0.05				<0.05	0.06	<0.05		<0.05	<0.05	
Phenanthrene	1	Table 2	µg/L				0.23				0.08	0.11	0.05		<0.05	<0.05	
Pyrene	4.1	Table 2	µg/L				<0.05				<0.05	<0.05	<0.05		<0.05	<0.05	

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03	MW2-03
			Sampling Date	2007/05/16	2007/05/16	2007/07/31	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/03	2011/01/10	2011/05/30	2011/05/30	2011/05/30	2011/07/05
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Indicator	Lab Replicate	GW Comprehensive	Lab Replicate	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	Field Duplicate	QA/QC Check	GW Comprehensive
Field Parameters																
Conductivity			µS/cm										1158			1264
pH	6.5-8.5	OG											7.15			8.2
Temperature			°C										9.8			11
General																
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	414		413		375	410	417	419	402	383	392	2.32	381
Ammonia (as N)			mg/L	<0.05		0.09		<0.06	0.253	<0.050	<0.05	<0.02	<0.02	<0.02	0.00	<0.02
Biological Oxygen Demand (BOD_5)			mg/L			<2			<6.0							<5
Calcium (Ca)			mg/L	160		210		199	197	197	173	191	196	187	4.70	180
Chemical Oxygen Demand (COD)			mg/L	16		9		18	10	27	29	18	<5	9	0.00	13.3
Chloride (Cl)	250	AO	mg/L	56		53		139	116	98.5	95.6	86.9	99.7	101	1.30	105
Conductivity			µS/cm	1200		1150		1380	1320	1300	1260	1160	1160	1160	0.00	1270
Dissolved Organic Carbon (DOC)	5	AO	mg/L	8.2	8.2	8.1		6.5	8.3	6.4	8.5	7.7	5.87	6.21	5.63	6.9
Hardness ($CaCO_3$)	80-100	OG	mg/L			710		685	695		588					619
Nitrate (as N)	10	MAC	mg/L	0.3		0.3	0.3	<0.15	<1.0	<0.10	<0.005	<0.05	<0.05	<0.05	0.00	<0.05
Nitrite (as N)	1	MAC	mg/L			<0.01		<0.005	<1.0		<0.06					<0.05
pH	6.5-8.5	OG		7.8		7.90		7.73	7.65	7.74	8.11	7.77	7.73	7.86	1.67	7.87
Phenol 4AAP			mg/L			<0.001		<0.0002	<0.0010		<0.2					<0.001
Potassium (K)			mg/L			2.6		1.63	<10		1.22					2.05
Sulphates (SO_4)	500	AO	mg/L	188		187		181	230	176	153	186	217	218	0.46	207
Total Dissolved Solids (TDS)	500	AO	mg/L	755		740		1060	974	874	876	840	884	904	2.24	840
Total Kjeldahl Nitrogen (TKN)			mg/L			0.7		0.35	<0.15		0.44					0.16
Total Phosphorus (P)			mg/L			0.076		<0.02	0.1		<0.06					0.104
Total Suspended Solids (TSS)			mg/L			150		47.4	54		115					158
Metals																
Arsenic	0.025	IMAC	mg/L			<0.001		<0.001	<0.010		<0.0005					<0.003
Barium	1	MAC	mg/L	0.04		0.041		0.058	<0.10	0.058	0.076	0.048	0.0411	0.0468	12.97	0.0447
Beryllium			mg/L			<0.0005		<0.001	<0.010		<0.001					<0.001
Boron	5	IMAC	mg/L	0.033		0.044		<0.005	<0.50	0.057	<0.025	0.035	0.0303	0.0331	0.00	0.0297
Cadmium	0.005	MAC	mg/L			0.0001		<0.001	<0.0010		<0.001					<0.0001
Chromium	0.05	MAC	mg/L			<0.005		<0.002	<0.010		<0.002					0.0031
Cobalt			mg/L			<0.003		<0.001	<0.0080		<0.001					<0.0005
Copper	1	AO	mg/L			0.002		<0.002	<0.010		<0.004					0.00299
Iron	0.3	AO	mg/L	<0.05		<0.05		<0.037	<0.50	0.64	<0.023	<0.010	0.011	0.0126	0.00	<0.01
Lead	0.01	MAC	mg/L			<0.0005		<0.005	<0.010		<0.005					<0.001
Magnesium			mg/L	36		47		48.9	49.4	42.8	40.9	42.6	42	40.5	3.64	41.1
Manganese	0.05	AO	mg/L			0.12		0.062	<0.010		0.028					0.0041
Mercury	0.001	MAC	mg/L			<0.0001		<0.02	<0.00010		<0.02					<0.00005
Molybdenum			mg/L			0.003		<0.005	<0.010		<0.005					<0.002
Nickel			mg/L			<0.005		<0.006	<0.020		<0.006					<0.003
Silver			mg/L			<0.001		<0.003	<0.0010		<0.003					<0.0001
Sodium	200	AO	mg/L	22		26		35.5	31.4	26	34.6	29.5	28.9	27.4	5.33	32
Thallium			mg/L			<0.00005			<0.0030							<0.0003
Vanadium			mg/L			<0.001		<0.001	<0.010		<0.001					<0.002
Zinc	5	AO	mg/L			<0.005		<0.009	<0.030		0.011					0.0269
VOCs																
1,1,1,2-Tetrachloroethane	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.10
1,1,1-Trichloroethane	200		µg/L			<0.1		<0.2	<0.5		<0.2					<0.30
1,1,2,2-Tetrachloroethane	1		µg/L			<0.1		<0.2	<0.5		<0.2					<0.10
1,1,2-Trichloroethane	5		µg/L			<0.2		<0.2	<0.5		<0.2					<0.20
1,1-Dichloroethane	70		µg/L			<0.1		<0.2	<0.5		<0.2					<0.30
1,1-Dichloroethylene	14		µg/L			<0.1		<0.2	<0.5		<0.2					<0.30
1,2-Dibromoethane (EDB)	1		µg/L			<0.2		<0.2	<0.5		<0.2					
1,2-Dichlorobenzene	3		µg/L			<0.2		<0.2	<0.5		<0.2					<0.10
1,2-Dichloroethane	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
1,2-Dichloropropane	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
1,3-Dichlorobenzene	630		µg/L			<0.2		<0.2	<0.5		<0.2					<0.10
1,4-Dichlorobenzene	5		µg/L			<0.2		<0.2	<0.5		<0.2					<0.10
2-Hexanone			µg/L			<5			<20							<0.30
Acetone	3 000		µg/L			<10			<20							<1.0
Benzene	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
Bromodichloromethane	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
Bromoform	5		µg/L			<0.2		<0.2	<0.5		<0.2					<0.10
Bromomethane	10		µg/L			<0.5		<0.5	1.79		<0.5					<0.20
Carbon Tetrachloride	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
Chlorobenzene	30		µg/L			<0.1		<0.2	<0.5		<0.2					<0.10
Chloroethane			µg/L			<0.2		<0.5	<1		<0.5					<0.20
Chloroform	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
Chloromethane			µg/L			<0.5		<0.5	<1		<0.5					<0.40
cis-1,2-Dichloroethylene	70		µg/L			<0.1		<0.2	<0.5		<0.2					
cis-1,3-Dichloropropene	1.4		µg/L			<0.2		<0.2	<0.5		<0.2					<0.20
Dibromochloromethane	5		µg/L			<0.2		<0.2	<0.5		<0.2					<0.10
Dichlorodifluoromethane			µg/L						<1		<0.5					<0.20
Dichloromethane(Methylene Chloride)	50		µg/L			<0.5		<0.2	<0.5		<0.2					
Ethylbenzene	2.4		µg/L			<0.1		<0.2	<0.5		<0.2					<0.10
Methyl isobutyl ketone	350		µg/L			<5			<20							
Methyl t-butyl ether (MTBE)	700		µg/L			<0.2			<0.5							
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L			<5			<20							
Styrene	100		µg/L			<0.1		<0.2	<0.5		<0.2					<0.10
Tetrachloroethylene	30		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
Toluene	24		µg/L			<0.2		<0.2	<0.5		<0.2					<0.20
trans-1,2-Dichloroethylene	100		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
trans-1,3-Dichloropropene	1.4		µg/L			<0.2		<0.2	<0.5		<0.2					<0.30
Trichloroethylene	5		µg/L			<0.1		<0.2	<0.5		<0.2					<0.20
Trichlorofluoromethane (FREON 11)			µg/L			<0.2		<0.5	<1		<0.5					
Vinyl Chloride	2		µg/L			<0.2			<0.5							<0.17
Xylene, *o*-	300		µg/L			<0.1		<0.2	<0.5		<0.2					<0.10
Xylene, *p*- + *m*-	300		µg/L			<0.1		<0.2	<1		<0.2					<0.20
Xylenes (total)	300		µg/L			<0.1		<0.2	<1.5		<0.2					<0.20
PAHs																
2-Methylnaphthalene			µg/L			0		<0.2	<0.02	<0.02	<0.2					
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L													<0.20
Acenaphthene	4.1	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.10
Acenaphthylene	1	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.11
Anthracene	2.4	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.05
Benzo(a)anthracene	1	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.08
Benzo(a)pyrene	0.01	MAC	µg/L			0		<0.2	<0.005	0.0126	<0.2					<0.01
Benzo(b)fluoranthene	0.1	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					
Benzo(b,j)fluoranthene			µg/L			0										
Benzo(g,h,i)perylene	0.2	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.06
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L													
Benzo(k)fluoranthene	0.1	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.05
Chrysene	0.1	Table 2	µg/L			0		<0.2	<0.02	0.027	<0.2					<0.05
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L			0		<0.5	<0.02	<0.02	<0.5					<0.09
Fluoranthene	0.41	Table 2	µg/L			0		<0.2	<0.02	0.038	<0.2					<0.12
Fluorene	120	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.09
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L			0		<0.5	<0.02	<0.02	<0.5					<0.06
Naphthalene	11	Table 2	µg/L			0		<0.2	<0.02	<0.02	<0.2					<0.12
Phenanthrene	1	Table 2	µg/L			0		<0.2	<0.02	0.04	<0.2					<0.10
Pyrene	4.1	Table 2	µg/L			0		<0.2	<0.02	0.03	<0.2					<0.05

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW2-03	MW2-03	MW2-03	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW2B-07	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW2C-01
			Sampling Date	**2011/11/16**	**2011/11/16**	**2011/11/16**	**2007/05/16**	**2009/04/30**	**2009/07/23**	**2011/05/30**	**2011/07/06**	**2011/11/14**	**2004/11/29**	**2005/12/01**	**2006/05/29**	**2006/07/19**	**2006/12/12**
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Indicator	Lab Replicate	Q4/QC Check	GW Indicator	MOE	GW Comprehensive	GW Indicator	GW Comprehensive	GW Indicator	GW Indicator + Metals	GW Indicator	GW Indicator	GW Inorganic + GW Metals	GW Indicator
Field Parameters																	
Conductivity			µS/cm	1270						2780	3000	2030					
pH	6.5-8.5	OG		6.79						7.51	7.8	7.64					
Temperature			°C	12.7						10.1	13.5	12.7					
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	335			746		243	646		509	747	829	897	910	908
Ammonia (as N)			mg/L	<0.02			<0.05		0.144	0.034		0.82	<0.05	0.06	0.07	0.12	<0.05
Biological Oxygen Demand (BOD_5)			mg/L						<6.0							<2	
Calcium (Ca)			mg/L	169			120		146	128		79.7	220	200	170	180	170
Chemical Oxygen Demand (COD)			mg/L	5.6			15		12	<5		<5	21	22	43	24	20
Chloride (Cl)	250	AO	mg/L	107	106	0.94	10		<20	20.1		13.8	13.5	14	15	13	13
Conductivity			µS/cm	1260			3510		1490	2540		2080	4200	4650	4760	4770	4710
Dissolved Organic Carbon (DOC)	5	AO	mg/L	7.3			6.2		8.1	14		5.2	7.9	5.2	5.1	5.1	13
Hardness ($CaCO_3$)	80-100	OG	mg/L						730							2700	
Nitrate (as N)	10	MAC	mg/L	<0.25	<0.25	0.00	<0.1		<1.0	1.23		<0.25	<0.1	0.7	3.5	2.6	
Nitrite (as N)	1	MAC	mg/L						<1.0							<0.3	<0.1
pH	6.5-8.5	OG		8.03			7.90		7.86	8.08		8.26	8.06	8.12	7.9	7.80	8
Phenol 4AAP			mg/L					<0.0002	0.0081							<0.001	
Potassium (K)			mg/L	2.29					<10			6.89				13	
Sulphates (SO_4)	500	AO	mg/L	187	185	1.08	1590		753	1340		796	2230	2420	1990	2330	2520
Total Dissolved Solids (TDS)	500	AO	mg/L	828			1750		1200	2320		1500	4560	4340	3100	3110	3960
Total Kjeldahl Nitrogen (TKN)			mg/L						0.55							0.4	
Total Phosphorus (P)			mg/L						0.128							0.22	
Total Suspended Solids (TSS)			mg/L						14300							1200	
Metals																	
Arsenic	0.025	IMAC	mg/L					<0.0005	<0.010				0.002			<0.001	
Barium	1	MAC	mg/L	0.0492			0.019	0.018	<0.10	0.0752		0.0391	0.018	0.014	<0.03	0.012	<0.03
Beryllium			mg/L					<0.001	<0.010				<0.0014			<0.0005	
Boron	5	IMAC	mg/L	0.0345			0.21	0.08	<0.50	0.0493		0.0635	0.36	0.33	0.35	0.31	0.36
Cadmium	0.005	MAC	mg/L					<0.001	<0.0010				<0.001			<0.0001	
Chromium	0.05	MAC	mg/L					<0.002	<0.010				<0.0016			<0.005	
Cobalt			mg/L					<0.006	<0.0080				0.005			<0.0005	
Copper	1	AO	mg/L					<0.001	<0.010				0.006			0.005	
Iron	0.3	AO	mg/L	0.219			<0.05	<0.029	<0.50	<0.01		<0.01	2	<0.050	<0.05	<0.05	<0.05
Lead	0.01	MAC	mg/L					<0.005	<0.010				<0.0022			<0.0005	
Magnesium			mg/L	38.1			400	632	88.8	337		221	650	590	510	550	550
Manganese	0.05	AO	mg/L					0.121	0.319				0.15			0.011	
Mercury	0.001	MAC	mg/L					<0.02	<0.00010				<0.0001			<0.0001	
Molybdenum			mg/L					<0.012	<0.010				0.011			0.009	
Nickel			mg/L					<0.01	<0.020				0.005			0.002	
Silver			mg/L					<0.003	<0.0010				<0.0006			<0.0001	
Sodium	200	AO	mg/L	39.5			220	282	57.5	150		121	300	240	460	400	440
Thallium			mg/L						<0.0030				<0.001			<0.00005	
Vanadium			mg/L					<0.001	<0.010				<0.001			<0.001	
Zinc	5	AO	mg/L					0.014	<0.030				0.024			<0.05	
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L					<0.2	<0.5		<0.10						
1,1,1-Trichloroethane	200		µg/L					<0.2	<0.5		<0.30						
1,1,2,2-Tetrachloroethane	1		µg/L					<0.2	<0.5		<0.10						
1,1,2-Trichloroethane	5		µg/L					<0.2	<0.5		<0.20						
1,1-Dichloroethane	70		µg/L					<0.2	<0.5		<0.30						
1,1-Dichloroethylene	14		µg/L					<0.2	<0.5		<0.30						
1,2-Dibromoethane (EDB)	1		µg/L					<0.2	<0.5		<0.20						
1,2-Dichlorobenzene	3		µg/L					<0.2	<0.5		<0.10						
1,2-Dichloroethane	5		µg/L					<0.2	<0.5		<0.20						
1,2-Dichloropropane	5		µg/L					<0.2	<0.5		<0.20						
1,3-Dichlorobenzene	630		µg/L					<0.2	<0.5		<0.10						
1,4-Dichlorobenzene	5		µg/L					<0.2	<0.5		<0.10						
2-Hexanone			µg/L						<20		<0.30						
Acetone	3 000		µg/L						<20		<1.0						
Benzene	5		µg/L					<0.2	<0.5		<0.20						
Bromodichloromethane	5		µg/L					<0.2	<0.5		<0.20						
Bromoform	5		µg/L					<0.2	<0.5		<0.10						
Bromomethane	10		µg/L					<0.5	1.67		<0.20						
Carbon Tetrachloride	5		µg/L					<0.2	0.5		<0.20						
Chlorobenzene	30		µg/L					<0.2	<0.5		<0.10						
Chloroethane			µg/L					<0.5	<1		<0.20						
Chloroform	5		µg/L					<0.2	<0.5		<0.20						
Chloromethane			µg/L					<0.5	<1		<0.40						
cis-1,2-Dichloroethylene	70		µg/L					<0.2	<0.5		<0.20						
cis-1,3-Dichloropropene	1.4		µg/L					<0.2	<0.5		<0.20						
Dibromochloromethane	5		µg/L					<0.2	<0.5		<0.10						
Dichlorodifluoromethane			µg/L						<1		<0.20						
Dichloromethane(Methylene Chloride)	50		µg/L					<0.2	<0.5		<0.30						
Ethylbenzene	2.4		µg/L					<0.2	<0.5		<0.10						
Methyl isobutyl ketone	350		µg/L						<20		<1.0						
Methyl t-butyl ether (MTBE)	700		µg/L						<0.5		<0.20						
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L						<20		<1.0						
Styrene	100		µg/L					<0.2	<0.5		<0.10						
Tetrachloroethylene	30		µg/L					<0.2	<0.5		<0.20						
Toluene	24		µg/L					<0.2	<0.5		<0.20						
trans-1,2-Dichloroethylene	100		µg/L					<0.2	<0.5		<0.20						
trans-1,3-Dichloropropene	1.4		µg/L					<0.2	<0.5		<0.30						
Trichloroethylene	5		µg/L					<0.2	<0.5		<0.20						
Trichlorofluoromethane (FREON 11)			µg/L					<0.5	<1		<0.40						
Vinyl Chloride	2		µg/L						<0.5		<0.17						
Xylene, *o*-	300		µg/L					<0.2	<0.5		<0.10						
Xylene, *p*- + *m*-	300		µg/L					<0.2	<1		<0.20						
Xylenes (total)	300		µg/L					<0.2	<1.5		<0.20						
PAHs																	
2-Methylnaphthalene			µg/L					<0.2	<0.02								
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L								<0.20						
Acenaphthene	4.1	Table 2	µg/L					<0.2	<0.02		<0.10						
Acenaphthylene	1	Table 2	µg/L					<0.2	<0.02		<0.11						
Anthracene	2.4	Table 2	µg/L					<0.2	<0.02		<0.05						
Benzo(a)anthracene	1	Table 2	µg/L					<0.2	<0.02		<0.08						
Benzo(a)pyrene	0.01	MAC	µg/L					<0.2	<0.005		<0.01						
Benzo(b)fluoranthene	0.1	Table 2	µg/L					<0.2	<0.02		<0.05						
Benzo(b,j)fluoranthene			µg/L														
Benzo(g,h,i)perylene	0.2	Table 2	µg/L					<0.2	<0.02		<0.06						
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L					<0.2	<0.02		<0.05						
Chrysene	0.1	Table 2	µg/L					<0.2	<0.02		<0.05						
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L					<0.5	<0.02		<0.09						
Fluoranthene	0.41	Table 2	µg/L					<0.2	<0.02		<0.12						
Fluorene	120	Table 2	µg/L					<0.2	<0.02		<0.09						
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L					<0.5	<0.02		<0.06						
Naphthalene	11	Table 2	µg/L					<0.2	<0.02		<0.12						
Phenanthrene	1	Table 2	µg/L					<0.2	<0.02		<0.10						
Pyrene	4.1	Table 2	µg/L					<0.2	<0.02		<0.05						

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW2C-01	MW3-03	MW3-03	MW3-03	MW3-03
			Sampling Date	2007/05/16	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/03	2011/01/10	2011/05/30	2011/07/06	2011/11/14	2004/06/07	2004/06/07	2004/11/29	2005/05/09
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Indicator	GW Comprehensive	MOE	GW Comprehensive	GW Indicator	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	GW Comprehensive	Field Duplicate	GW Indicator + Metals	GW Indicator
Field Parameters																	
Conductivity			µS/cm								4540	4610	5030				
pH	6.5-8.5	OG									7.46	7.39	7.35				
Temperature			°C								17.4	11.7	10.8				
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	873	872		831	806	842	813	839		816	685	686	660	629
Ammonia (as N)			mg/L	<0.05	0.09		0.097	<0.050	<0.05	<0.02	0.043		0.041	<0.05	<0.05	<0.05	<0.05
Biological Oxygen Demand (BOD_5)			mg/L		<2		<6.0							<3	<3		
Calcium (Ca)			mg/L	180	190		177	184	174	201	192		197	190	180	200	220
Chemical Oxygen Demand (COD)			mg/L	14	13		<10	18		9	<5		9.78	18	15	12	16
Chloride (Cl)	250	AO	mg/L	15	15		20.4	13	12.1	12.7	14.9		14.3	50.2	50.1	40.6	35.9
Conductivity			µS/cm	4740	4200		4490	4540	4480	4010	4140		4730	2350	2450	2450	2550
Dissolved Organic Carbon (DOC)	5	AO	mg/L	5.1	6.6		6.9	5.1	5.6	8.6	6.1		28.8	6.6	7.2	5.6	4
Hardness ($CaCO_3$)	80-100	OG	mg/L		3000		2930		2800					1620	1620		
Nitrate (as N)	10	MAC	mg/L	1.4	1.2		<1.0	<0.50	<0.005	<0.10	1.11		<0.25	<1	<1	<0.1	<1
Nitrite (as N)	1	MAC	mg/L		<0.01		<1.0		<0.15					<0.1	<0.1		
pH	6.5-8.5	OG		7.70	8		7.78	7.80	7.93	8.11	8.04		8.16	7.81	7.88	8.02	7.91
Phenol 4AAP			mg/L		<0.001		0.0038		0.0004					<0.001	<0.001		
Potassium (K)			mg/L		13000		12		13.2				13.9	5.8	5.4		
Sulphates (SO_4)	500	AO	mg/L	2190	2350		2650	2820	2450	2600	2860		2680	1060	1060	1010	1010
Total Dissolved Solids (TDS)	500	AO	mg/L	4080	3070		4290	4460		4400	4290		4490	2190	1970	1910	2350
Total Kjeldahl Nitrogen (TKN)			mg/L		0.8		0.23		1.04					1.4	0.9		
Total Phosphorus (P)			mg/L		0.2		0.114		0.74					0.47	0.25		
Total Suspended Solids (TSS)			mg/L		270		508							227	211		
Metals																	
Arsenic	0.025	IMAC	mg/L		<0.001		<0.010							0.0064	0.0057	0.0029	
Barium	1	MAC	mg/L	<0.03	0.011		<0.10	0.014		0.016	0.0106		0.0095	0.014	0.014	0.015	0.013
Beryllium			mg/L		<0.0005		<0.010							<0.0014	<0.0014	<0.0014	
Boron	5	IMAC	mg/L	0.35	0.31		<0.50	0.326		0.312	0.275		0.296	0.075	0.075	0.11	0.07
Cadmium	0.005	MAC	mg/L		<0.0001		<0.0010							<0.001	<0.001	<0.001	
Chromium	0.05	MAC	mg/L		<0.005		<0.010							<0.0016	<0.0016	0.0054	
Cobalt			mg/L		<0.0005		<0.0080							<0.001	<0.001	<0.001	
Copper	1	AO	mg/L		<0.005		<0.010							<0.003	<0.003	0.003	
Iron	0.3	AO	mg/L	<0.3	<0.05		<0.50	<0.050		<0.010	<0.01		<0.01	1.7	1.6	2.4	2.2
Lead	0.01	MAC	mg/L		<0.0005		<0.010							<0.0022	<0.0022	<0.0022	
Magnesium			mg/L	570	610		603	511		630	621		630	260	280	290	270
Manganese	0.05	AO	mg/L		0.012		0.017							0.49	0.48	0.51	
Mercury	0.001	MAC	mg/L		0.0001		<0.00010		<0.03					<0.0001	<0.0001	<0.0001	
Molybdenum			mg/L		0.008		<0.010							0.0035	0.0033	0.0026	
Nickel			mg/L		0.003		<0.020							<0.001	<0.001	<0.001	
Silver			mg/L		<0.0001		<0.0010							<0.0006	<0.0006	<0.0006	
Sodium	200	AO	mg/L	400	450		375	310		299	317		305	97	98	110	100
Thallium			mg/L		<0.00005		<0.0030							<0.001	<0.001	<0.001	
Vanadium			mg/L		<0.001		<0.010							0.003	0.003	<0.001	
Zinc	5	AO	mg/L		<0.03		<0.030							<0.005	<0.005	0.008	
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<0.1		<0.5					<0.10		<0.5	<0.5		
1,1,1-Trichloroethane	200		µg/L		<0.1		<0.5					<0.30		<0.5	<0.5		
1,1,2,2-Tetrachloroethane	1		µg/L		<0.1		<0.5					<0.10		<1	<1		
1,1,2-Trichloroethane	5		µg/L		<0.2		<0.5					<0.20		<0.5	<0.5		
1,1-Dichloroethane	70		µg/L		<0.1		<0.5					<0.30		<0.4	<0.4		
1,1-Dichloroethylene	14		µg/L		<0.1		<0.5					<0.30		<0.5	<0.5		
1,2-Dibromoethane (EDB)	1		µg/L		<0.2		<0.5					<0.20		<0.5	<0.5		
1,2-Dichlorobenzene	3		µg/L		<0.2		<0.5					<0.10		<0.5	<0.5		
1,2-Dichloroethane	5		µg/L		<0.1		<0.5					<0.20		<0.5	<0.5		
1,2-Dichloropropane	5		µg/L		<0.1		<0.5					<0.20		<0.5	<0.5		
1,3-Dichlorobenzene	630		µg/L		<0.2		<0.5					<0.10		<0.5	<0.5		
1,4-Dichlorobenzene	5		µg/L		<0.2		<0.5					<0.10		<0.5	<0.5		
2-Hexanone			µg/L		<5		<20					<0.30		<10	<10		
Acetone	3 000		µg/L		<10		<20					<1.0		<10	<10		
Benzene	5		µg/L		<0.1		<0.5					<0.20		<0.5	<0.5		
Bromodichloromethane	5		µg/L		<0.1		<0.5					<0.20		<0.2	<0.2		
Bromoform	5		µg/L		<0.2		<0.5					<0.10		<0.2	<0.2		
Bromomethane	10		µg/L		<0.5		1.63					<0.20		<3	<3		
Carbon Tetrachloride	5		µg/L		<0.1		0.5					<0.20		<0.5	<0.5		
Chlorobenzene	30		µg/L		<0.1		<0.5					<0.10		<0.5	<0.5		
Chloroethane			µg/L		<0.2		<1					<0.20		<1	<1		
Chloroform	5		µg/L		<0.1		<0.5					<0.20		<0.2	<0.2		
Chloromethane			µg/L		<0.5		<1					<0.40		<2	<2		
cis-1,2-Dichloroethylene	70		µg/L		<0.1		<0.5					<0.20		<1	<1		
cis-1,3-Dichloropropene	1.4		µg/L		<0.2		<0.5					<0.20		<0.14	<0.14		
Dibromochloromethane	5		µg/L		<0.2		<0.5					<0.10		<0.2	<0.2		
Dichlorodifluoromethane			µg/L				<1					<0.20					
Dichloromethane(Methylene Chloride)	50		µg/L		<0.5		<0.5					<0.30		<1	<1		
Ethylbenzene	2.4		µg/L		<0.1		<0.5					<0.10		<0.5	<0.5		
Methyl isobutyl ketone	350		µg/L		<5		<20					<1.0		<10	<10		
Methyl t-butyl ether (MTBE)	700		µg/L		<0.2		<0.5					<0.20		<2	<2		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<5		<20					<1.0		<15	<15		
Styrene	100		µg/L		<0.1		<0.5					<0.10		<0.5	<0.5		
Tetrachloroethylene	30		µg/L		<0.1		<0.5					<0.20		<0.5	<0.5		
Toluene	24		µg/L		<0.2		<0.5					<0.20		<0.5	<0.5		
trans-1,2-Dichloroethylene	100		µg/L		<0.1		<0.5					<0.20		<1	<1		
trans-1,3-Dichloropropene	1.4		µg/L		<0.2		<0.5					<0.30		<0.14	<0.14		
Trichloroethylene	5		µg/L		<0.1		<0.5					<0.20		<0.5	<0.5		
Trichlorofluoromethane (FREON 11)			µg/L		<0.2		<1					<0.40		<2	<2		
Vinyl Chloride	2		µg/L		<0.2		<0.5					<0.17		<0.5	<0.5		
Xylene, *o*-	300		µg/L		<0.1		<0.5					<0.10		<0.5	<0.5		
Xylene, *p*- + *m*-	300		µg/L		<0.1		<1					<0.20		<0.5	<0.5		
Xylenes (total)	300		µg/L		<0.1		<1.5					<0.20		<1	<1		
PAHs																	
2-Methylnaphthalene			µg/L			<0.2	<0.02		<0.2								
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L									<0.20					
Acenaphthene	4.1	Table 2	µg/L		<0.05	<0.2	0.032		<0.2			<0.10		<0.05	<0.05		
Acenaphthylene	1	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.11		<0.05	<0.05		
Anthracene	2.4	Table 2	µg/L		<0.05	<0.2	<0.035		<0.2			<0.05		<0.05	<0.05		
Benzo(a)anthracene	1	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.08		<0.05	<0.05		
Benzo(a)pyrene	0.01	MAC	µg/L		0.02	<0.2	<0.006		<0.2			<0.01		<0.01	<0.01		
Benzo(b)fluoranthene	0.1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.05					
Benzo(b,j)fluoranthene			µg/L		<0.05									<0.05	<0.05		
Benzo(g,h,i)perylene	0.2	Table 2	µg/L		<0.1	<0.2	<0.02		<0.2			<0.06		<0.1	<0.1		
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.05		<0.05	<0.05		
Chrysene	0.1	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.05		<0.05	<0.05		
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L		<0.1	<0.5	<0.02		<0.5			<0.09		<0.1	<0.1		
Fluoranthene	0.41	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.12		<0.05	<0.05		
Fluorene	120	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.09		<0.05	<0.05		
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L		<0.1	<0.5	<0.02		<0.5			<0.06		<0.1	<0.1		
Naphthalene	11	Table 2	µg/L		0.1	<0.2	<0.02		<0.2			<0.12		<0.05	<0.05		
Phenanthrene	1	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.10		0.48	0.49		
Pyrene	4.1	Table 2	µg/L		<0.05	<0.2	<0.02		<0.2			<0.05		<0.05	<0.05		

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03
			Sampling Date	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2006/12/12	2007/05/16	2007/05/16	2007/07/31	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/03
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	Field Duplicate	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Indicator	GW Indicator	Lab Replicate	GW Comprehensive	Lab Replicate	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE
Field Parameters																	
Conductivity			µS/cm														
pH	6.5-8.5	OG															
Temperature			°C														
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	632	670	456	579	580	611	463		466		491	490	460	496
Ammonia (as N)			mg/L	<0.05	<0.05	<0.05	0.09	0.16	0.24	0.11	0.1	0.09		<0.05	0.087	<0.050	<0.05
Biological Oxygen Demand (BOD_5)			mg/L		<2			<2				<2		<6.0			
Calcium (Ca)			mg/L	220	190	150	160	150	130	140		150		157	142	155	154
Chemical Oxygen Demand (COD)			mg/L	14	13	85	74	43	22	15		<4		22	16	29	35
Chloride (Cl)	250	AO	mg/L	40	39.6	18	25	27	40	44		48		76.6	56.3	66.5	63.1
Conductivity			µS/cm	2560	2400	1190	1560	1630	1770	1380		1370		1480	1630	1360	1330
Dissolved Organic Carbon (DOC)	5	AO	mg/L	4	3.7	12.4	7.7	8	5.5	6.4		6.2		6.5	7.1	8.3	8.2
Hardness ($CaCO_3$)	80-100	OG	mg/L		1440			920				880		756	1020		559
Nitrate (as N)	10	MAC	mg/L	<1	<0.2	0.6	0.1	<0.2	<0.1	1.1		1		<0.05	<1.0	<0.10	<0.005
Nitrite (as N)	1	MAC	mg/L		<0.3			<0.3				<0.01		<0.005	<1.0		<0.05
pH	6.5-8.5	OG		7.86	7.94	8.17	8.1	7.90	8	7.9		8.10		7.71	7.75	7.68	8.1
Phenol 4AAP			mg/L		<0.001			<0.001				<0.001		<0.0002	<0.0010		<0.0002
Potassium (K)			mg/L		4.8			3.4				3		2.09	<10		0.85
Sulphates (SO_4)	500	AO	mg/L	1070	921	198	366	342	484	263		305		271	429	219	111
Total Dissolved Solids (TDS)	500	AO	mg/L	2260	1970	882	1050	1120	1140	758		850	848	1110	1100	906	796
Total Kjeldahl Nitrogen (TKN)			mg/L		0.4			0.5				1.2		0.54	0.25		0.79
Total Phosphorus (P)			mg/L		0.099			0.33				0.12		0.12	0.411		0.2
Total Suspended Solids (TSS)			mg/L		130			560				260	260	605	1130		87.7
Metals																	
Arsenic	0.025	IMAC	mg/L		<0.001			0.001				<0.001		<0.0005	<0.010		0.0025
Barium	1	MAC	mg/L	0.013	0.023	0.02	0.026	0.023	0.03	0.035		0.035		0.038	<0.10	0.045	0.038
Beryllium			mg/L		<0.0005			<0.0005				<0.0005		<0.001	<0.010		<0.001
Boron	5	IMAC	mg/L	0.07	0.076	0.061	0.031	0.047	0.048	0.04		0.058		<0.045	<0.50	0.064	0.05
Cadmium	0.005	MAC	mg/L		<0.0001			<0.0001				<0.0001		<0.001	<0.0010		<0.001
Chromium	0.05	MAC	mg/L		<0.005			<0.005				<0.005		<0.002	<0.010		<0.002
Cobalt			mg/L		0.0005			0.001				0.0005		<0.001	<0.0080		<0.001
Copper	1	AO	mg/L		<0.001			0.001				0.001		<0.001	<0.010		<0.002
Iron	0.3	AO	mg/L	2.4	1.8	<0.05	0.11	0.9	0.25	0.56		0.23		1.28	2.04	0.117	0.39
Lead	0.01	MAC	mg/L		<0.0002			<0.0005				0.0009		<0.005	<0.010		<0.005
Magnesium			mg/L	270	280	85	66	130	74	110		120		111	161	70.1	88.5
Manganese	0.05	AO	mg/L		0.43			0.15				0.11		0.144	0.188		0.068
Mercury	0.001	MAC	mg/L		<0.0001			<0.0001				<0.0001		<0.03	<0.00010		<0.02
Molybdenum			mg/L		0.0018			0.003				0.002		<0.005	<0.010		<0.005
Nickel			mg/L		0.0013			0.001				0.002		<0.006	<0.020		<0.006
Silver			mg/L		<0.0005			<0.0001				<0.001		<0.003	<0.0010		<0.003
Sodium	200	AO	mg/L	99	99	51	66	60	35	50		56		92.2	67.6	47.9	49.1
Thallium			mg/L		<0.00005			<0.00005				<0.00005			<0.0030		
Vanadium			mg/L		<0.001			<0.001				<0.001		<0.001	<0.010		<0.001
Zinc	5	AO	mg/L		<0.050			0.01				0.007		<0.005	<0.030		<0.008
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
1,1,1-Trichloroethane	200		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
1,1,2,2-Tetrachloroethane	1		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
1,1,2-Trichloroethane	5		µg/L		<0.2			<0.2				<0.2		<0.2	<0.5		<0.2
1,1-Dichloroethane	70		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
1,1-Dichloroethylene	14		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
1,2-Dibromoethane (EDB)	1		µg/L		<0.2			<0.2				<0.2		<0.2	<0.5		<0.2
1,2-Dichlorobenzene	3		µg/L		<0.1			<0.2				<0.2		<0.2	<0.5		<0.2
1,2-Dichloroethane	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
1,2-Dichloropropane	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
1,3-Dichlorobenzene	630		µg/L		<0.1			<0.2				<0.2		<0.2	<0.5		<0.2
1,4-Dichlorobenzene	5		µg/L		<0.1			<0.2				<0.2		<0.2	<0.5		<0.2
2-Hexanone			µg/L		<5			<5				<5			<20		
Acetone	3 000		µg/L		<10			<10				<10			<20		
Benzene	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Bromodichloromethane	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Bromoform	5		µg/L		<0.2			<0.2				<0.2		<0.2	<0.5		<0.2
Bromomethane	10		µg/L		<0.5			<0.5				<0.5		<0.5	1.76		<0.5
Carbon Tetrachloride	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Chlorobenzene	30		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Chloroethane			µg/L		<0.2			<0.2				<0.2		<0.5	<1		<0.5
Chloroform	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Chloromethane			µg/L		<0.5			<0.5				<0.5		<0.5	<1		<0.5
cis-1,2-Dichloroethylene	70		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
cis-1,3-Dichloropropene	1.4		µg/L		<0.2			<0.2				<0.2		<0.2	<0.5		<0.2
Dibromochloromethane	5		µg/L		<0.2			<0.2				<0.2		<0.2	<0.5		<0.2
Dichlorodifluoromethane			µg/L												<1		<0.5
Dichloromethane(Methylene Chloride)	50		µg/L		<0.5			<0.5				<0.5		<0.2	<0.5		<0.2
Ethylbenzene	2.4		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Methyl isobutyl ketone	350		µg/L		<5			<5				<5			<20		
Methyl t-butyl ether (MTBE)	700		µg/L		<0.2			<0.2				<0.2			<0.5		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<5			<5				<5			<20		
Styrene	100		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Tetrachloroethylene	30		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Toluene	24		µg/L		<0.2			<0.2				<0.2		0.7	<0.5		<0.2
trans-1,2-Dichloroethylene	100		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
trans-1,3-Dichloropropene	1.4		µg/L		<0.2			<0.2				<0.2		<0.2	<0.5		<0.2
Trichloroethylene	5		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Trichlorofluoromethane (FREON 11)			µg/L		<0.2							<0.2		<0.5	<1		<0.5
Vinyl Chloride	2		µg/L		<0.2			<0.2				<0.2			<0.5		
Xylene, *o*-	300		µg/L		<0.1			<0.1				<0.1		<0.2	<0.5		<0.2
Xylene, *p*- + *m*-	300		µg/L		<0.1			<0.1				<0.1		<0.2	<1		<0.2
Xylenes (total)	300		µg/L		<0.1			<0.1				<0.1		<0.2	<1.5		<0.2
PAHs																	
2-Methylnaphthalene			µg/L											<0.2	<0.02	<0.02	<0.2
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	<0.02	<0.02	<0.2
Acenaphthylene	1	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	0.023	<0.02	<0.2
Anthracene	2.4	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	0.027	<0.02	<0.2
Benzo(a)anthracene	1	Table 2	µg/L		<0.05	0.07		<0.05				<0.05		<0.2	0.026	<0.02	<0.2
Benzo(a)pyrene	0.01	MAC	µg/L		<0.01	0.01		0.01				0.02		<0.2	0.0421	0.0072	<0.2
Benzo(b)fluoranthene	0.1	Table 2	µg/L											<0.2	0.04	<0.02	<0.2
Benzo(b,j)fluoranthene			µg/L		<0.05			<0.05				<0.05					
Benzo(g,h,i)perylene	0.2	Table 2	µg/L		<0.1	<0.1		<0.1				<0.1		<0.2	0.041	<0.02	<0.2
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	0.036	<0.02	<0.2
Chrysene	0.1	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	0.048	<0.02	<0.2
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L		<0.1	<0.1		<0.1				<0.1		<0.5	<0.02	<0.02	<0.5
Fluoranthene	0.41	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	0.059	<0.02	<0.2
Fluorene	120	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	<0.02	<0.02	<0.2
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L		<0.1	<0.1		<0.1				<0.1		<0.5	0.035	<0.02	<0.5
Naphthalene	11	Table 2	µg/L		<0.05	<0.05		0.06				0.07		<0.2	<0.02	<0.02	<0.2
Phenanthrene	1	Table 2	µg/L		<0.05	0.08		0.1				0.07		<0.2	0.099	0.029	<0.2
Pyrene	4.1	Table 2	µg/L		<0.05	<0.05		<0.05				<0.05		<0.2	0.049	<0.02	<0.2

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW3-03	MW5B-09	MW5B-09
			Sampling Date	2009/12/03	2011/01/10	2011/05/30	2011/05/30	2011/05/30	2011/07/05	2011/07/05	2011/07/05	2011/11/16	2011/11/16	2011/11/16	2011/05/30	2011/05/30
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	MOE - Lab Replicate	GW Indicator	GW Indicator	Lab Replicate	QA/QC Check	GW Comprehensive	Lab Replicate	QA/QC Check	GW Indicator	Lab Replicate	QA/QC Check	GW Indicator	Lab Replicate
Field Parameters																
Conductivity			µS/cm			1340			1068			1280			4740	
pH	6.5-8.5	OG				7.13			8.32			6.85			7.45	
Temperature			°C			9.9			11.9			12.3			11	
General																
Alkalinity ($CaCO_3$)	30-500	OG	mg/L		477	381			490			392			604	
Ammonia (as N)			mg/L		<0.02	<0.02			<0.02			<0.02			0.279	
Biological Oxygen Demand (BOD_5)			mg/L						<5							
Calcium (Ca)			mg/L		144	121	119	1.7	130			127	125	1.59	186	
Chemical Oxygen Demand (COD)			mg/L		13	<5			15.5			16.2			18.2	
Chloride (Cl)	250	AO	mg/L		46.3	34.6			43.7			56.9			13.5	
Conductivity			µS/cm		1180	954			1260			1210			4270	
Dissolved Organic Carbon (DOC)	5	AO	mg/L		9.4	8.23			21.8			33.9			13.8	13.3
Hardness ($CaCO_3$)	80-100	OG	mg/L						620							
Nitrate (as N)	10	MAC	mg/L		<0.05	<0.05			<0.05			<0.25			<0.25	
Nitrite (as N)	1	MAC	mg/L						<0.05							
pH	6.5-8.5	OG			7.74	7.76			7.91			8.04			7.84	
Phenol 4AAP			mg/L						<0.001							
Potassium (K)			mg/L						1.82			1.49				
Sulphates (SO_4)	500	AO	mg/L		206	150			212			192			3140	
Total Dissolved Solids (TDS)	500	AO	mg/L		822	670			822			748			5060	
Total Kjeldahl Nitrogen (TKN)			mg/L						0.25							
Total Phosphorus (P)			mg/L						0.128							
Total Suspended Solids (TSS)			mg/L						250	264	5.45					
Metals																
Arsenic	0.025	IMAC	mg/L						<0.003							
Barium	1	MAC	mg/L		0.035	0.0319			0.0412			0.0357			0.0093	
Beryllium			mg/L						<0.001							
Boron	5	IMAC	mg/L		0.045	0.0522			0.0426			0.0529			0.16	
Cadmium	0.005	MAC	mg/L						<0.0001							
Chromium	0.05	MAC	mg/L						<0.003							
Cobalt			mg/L						<0.0005							
Copper	1	AO	mg/L						0.00247							
Iron	0.3	AO	mg/L		0.269	0.726			0.254			0.275			<0.01	
Lead	0.01	MAC	mg/L						<0.001							
Magnesium			mg/L		70.4	51	49.7	2.6	71.8			52	52.9	1.72	725	
Manganese	0.05	AO	mg/L						0.0357							
Mercury	0.001	MAC	mg/L						<0.00005							
Molybdenum			mg/L						<0.002							
Nickel			mg/L						<0.003							
Silver			mg/L						<0.0001							
Sodium	200	AO	mg/L		51	38	38.1	0.3	43.3			51.5	50.6	1.76	244	
Thallium			mg/L						<0.0003							
Vanadium			mg/L						<0.002							
Zinc	5	AO	mg/L						0.0058							
VOCs																
1,1,1,2-Tetrachloroethane	5		µg/L	<0.2					<0.10							
1,1,1-Trichloroethane	200		µg/L	<0.2					<0.30							
1,1,2,2-Tetrachloroethane	1		µg/L	<0.2					<0.10							
1,1,2-Trichloroethane	5		µg/L	<0.2					<0.20							
1,1-Dichloroethane	70		µg/L	<0.2					<0.30							
1,1-Dichloroethylene	14		µg/L	<0.2					<0.30							
1,2-Dibromoethane (EDB)	1		µg/L	<0.2												
1,2-Dichlorobenzene	3		µg/L	<0.2					<0.10							
1,2-Dichloroethane	5		µg/L	<0.2					<0.20							
1,2-Dichloropropane	5		µg/L	<0.2					<0.20							
1,3-Dichlorobenzene	630		µg/L	<0.2					<0.10							
1,4-Dichlorobenzene	5		µg/L	<0.2					<0.10							
2-Hexanone			µg/L						<0.30							
Acetone	3 000		µg/L						<1.0							
Benzene	5		µg/L	<0.2					<0.20							
Bromodichloromethane	5		µg/L	<0.2					<0.20							
Bromoform	5		µg/L	<0.2					<0.10							
Bromomethane	10		µg/L	<0.5					<0.20							
Carbon Tetrachloride	5		µg/L	<0.2					<0.20							
Chlorobenzene	30		µg/L	<0.2					<0.10							
Chloroethane			µg/L	<0.5					<0.20							
Chloroform	5		µg/L	<0.2					<0.20							
Chloromethane			µg/L	<0.5					<0.40							
cis-1,2-Dichloroethylene	70		µg/L	<0.2												
cis-1,3-Dichloropropene	1.4		µg/L	<0.2					<0.20							
Dibromochloromethane	5		µg/L	<0.2					<0.10							
Dichlorodifluoromethane			µg/L	<0.5					<0.20							
Dichloromethane(Methylene Chloride)	50		µg/L	<0.2												
Ethylbenzene	2.4		µg/L	<0.2					<0.10							
Methyl isobutyl ketone	350		µg/L													
Methyl t-butyl ether (MTBE)	700		µg/L													
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L													
Styrene	100		µg/L	<0.2					<0.10							
Tetrachloroethylene	30		µg/L	<0.2					<0.20							
Toluene	24		µg/L	<0.2					<0.20							
trans-1,2-Dichloroethylene	100		µg/L	<0.2					<0.20							
trans-1,3-Dichloropropene	1.4		µg/L	<0.2					<0.30							
Trichloroethylene	5		µg/L	<0.2					<0.20							
Trichlorofluoromethane (FREON 11)			µg/L	<0.5												
Vinyl Chloride	2		µg/L						<0.17							
Xylene, *o*-	300		µg/L	<0.2					<0.10							
Xylene, *p*- + *m*-	300		µg/L	<0.2					<0.20							
Xylenes (total)	300		µg/L	<0.2					<0.20							
PAHs																
2-Methylnaphthalene			µg/L	<0.2												
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L						<0.20							
Acenaphthene	4.1	Table 2	µg/L	<0.2					<0.10							
Acenaphthylene	1	Table 2	µg/L	<0.2					<0.11							
Anthracene	2.4	Table 2	µg/L	<0.2					<0.05							
Benzo(a)anthracene	1	Table 2	µg/L	<0.2					<0.08							
Benzo(a)pyrene	0.01	MAC	µg/L	<0.2					<0.01							
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.2												
Benzo(b,j)fluoranthene			µg/L													
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.2					<0.06							
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L													
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.2					<0.05							
Chrysene	0.1	Table 2	µg/L	<0.2					<0.05							
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.5					<0.09							
Fluoranthene	0.41	Table 2	µg/L	<0.2					<0.12							
Fluorene	120	Table 2	µg/L	<0.2					<0.09							
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.5					<0.06							
Naphthalene	11	Table 2	µg/L	<0.2					<0.12							
Phenanthrene	1	Table 2	µg/L	<0.2					<0.10							
Pyrene	4.1	Table 2	µg/L	<0.2					<0.05							

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW5B-09	MW5B-09	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	OW1B-06
			Sampling Date	2011/05/30	2011/07/05	2009/04/30	2009/07/23	2009/11/24	2009/12/03	2011/01/10	2011/05/30	2011/07/05	2011/07/05	2011/07/05	2011/11/15	2006/12/12
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	QA/QC Check	DRY	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehensive	Lab Replicate	QA/QC Check	GW Indicator	GW Indicator
Field Parameters																
Conductivity			µS/cm		3999+						2560	2920			3030	
pH	6.5-8.5	OG			8.46						7.28	7.27			7.33	
Temperature			°C		13						10.6	14			13.3	
General																
Alkalinity ($CaCO_3$)	30-500	OG	mg/L			467	481	455	474	455	446	465			477	677
Ammonia (as N)			mg/L			<0.05	0.087	<0.050	<0.05	<0.02	0.073	<0.02			0.026	0.1
Biological Oxygen Demand (BOD_5)			mg/L				<6.0					<5				
Calcium (Ca)			mg/L			229	212	248	195	250	214	209			204	140
Chemical Oxygen Demand (COD)			mg/L			15	<10	23	12	6	<5	10.4			<5	52
Chloride (Cl)	250	AO	mg/L			47.3	36.8	51.8	45.3	49.4	51.9	49.6			44.9	44
Conductivity			µS/cm			3100	2800	2980	2890	2620	2690	2770			2930	2370
Dissolved Organic Carbon (DOC)	5	AO	mg/L	3.69		4.5	5.3	6.4	4	5.8	6.82	8.1			4.7	10
Hardness ($CaCO_3$)	80-100	OG	mg/L			1930	2060		1850			1860				
Nitrate (as N)	10	MAC	mg/L			<0.05	<1.0	<0.50	<0.01	<0.10	<0.1	<0.2			<0.25	0.2
Nitrite (as N)	1	MAC	mg/L			<0.005	<1.0		<0.05			<0.2				
pH	6.5-8.5	OG				7.89	7.87	7.74	7.75	8.01	7.88	8.03			8	8
Phenol 4AAP			mg/L			<0.0002	<0.0010		<0.0002			<0.001				
Potassium (K)			mg/L			3.47	<10		3.57			3.22			3.16	
Sulphates (SO_4)	500	AO	mg/L			1610	1700	1720	1420	1560	1700	1530			1500	751
Total Dissolved Solids (TDS)	500	AO	mg/L			3030	2720	2830	2750	2760	2660	2390			2620	1830
Total Kjeldahl Nitrogen (TKN)			mg/L			<0.22	<0.15		<0.19			0.16				
Total Phosphorus (P)			mg/L			<0.04	0.355		<0.07			0.42				
Total Suspended Solids (TSS)			mg/L			75.4	1350		140			930				
Metals																
Arsenic	0.025	IMAC	mg/L			<0.0005	<0.010		<0.0005			<0.003				
Barium	1	MAC	mg/L			0.019	<0.10	0.013	0.015	0.012	0.012	0.0151			0.014	0.008
Beryllium			mg/L			<0.001	<0.010		<0.001			<0.001				
Boron	5	IMAC	mg/L			0.07	<0.50	0.072	0.17	0.059	0.0581	0.0567			0.0784	0.097
Cadmium	0.005	MAC	mg/L			<0.001	<0.0010		<0.001			<0.0001				
Chromium	0.05	MAC	mg/L			<0.002	<0.010		<0.002			<0.003				
Cobalt			mg/L			<0.002	<0.0080		<0.001			<0.0005				
Copper	1	AO	mg/L			<0.001	<0.010		<0.001			0.00185				
Iron	0.3	AO	mg/L			0.055	<0.50	<0.050	<0.005	<0.010	<0.01	<0.01			0.0299	<0.05
Lead	0.01	MAC	mg/L			<0.005	<0.010		<0.005			<0.001				
Magnesium			mg/L			373	372	330	368	357	325	324			310	250
Manganese	0.05	AO	mg/L			0.418	0.169		0.077			0.0159				
Mercury	0.001	MAC	mg/L			<0.02	<0.00010		<0.02			<0.00005				
Molybdenum			mg/L			<0.005	<0.010		<0.005			<0.002				
Nickel			mg/L			<0.006	<0.020		<0.006			<0.003				
Silver			mg/L			<0.003	<0.0010		<0.003			<0.0001				
Sodium	200	AO	mg/L			93.5	95.9	88.5	102	93.2	83.5	85.3			82.9	140
Thallium			mg/L				<0.0030					<0.0003				
Vanadium			mg/L			<0.001	<0.010		<0.001			<0.002				
Zinc	5	AO	mg/L			0.01	<0.030		0.015			0.0117				
VOCs																
1,1,1,2-Tetrachloroethane	5		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
1,1,1-Trichloroethane	200		µg/L			<0.2	<0.5		<0.2			<0.30	<0.30	0.0		
1,1,2,2-Tetrachloroethane	1		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
1,1,2-Trichloroethane	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
1,1-Dichloroethane	70		µg/L			<0.2	<0.5		<0.2			<0.30	<0.30	0.0		
1,1-Dichloroethylene	14		µg/L			<0.2	<0.5		<0.2			<0.30	<0.30	0.0		
1,2-Dibromoethane (EDB)	1		µg/L			<0.2	<0.5		<0.2							
1,2-Dichlorobenzene	3		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
1,2-Dichloroethane	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
1,2-Dichloropropane	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
1,3-Dichlorobenzene	630		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
1,4-Dichlorobenzene	5		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
2-Hexanone			µg/L				<20					<0.30	<0.30	0.0		
Acetone	3 000		µg/L				<20					<1.0	<1.0	0.0		
Benzene	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
Bromodichloromethane	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
Bromoform	5		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
Bromomethane	10		µg/L			<0.5	1.81		<0.5			<0.20	<0.20	0.0		
Carbon Tetrachloride	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
Chlorobenzene	30		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
Chloroethane			µg/L			<0.2	<1		<0.5			<0.20	<0.20	0.0		
Chloroform	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
Chloromethane			µg/L			<0.5	<1		<0.5			<0.40	<0.40	0.0		
cis-1,2-Dichloroethylene	70		µg/L			<0.2	<0.5		<0.2							
cis-1,3-Dichloropropene	1.4		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
Dibromochloromethane	5		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
Dichlorodifluoromethane			µg/L				<1		<0.5			<0.20	<0.20	0.0		
Dichloromethane(Methylene Chloride)	50		µg/L			<0.2	<0.5		<0.2							
Ethylbenzene	2.4		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
Methyl isobutyl ketone	350		µg/L				<20									
Methyl t-butyl ether (MTBE)	700		µg/L				<0.5									
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L				<20									
Styrene	100		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
Tetrachloroethylene	30		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
Toluene	24		µg/L			2.9	6.49		<0.2			<0.20	<0.20	0.0		
trans-1,2-Dichloroethylene	100		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
trans-1,3-Dichloropropene	1.4		µg/L			<0.2	<0.5		<0.2			<0.30	<0.30	0.0		
Trichloroethylene	5		µg/L			<0.2	<0.5		<0.2			<0.20	<0.20	0.0		
Trichlorofluoromethane (FREON 11)			µg/L			<0.5	<1		<0.5							
Vinyl Chloride	2		µg/L				<0.5					<0.17	<0.17	0.0		
Xylene, o-	300		µg/L			<0.2	<0.5		<0.2			<0.10	<0.10	0.0		
Xylene, *p-* + *m-*	300		µg/L			<0.2	<1		<0.2			<0.20	<0.20	0.0		
Xylenes (total)	300		µg/L			<0.2	<1.5		<0.2			<0.20	<0.20	0.0		
PAHs																
2-Methylnaphthalene			µg/L			<0.2	<0.02		<0.2							
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L									<0.20				
Acenaphthene	4.1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.10				
Acenaphthylene	1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.11				
Anthracene	2.4	Table 2	µg/L			<0.2	<0.02		<0.2			<0.05				
Benzo(a)anthracene	1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.08				
Benzo(a)pyrene	0.01	MAC	µg/L			<0.2	<0.005		<0.2			<0.01				
Benzo(b)fluoranthene	0.1	Table 2	µg/L			<0.2	<0.02		<0.2							
Benzo(b,j)fluoranthene			µg/L													
Benzo(g,h,i)perylene	0.2	Table 2	µg/L			<0.2	<0.02		<0.2			<0.06				
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L													
Benzo(k)fluoranthene	0.1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.05				
Chrysene	0.1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.05				
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L			<0.5	<0.02		<0.5			<0.09				
Fluoranthene	0.41	Table 2	µg/L			<0.2	<0.02		<0.2			<0.12				
Fluorene	120	Table 2	µg/L			<0.2	<0.02		<0.2			<0.09				
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L			<0.5	<0.02		<0.5			<0.06				
Naphthalene	11	Table 2	µg/L			<0.2	<0.02		<0.2			<0.12				
Phenanthrene	1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.10				
Pyrene	4.1	Table 2	µg/L			<0.2	<0.02		<0.2			<0.05				

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06	OW1B-06
			Sampling Date	2007/05/16	2007/05/16	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/03	2009/12/08	2011/01/07	2011/05/30	2011/07/06	2011/07/06	2011/07/06	2011/11/15
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Indicator	Lab Replicate	GW Comprehensive	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	MOE	GW Indicator	GW Indicator	GW Comprehensive	Lab Replicate	QA/QC Check	GW Indicator
Field Parameters																	
Conductivity			µS/cm										2140	1930			2440
pH	6.5-8.5	OG											7.54	7.42			7.37
Temperature			°C										10	10.8			12.3
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	768		791	651	708	762			787	830	792	792	0.0	872
Ammonia (as N)			mg/L	0.07	0.06	0.12	<0.05	0.065	<0.050		<0.05	<0.02	<0.02	<0.02			0.028
Biological Oxygen Demand (BOD_5)			mg/L			<2		<6.0						<5			
Calcium (Ca)			mg/L	100		88	70.9	77.3	78.9		65.3	79.3	76.7	68.1			80
Chemical Oxygen Demand (COD)			mg/L	18		4	64	18	18			7	<5	10			<5
Chloride (Cl)	250	AO	mg/L	28		27	19.2	27.1	19.5		18.1	18.6	18.3	18.1			16.3
Conductivity			µS/cm	2250		2060	1750	1960	2120			1910	2220	2050	2050	0.0	2540
Dissolved Organic Carbon (DOC)	5	AO	mg/L	7.8		0.5	64	6.8	4.9		5.1	9.3	4.64	4.3			7.6
Hardness ($CaCO_3$)	80-100	OG	mg/L			1400	923	1170			1300			1200			
Nitrate (as N)	10	MAC	mg/L	0.1		<0.1	<0.09	<1.0	<0.10		<0.005	<0.05	<0.1	<0.1			<0.25
Nitrite (as N)	1	MAC	mg/L			<0.01	<0.005	<1.0			<0.05			<0.1			
pH	6.5-8.5	OG		7.80		8	8.02	7.86	7.91			8	8.00	8.23	8.23	0.0	8.16
Phenol 4AAP			mg/L			<0.001	<0.0002	0.0019			<0.6			<0.001			
Potassium (K)			mg/L			7	3.86	<10			6.75			5.35			7.1
Sulphates (SO_4)	500	AO	mg/L	596		683		553	596		690	621	869	605			812
Total Dissolved Solids (TDS)	500	AO	mg/L	1330		1340		1370	1580		816	1700	1910	1680			1890
Total Kjeldahl Nitrogen (TKN)			mg/L			1.2	0.57	<0.15			0.3			0.18			
Total Phosphorus (P)			mg/L			0.27	0.2	0.192			0.12			0.088			
Total Suspended Solids (TSS)			mg/L			1500		405			2250			140			
Metals																	
Arsenic	0.025	IMAC	mg/L			0.001	<0.0005	<0.010			<0.001			<0.003			
Barium	1	MAC	mg/L	0.01		0.005	0.012	<0.10	0.013		0.015	0.015	0.016	0.0163			0.0157
Beryllium			mg/L			<0.0005	<0.001	<0.010			<0.001			<0.001			
Boron	5	IMAC	mg/L	0.069		0.087	0.075	<0.50	0.114		0.13	0.078	0.135	0.0828			0.158
Cadmium	0.005	MAC	mg/L			<0.0001	<0.001	<0.0010			<0.001			<0.0001			
Chromium	0.05	MAC	mg/L			<0.005	<0.002	<0.010			<0.002			<0.003			
Cobalt			mg/L			0.0013	<0.001	<0.0080			<0.001			0.00054			
Copper	1	AO	mg/L			0.002	<0.001	<0.010			<0.001			0.00244			
Iron	0.3	AO	mg/L	1.7		0.14	0.126	<0.50	0.231		<0.005	0.456	1.08	0.0231			0.069
Lead	0.01	MAC	mg/L			<0.0005	<0.005	<0.010			<0.005			<0.001			
Magnesium			mg/L	260		300	217	238	256		287	281	298	250			316
Manganese	0.05	AO	mg/L			0.085	0.048	0.017			0.042			0.0179			
Mercury	0.001	MAC	mg/L			<0.0001	<0.02	<0.00010			<0.02			<0.00005			
Molybdenum			mg/L			0.012	<0.005	<0.010			<0.005			0.0064			
Nickel			mg/L			0.001	<0.006	<0.020			<0.006			<0.003			
Silver			mg/L			<0.0001	<0.003	<0.0010			<0.003			<0.0001			
Sodium	200	AO	mg/L	93		110	84.7	82.4	89.6		103	97.5	104	88.2			109
Thallium			mg/L			<0.00005		<0.0030						<0.0003			
Vanadium			mg/L			0.002	<0.001	<0.010			<0.001			<0.002			
Zinc	5	AO	mg/L			<0.005	0.022	<0.030			<0.009			0.0425			
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
1,1,1-Trichloroethane	200		µg/L			<0.1	<0.2	<0.5		<0.2				<0.30	< 0.30	0.0	
1,1,2,2-Tetrachloroethane	1		µg/L			<0.1	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
1,1,2-Trichloroethane	5		µg/L			<0.2	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
1,1-Dichloroethane	70		µg/L			<0.1	<0.2	<0.5		<0.2				<0.30	< 0.30	0.0	
1,1-Dichloroethylene	14		µg/L			<0.1	<0.2	<0.5		<0.2				<0.30	< 0.30	0.0	
1,2-Dibromoethane (EDB)	1		µg/L			<0.2	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
1,2-Dichlorobenzene	3		µg/L			<0.2	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
1,2-Dichloroethane	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
1,2-Dichloropropane	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
1,3-Dichlorobenzene	630		µg/L			<0.2	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
1,4-Dichlorobenzene	5		µg/L			<0.2	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
2-Hexanone			µg/L			<5		<20						<0.30	< 0.30	0.0	
Acetone	3 000		µg/L			<10		<20						<1.0	< 1.0	0.0	
Benzene	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
Bromodichloromethane	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
Bromoform	5		µg/L			<0.2	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
Bromomethane	10		µg/L			<0.5	<0.5	3.21		<0.5				<0.20	< 0.20	0.0	
Carbon Tetrachloride	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
Chlorobenzene	30		µg/L			<0.1	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
Chloroethane			µg/L			<0.2	<0.5	<1		<0.5				<0.20	< 0.20	0.0	
Chloroform	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
Chloromethane			µg/L			<0.5	<0.5	<1		<0.5				<0.40	< 0.40	0.0	
cis-1,2-Dichloroethylene	70		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
cis-1,3-Dichloropropene	1.4		µg/L			<0.2	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
Dibromochloromethane	5		µg/L			<0.2	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
Dichlorodifluoromethane			µg/L					<1		<0.5				<0.20	< 0.20	0.0	
Dichloromethane(Methylene Chloride)	50		µg/L			<0.5	<0.2	<0.5		<0.2				<0.30	< 0.30	0.0	
Ethylbenzene	2.4		µg/L			<0.1	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
Methyl isobutyl ketone	350		µg/L			<5		<20						<1.0	< 1.0	0.0	
Methyl t-butyl ether (MTBE)	700		µg/L			<0.2		<0.5						<0.20	< 0.20	0.0	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L			<5		<20						<1.0	< 1.0	0.0	
Styrene	100		µg/L			<0.1	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
Tetrachloroethylene	30		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
Toluene	24		µg/L			<0.2	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
trans-1,2-Dichloroethylene	100		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
trans-1,3-Dichloropropene	1.4		µg/L			<0.2	<0.2	<0.5		<0.2				<0.30	< 0.30	0.0	
Trichloroethylene	5		µg/L			<0.1	<0.2	<0.5		<0.2				<0.20	< 0.20	0.0	
Trichlorofluoromethane (FREON 11)			µg/L			<0.2	<0.5	<1		<0.5				<0.40	< 0.40	0.0	
Vinyl Chloride	2		µg/L			<0.2		<0.5						<0.17	< 0.17	0.0	
Xylene, *o*-	300		µg/L			<0.1	<0.2	<0.5		<0.2				<0.10	< 0.10	0.0	
Xylene, *p*- + *m*-	300		µg/L			<0.1	<0.2	<1		<0.2				<0.20	< 0.20	0.0	
Xylenes (total)	300		µg/L			<0.1	<0.2	<1.5		<0.2				<0.20	< 0.20	0.0	
PAHs																	
2-Methylnaphthalene			µg/L				<0.2	0.022	<0.02		<0.2						
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L											<0.20			
Acenaphthene	4.1	Table 2	µg/L			<0.05	<0.2	<0.02	<0.02		<0.2			<0.10			
Acenaphthylene	1	Table 2	µg/L			<0.05	<0.2	<0.02	<0.02		<0.2			<0.11			
Anthracene	2.4	Table 2	µg/L			<0.05	<0.2	0.023	<0.02		<0.2			<0.05			
Benzo(a)anthracene	1	Table 2	µg/L			0.1	<0.2	0.031	<0.02		<0.2			<0.08			
Benzo(a)pyrene	0.01	MAC	µg/L			0.06	<0.2	0.0296	0.011		<0.2			<0.01			
Benzo(b)fluoranthene	0.1	Table 2	µg/L				<0.2	0.028	<0.02		<0.2			<0.05			
Benzo(b,j)fluoranthene			µg/L			0.1											
Benzo(g,h,i)perylene	0.2	Table 2	µg/L			<0.1	<0.2	0.024	<0.02		<0.2			<0.06			
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L			<0.05	<0.2	<0.02	<0.02		<0.2			<0.05			
Chrysene	0.1	Table 2	µg/L			0.1	<0.2	0.05	0.024		<0.2			<0.05			
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L			<0.1	<0.5	<0.02	<0.02		<0.5			<0.09			
Fluoranthene	0.41	Table 2	µg/L			0.1	<0.2	0.039	0.022		<0.2			<0.12			
Fluorene	120	Table 2	µg/L			<0.05	<0.2	<0.02	<0.02		<0.2			<0.09			
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L			<0.1	<0.5	<0.02	<0.02		<0.5			<0.06			
Naphthalene	11	Table 2	µg/L			0.1	<0.2	<0.02	<0.02		<0.2			<0.12			
Phenanthrene	1	Table 2	µg/L			0.1	<0.2	0.053	0.023		<0.2			<0.10			
Pyrene	4.1	Table 2	µg/L			0.1	<0.2	0.038	0.021		<0.2			<0.05			

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard			Sample Location	OW1B-85	OW1B-85	OW1B-85	OW1B-85	OW1B-85	OW1B-85	OW1B-85	OW3B-07	OW3B-07	OW3B-07	OW3B-07	OW3B-07	OW3B-07	OW3B-07
				Sampling Date	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2007/05/16	2007/07/31	2009/07/23	2009/11/25	2009/12/03	2009/12/04	2009/12/08
	ODWQS			Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Indicator	GW Comprehensive	GW Comprehensive	GW Indicator + GW PAH	MOE	MOE	MOE
Field Parameters																		
Conductivity			µS/cm															
pH	6.5-8.5	OG																
Temperature			°C															
General																		
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	342	456	277	325	418	440	544	402	423	438	428				380
Ammonia (as N)			mg/L	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	0.15	0.53	0.58	0.083	0.19				0.28
Biological Oxygen Demand (BOD_5)			mg/L	<3			<2			<2		<2	<6.0					
Calcium (Ca)			mg/L	66	103	110	67	110	100	120	240	270	209	198				177
Chemical Oxygen Demand (COD)			mg/L	16	56	11	25	13	12	<4	48	29	33	44				42
Chloride (Cl)	250	AO	mg/L	19.4	6.55	7.9	4	7	10	12	19	19	<20	14.1				15
Conductivity			µS/cm	621	1220	613	712	1010	1080	1260	1230	1170	1080	1070				1020
Dissolved Organic Carbon (DOC)	5	AO	mg/L	5.5	4.3	2.6	5.2	3.1	3.2	3.2	17.5	13.4	15	10.1				11.7
Hardness ($CaCO_3$)	80-100	OG	mg/L	327			373			570		770	612					519
Nitrate (as N)	10	MAC	mg/L	<1	0.3	<1	1.7	3.4	1.3	0.1	<0.1	<0.1	<1.0	<0.10				<0.005
Nitrite (as N)	1	MAC	mg/L	<0.1			<0.3			<0.3		<0.01	<1.0					<0.13
pH	6.5-8.5	OG		8.01	8.04	8.11	8.23	8.23	8	8	7.8	7.7	7.52	7.55				7.66
Phenol 4AAP			mg/L	<0.001			<0.001			8		<0.001	0.0013					0.001
Potassium (K)			mg/L	1.8			1.5			1.9		4.9	<10					3.14
Sulphates (SO_4)	500	AO	mg/L	43.9	264	48	92.3	150	194	176	251	256	194	183				195
Total Dissolved Solids (TDS)	500	AO	mg/L	320	786	595	768	770	701	812	745	728	750	754				785
Total Kjeldahl Nitrogen (TKN)			mg/L	0.9			2			0.3		2	0.74					0.92
Total Phosphorus (P)			mg/L	0.39			1.2			0.36		0.45	0.22					0.23
Total Suspended Solids (TSS)			mg/L	1110			680			500		840	377					236
Metals																		
Arsenic	0.025	IMAC	mg/L	<0.0014	<0.0002		<0.001			<0.001		0.004	<0.010					<0.0015
Barium	1	MAC	mg/L	0.056	0.318	0.05	0.045	0.087	0.085	0.095	0.053	0.028	0.1	0.142				0.154
Beryllium			mg/L	<0.0014	<0.0002		<0.0005			<0.0005		<0.0005	<0.010					<0.001
Boron	5	IMAC	mg/L	0.027	0.249	0.02	0.018	0.027	0.013	0.017	0.042	0.032	<0.50	<0.050				0.04
Cadmium	0.005	MAC	mg/L	<0.001	<0.0002		<0.0001			<0.0001		<0.0001	<0.0010					<0.001
Chromium	0.05	MAC	mg/L	<0.0016	<0.0004		<0.005			<0.005		<0.005	<0.010					<0.002
Cobalt			mg/L	<0.001	0.0006		<0.0005			<0.0005		0.0026	<0.0080					<0.001
Copper	1	AO	mg/L	<0.003	0.0041		0.0023			0.002		<0.001	<0.010					<0.001
Iron	0.3	AO	mg/L	0.041	0.212	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	6	4.22	1.7				0.484
Lead	0.01	MAC	mg/L	0.0028	<0.0004		<0.0002			<0.0005		<0.0005	<0.010					<0.005
Magnesium			mg/L	43	104	40	22	74	66	68	23	24	22.3	19.8				19.3
Manganese	0.05	AO	mg/L	0.013	0.139		<0.002			0.003		0.82	0.6					0.295
Mercury	0.001	MAC	mg/L	<0.0001	<0.0001		<0.0001			<0.0001		<0.0001	<0.00010					
Molybdenum			mg/L	<0.0014	0.0014		<0.001			<0.001		0.023	<0.010					<0.005
Nickel			mg/L	<0.001	<0.0002		<0.001			<0.001		0.006	<0.020					<0.006
Silver			mg/L	<0.0006	<0.0002		<0.0005			<0.0001		<0.0001	<0.0010					<0.003
Sodium	200	AO	mg/L	14	57.8	12	8.4	30	32	34	18	18	17.6	16.5				16.3
Thallium			mg/L	<0.001	<0.0002		<0.00005			<0.00005		<0.00005	<0.0030					
Vanadium			mg/L	<0.001	0.0014		<0.001			<0.001		<0.001	<0.010					<0.001
Zinc	5	AO	mg/L	0.021	0.501		<0.005			<0.005		0.007	<0.030					0.012
VOCs																		
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
1,1,1-Trichloroethane	200		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
1,1,2,2-Tetrachloroethane	1		µg/L	<1			<0.1			<0.1		<0.1	<0.5		<0.2			
1,1,2-Trichloroethane	5		µg/L	<0.5			<0.2			<0.2		<0.2	<0.5		<0.2			
1,1-Dichloroethane	70		µg/L	<0.4			<0.1			<0.1		<0.1	<0.5		<0.2			
1,1-Dichloroethylene	14		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
1,2-Dibromoethane (EDB)	1		µg/L	<0.5			<0.2			<0.2		<0.2	<0.5		<0.2			
1,2-Dichlorobenzene	3		µg/L	<0.5			<0.1			<0.2		<0.2	<0.5		<0.2			
1,2-Dichloroethane	5		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
1,2-Dichloropropane	5		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
1,3-Dichlorobenzene	630		µg/L	<0.5			<0.1			<0.2		<0.2	<0.5		<0.2			
1,4-Dichlorobenzene	5		µg/L	<0.5			<0.1			<0.2		<0.2	<0.5		<0.2			
2-Hexanone			µg/L	<10			<5			<5		<5	<20					
Acetone	3 000		µg/L	<10			<10			<10		<10	<20					
Benzene	5		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Bromodichloromethane	5		µg/L	<0.2			<0.1			<0.1		<0.1	<0.5		<0.2			
Bromoform	5		µg/L	<0.2			<0.2			<0.2		<0.2	<0.5		<0.2			
Bromomethane	10		µg/L	<3			<0.5			<0.5		<0.5	2.09		<0.5			
Carbon Tetrachloride	5		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Chlorobenzene	30		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Chloroethane			µg/L	<1			<0.2			<0.2		<0.2	<1		<0.5			
Chloroform	5		µg/L	<0.2			<0.1			<0.1		<0.1	<0.5		<0.2			
Chloromethane			µg/L	<2			<0.5			<0.5		<0.5	<1		<0.5			
cis-1,2-Dichloroethylene	70		µg/L	<1			<0.1			<0.1		<0.1	<0.5		<0.2			
cis-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2			<0.2		<0.2	<0.5		<0.2			
Dibromochloromethane	5		µg/L	<0.2			<0.2			<0.2		<0.2	<0.5		<0.2			
Dichlorodifluoromethane			µg/L										<1		<0.5			
Dichloromethane(Methylene Chloride)	50		µg/L	<1			<0.5			<0.5		<0.5	<0.5		<0.2			
Ethylbenzene	2.4		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Methyl isobutyl ketone	350		µg/L	<10			<5			<5		<5	<20					
Methyl t-butyl ether (MTBE)	700		µg/L	<2			<0.2			<0.2		<0.2	0.5					
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<15			<5			<5		<5	<20					
Styrene	100		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Tetrachloroethylene	30		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Toluene	24		µg/L	<0.5			<0.2			<0.2		<0.2	<0.5		<0.2			
trans-1,2-Dichloroethylene	100		µg/L	<1			<0.1			<0.1		<0.1	<0.5		<0.2			
trans-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2			<0.2		<0.2	<0.5		<0.2			
Trichloroethylene	5		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Trichlorofluoromethane (FREON 11)			µg/L	<2			<0.2					<0.2	<1		<0.5			
Vinyl Chloride	2		µg/L	<0.2			<0.2			<0.2		<0.2	<0.5					
Xylene, *o*-	300		µg/L	<0.5			<0.1			<0.1		<0.1	<0.5		<0.2			
Xylene, *p*- + *m*-	300		µg/L	<0.5			<0.1			<0.1		<0.1	<1		<0.2			
Xylenes (total)	300		µg/L	<1			<0.1			<0.1		<0.1	<1.5		<0.2			
PAHs																		
2-Methylnaphthalene			µg/L										<0.02	<0.02		<0.2		
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L															
Acenaphthene	4.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		<0.05	<0.02	<0.02		<0.2		
Acenaphthylene	1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		<0.05	<0.02	<0.02		<0.2		
Anthracene	2.4	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		<0.05	<0.02	<0.02		<0.2		
Benzo(a)anthracene	1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		0.05	<0.02	<0.02		<0.2		
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01			0.01	<0.01		<0.01		0.04	<0.005	0.0098		<0.2		
Benzo(b)fluoranthene	0.1	Table 2	µg/L										<0.02	<0.02		<0.2		
Benzo(b,j)fluoranthene			µg/L	<0.05			<0.05	<0.05		<0.05		0.07						
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1		<0.1	<0.02	<0.02		<0.2		
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L															
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		<0.05	<0.02	<0.02		<0.2		
Chrysene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		0.07	<0.02	0.048		<0.2		
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1		<0.1	<0.02	<0.02		<0.5		
Fluoranthene	0.41	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		0.1	<0.02	0.043		<0.2		
Fluorene	120	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		<0.05	<0.02	<0.02		<0.2		
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1		<0.1	<0.02	<0.02		<0.5		
Naphthalene	11	Table 2	µg/L	<0.05			<0.05	<0.05		0.07		0.2	<0.02	<0.02		<0.2		
Phenanthrene	1	Table 2	µg/L	<0.05			0.05	<0.05		<0.05		0.2	0.033	0.093		<0.2		
Pyrene	4.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05		0.1	<0.02	0.049		<0.2		

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	OW3B-07	OW3B-07	OW3B-07	OW3B-07	OW3B-07	OW3B-07	OW3B-85	OW3B-85	OW3B-85	OW3B-85	OW3B-85	OW3B-85	OW4B-91	OW4B-91
			Sampling Date	2011/01/07	2011/05/30	2011/07/06	2011/07/06	2011/07/06	2011/11/14	2004/06/07	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2004/06/07	2004/11/29
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Indicator	GW Indicator	GW Comprehensive	Lab Replicate	QA/QC Check	GW Indicator	GW Comprehensive	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Comprehensive	GW Indicator + Metals
Field Parameters																	
Conductivity			µS/cm		987	1150			1220								
pH	6.5-8.5	OG			6.95	7.07			7.05								
Temperature			°C		11.4	13.6			13.3								
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	433	436	431			438	395	375	420	231	388	484	1220	840
Ammonia (as N)			mg/L	0.06	0.113	<0.02			0.098	<0.05	<0.05	<0.05	<0.05	0.54	0.17	2.22	1.42
Biological Oxygen Demand (BOD_5)			mg/L			<5				<3		<2			4	238	
Calcium (Ca)			mg/L	223	210	215			216	130	120	130	71	110	140	340	320
Chemical Oxygen Demand (COD)			mg/L	25	7.54	23			12	5	8	9	22	23	18	1280	12200
Chloride (Cl)	250	AO	mg/L	13.8	14.2	14.1	14.1	0.0	13.6	22.1	8.2	10.3	5	6	13	243	161
Conductivity			µS/cm	1020	1010	1080			1170	727	785	804	492	710	899	2180	2520
Dissolved Organic Carbon (DOC)	5	AO	mg/L	10	9.4	11.5			10	3.5	1.9	3	6.3	3.4	5.4	72.9	78.4
Hardness ($CaCO_3$)	80-100	OG	mg/L			623				382		438			460	1080	
Nitrate (as N)	10	MAC	mg/L	0.18	0.162	0.265	0.265	0.0	<0.25	<1	<1	<0.2	0.1	<0.2	<0.2	<5	<0.1
Nitrite (as N)	1	MAC	mg/L			<0.05	<0.05	0.0		<0.1		<0.3			<0.3	**<2**	
pH	6.5-8.5	OG		7.76	7.4	8.07			7.95	7.92	8.02	8.08	8.23	8.2	7.8	7.25	7.02
Phenol 4AAP			mg/L			<0.001				<0.001		<0.001			<0.001	0.054	
Potassium (K)			mg/L			2.12			2.18	1.4		0.84			0.79	5.5	
Sulphates (SO_4)	500	AO	mg/L	203	201	200	200	0.0	204	45.1	51	48.6	34	31	41	<25	<0.5
Total Dissolved Solids (TDS)	500	AO	mg/L	800	826	842			772	439	738	514	370	460	557	1320	1490
Total Kjeldahl Nitrogen (TKN)			mg/L			0.44				0.7		0.6			0.2	12.5	
Total Phosphorus (P)			mg/L			0.306				0.13		0.156			0.17	0.5	
Total Suspended Solids (TSS)			mg/L			460				274		270			250	2600	
Metals																	
Arsenic	0.025	IMAC	mg/L			<0.003				<0.0014		<0.001			0.001	<0.0014	0.0015
Barium	1	MAC	mg/L	0.133	0.118	0.139			0.121	0.049	0.058	0.054	0.034	0.048	0.056	0.18	0.17
Beryllium			mg/L			<0.001				<0.0014		<0.0005			<0.0005	<0.0014	<0.0014
Boron	5	IMAC	mg/L	0.033	0.0346	0.0324			0.0341	0.02	0.01	<0.01	0.01	<0.01	<0.01	0.1	0.1
Cadmium	0.005	MAC	mg/L			<0.0001				<0.001		<0.0001			<0.0001	<0.001	<0.001
Chromium	0.05	MAC	mg/L			<0.003				<0.0016		<0.005			<0.005	<0.0016	0.0063
Cobalt			mg/L			0.00089				<0.001		0.0008			<0.0005	0.002	0.002
Copper	1	AO	mg/L			0.00541				<0.003		0.0014			0.001	<0.003	0.006
Iron	0.3	AO	mg/L	0.131	0.408	<0.01			0.0285	1.5	<0.05	1	<0.05	0.64	1.3	26	26
Lead	0.01	MAC	mg/L			<0.001				0.0023		0.0006			<0.0005	0.0027	<0.0022
Magnesium			mg/L	21.9	21.2	21			21.3	30	25	29	12	24	29	130	120
Manganese	0.05	AO	mg/L			0.165				0.17		0.12			0.11	3.3	2
Mercury	0.001	MAC	mg/L			<0.00005				<0.0001		<0.0001			<0.0001	0.0002	<0.0001
Molybdenum			mg/L			0.0028				<0.0014		<0.001			<0.001	<0.0014	<0.0014
Nickel			mg/L			0.006				<0.001		<0.001			<0.001	0.007	<0.001
Silver			mg/L			<0.0001				<0.0006		<0.0005			<0.0001	<0.0006	<0.0006
Sodium	200	AO	mg/L	19	19.4	18.5			19.5	16	14	13	6.1	9.3	11	85	79
Thallium			mg/L			<0.0003				<0.001		<0.00005			<0.00005	<0.001	<0.001
Vanadium			mg/L			<0.002				<0.001		<0.001			<0.001	0.003	0.005
Zinc	5	AO	mg/L			0.128				0.03		0.01			0.006	0.009	0.028
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L			<0.10				<0.5		<0.1			<0.1	<40	
1,1,1-Trichloroethane	200		µg/L			<0.30				<0.5		<0.1			<0.1	<50	
1,1,2,2-Tetrachloroethane	1		µg/L			<0.10				<1		<0.1			<0.1	<50	
1,1,2-Trichloroethane	5		µg/L			<0.20				<0.5		<0.2			<0.2	<50	
1,1-Dichloroethane	70		µg/L			<0.30				<0.4		<0.1			<0.1	<50	
1,1-Dichloroethylene	14		µg/L			<0.30				<0.5		<0.1			<0.1	<100	
1,2-Dibromoethane (EDB)	1		µg/L			<0.20				<0.5		<0.2			<0.2	<50	
1,2-Dichlorobenzene	3		µg/L			<0.10				<0.5		<0.1			<0.2	<50	
1,2-Dichloroethane	5		µg/L			<0.20				<0.5		<0.1			<0.1	<50	
1,2-Dichloropropane	5		µg/L			<0.20				<0.5		<0.1			<0.1	<100	
1,3-Dichlorobenzene	630		µg/L			<0.10				<0.5		<0.1			<0.2	<100	
1,4-Dichlorobenzene	5		µg/L			<0.10				<0.5		<0.1			<0.2	<50	
2-Hexanone			µg/L			<0.30				<10		<5			<5	<50	
Acetone	3 000		µg/L			<1.0				<10		<10			<10	<14	
Benzene	5		µg/L			<0.20				<0.5		<0.1			<0.1	<14	
Bromodichloromethane	5		µg/L			<0.20				<0.2		<0.1			<0.1	<50	
Bromoform	5		µg/L			<0.10				<0.2		<0.2			<0.2	<1000	
Bromomethane	10		µg/L			<0.20				<3		<0.5			<0.5	<1000	
Carbon Tetrachloride	5		µg/L			<0.20				<0.5		<0.1			<0.1	<20	
Chlorobenzene	30		µg/L			<0.10				<0.5		<0.1			<0.1	<20	
Chloroethane			µg/L			<0.20				<1		<0.2			<0.2	<300	
Chloroform	5		µg/L			<0.20				<0.2		<0.1			<0.1		
Chloromethane			µg/L			<0.40				<2		<0.5			<0.5	<50	
cis-1,2-Dichloroethylene	70		µg/L			<0.20				<1		<0.1			<0.1	<50	
cis-1,3-Dichloropropene	1.4		µg/L			<0.20				<0.14		<0.2			<0.2	<100	
Dibromochloromethane	5		µg/L			<0.10				<0.2		<0.2			<0.2	<20	
Dichlorodifluoromethane			µg/L			<0.20										<200	
Dichloromethane(Methylene Chloride)	50		µg/L			<0.30				<1		<0.5			<0.5	<20	
Ethylbenzene	2.4		µg/L			<0.10				<0.5		<0.1			<0.1		
Methyl isobutyl ketone	350		µg/L			<1.0				<10		<5			<5	<100	
Methyl t-butyl ether (MTBE)	700		µg/L			<0.20				<2		<0.2			<0.2	1300	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L			<1.0				<15		<5			<5	<1500	
Styrene	100		µg/L			<0.10				<0.5		<0.1			<0.1	<200	
Tetrachloroethylene	30		µg/L			<0.20				<0.5		<0.1			<0.1	<1000	
Toluene	24		µg/L			<0.20				<0.5		<0.2			<0.2	<50	
trans-1,2-Dichloroethylene	100		µg/L			<0.20				<1		<0.1			<0.1	<50	
trans-1,3-Dichloropropene	1.4		µg/L			<0.30				<0.14		<0.2			<0.2	<50	
Trichloroethylene	5		µg/L			<0.20				<0.5		<0.1			<0.1	<50	
Trichlorofluoromethane (FREON 11)			µg/L			<0.40				<2		<0.2				<200	
Vinyl Chloride	2		µg/L			<0.17				<0.2		<0.2			<0.2	<20	
Xylene, *o*-	300		µg/L			<0.10				<0.5		<0.1			<0.1	2000	
Xylene, *p*- + *m*-	300		µg/L			<0.20				<0.5		<0.1			<0.1	2000	
Xylenes (total)	300		µg/L			<0.20				<1		<0.1			<0.1	4000	
PAHs																	
2-Methylnaphthalene			µg/L														
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L			<0.20											
Acenaphthene	4.1	Table 2	µg/L			<0.10				<0.05		<0.05			<0.05	<500	
Acenaphthylene	1	Table 2	µg/L			<0.11				<0.05		<0.05			<0.05	<500	
Anthracene	2.4	Table 2	µg/L			<0.05				<0.05		<0.05			<0.05	<500	
Benzo(a)anthracene	1	Table 2	µg/L			<0.08				<0.05		<0.05			<0.05	2790	
Benzo(a)pyrene	0.01	MAC	µg/L			<0.01				<0.01		<0.01			<0.01	<100	
Benzo(b)fluoranthene	0.1	Table 2	µg/L			<0.05											
Benzo(b,j)fluoranthene			µg/L							<0.05		<0.05			<0.05	<500	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L			<0.06				<0.1		<0.1			<0.1	<1000	
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L			<0.05				<0.05		<0.05			<0.05	<500	
Chrysene	0.1	Table 2	µg/L			<0.05				<0.05		<0.05			<0.05	<500	
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L			<0.09				<0.1		<0.1			<0.1	<1000	
Fluoranthene	0.41	Table 2	µg/L			<0.12				<0.05		<0.05			<0.05	<500	
Fluorene	120	Table 2	µg/L			<0.09				<0.05		<0.05			<0.05	<500	
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L			<0.06				<0.1		<0.1			<0.1	<1000	
Naphthalene	11	Table 2	µg/L			<0.12				<0.05		<0.05			<0.05	145000	
Phenanthrene	1	Table 2	µg/L			<0.10				<0.05		<0.05			<0.05	18000	
Pyrene	4.1	Table 2	µg/L			<0.05				<0.05		<0.05			<0.05	3020	

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	OW4B-91	OW4B-91	OW4B-91	OW4B-91	OW4B-91	OW4B-91	OW4B-91	OW4B-91	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06
			Sampling Date	2005/05/09	2005/07/28	2005/12/01	2005/12/01	2006/05/29	2006/07/19	2006/12/11	2006/12/11	2006/12/11	2007/05/16	2007/05/16	2007/07/31	2007/07/31	2009/04/30
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	Field Duplicate	GW Indicator	GW Comprehensive	GW Indicator	Lab Replicate	GW Indicator	GW Indicator	Lab Replicate	GW Comprehensive	Lab Replicate	MOE
Field Parameters																	
Conductivity			µS/cm														
pH	6.5-8.5	OG															
Temperature			°C														
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	1110	1140	1210	1220	1280	1220	1130		740	722		816		742
Ammonia (as N)			mg/L	0.89	1.9	2.86	2.86	1.17	2.2	3.37		0.11	<0.05		0.14		0.53
Biological Oxygen Demand (BOD_5)			mg/L		170				500						<2		
Calcium (Ca)			mg/L	330	300	310	310	320	310	330		170	72		84		63.6
Chemical Oxygen Demand (COD)			mg/L	1200	550	280	380	290	1100	1100		38	19		10		32
Chloride (Cl)	250	AO	mg/L	149	159	149	148	150	155	150	150	11	18		20		7.8
Conductivity			µS/cm	2350	2150	2340	2340	2260	2270	2150		2490	1910		1860		1610
Dissolved Organic Carbon (DOC)	5	AO	mg/L	55	57.3	54.4	56.6	69	60.4	65		8	7.6	7.6	7.4		32
Hardness ($CaCO_3$)	80-100	OG	mg/L		1200				1200						1300		814
Nitrate (as N)	10	MAC	mg/L	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1		<0.1		<0.05
Nitrite (as N)	1	MAC	mg/L		<0.3				<0.3						0.02		<0.005
pH	6.5-8.5	OG		7.52	7.45	7.41	7.33	7	7.5	7.70		8.10	7.9		8		7.94
Phenol 4AAP			mg/L		0.007				0.04						<0.001		<0.0002
Potassium (K)			mg/L		4.6				4.7						6.4		8.07
Sulphates (SO_4)	500	AO	mg/L	<5	8	<5	<5	<5	<5	<10	<10	876	408		443		269
Total Dissolved Solids (TDS)	500	AO	mg/L	1880	1530	1310	1500	1470	1440	1210		1360	1050		1030	1160	1180
Total Kjeldahl Nitrogen (TKN)			mg/L		2.7				3.5						0.8		0.7
Total Phosphorus (P)			mg/L		0.27				0.38						0.16		0.12
Total Suspended Solids (TSS)			mg/L		700				1300						380	390	303
Metals																	
Arsenic	0.025	IMAC	mg/L		0.0015				0.002						0.003		<0.001
Barium	1	MAC	mg/L	0.16	0.17	0.15	0.12	0.16	0.16	0.18		0.02	0.015		0.016		0.023
Beryllium			mg/L		<0.0005				<0.0005						<0.0005		<0.001
Boron	5	IMAC	mg/L	0.09	0.1	0.12	0.094	0.092	0.13	0.13		0.31	0.046		0.055		0.055
Cadmium	0.005	MAC	mg/L		<0.0001				<0.0001						<0.0001		<0.001
Chromium	0.05	MAC	mg/L		0.0056				<0.005						<0.005		<0.002
Cobalt			mg/L		0.0016				0.0015						0.0008		<0.003
Copper	1	AO	mg/L		<0.001				0.002						<0.001		<0.001
Iron	0.3	AO	mg/L	25	26	10	0.61	23	24	25		<0.05	<0.05		1.9		0.268
Lead	0.01	MAC	mg/L		0.0002				<0.0005						<0.0005		<0.005
Magnesium			mg/L	110	110	110	110	110	100	110		280	230		270		177
Manganese	0.05	AO	mg/L		2.2				2.2						0.19		0.076
Mercury	0.001	MAC	mg/L		<0.0001				<0.0001						<0.0001		<0.02
Molybdenum			mg/L		<0.001				0.002						0.01		<0.006
Nickel			mg/L		0.0012				<0.001						0.001		<0.006
Silver			mg/L		<0.0005				<0.0001						<0.0001		<0.003
Sodium	200	AO	mg/L	78	71	75	73	72	71	76		100	98		120		118
Thallium			mg/L		<0.001				<0.00005						<0.00005		
Vanadium			mg/L		0.0041				0.003						<0.001		<0.001
Zinc	5	AO	mg/L		0.072				0.01						<0.005		<0.003
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<20				<50						<0.1		<0.2
1,1,1-Trichloroethane	200		µg/L		<20				<50						<0.1		<0.2
1,1,2,2-Tetrachloroethane	1		µg/L		<20				<50						<0.1		<0.2
1,1,2-Trichloroethane	5		µg/L		<20				<50						<0.2		<0.2
1,1-Dichloroethane	70		µg/L		<40				<100						<0.1		<0.2
1,1-Dichloroethylene	14		µg/L		<20				<50						<0.1		<0.2
1,2-Dibromoethane (EDB)	1		µg/L		<40				<100						<0.2		<0.2
1,2-Dichlorobenzene	3		µg/L		<20				<100						<0.2		<0.2
1,2-Dichloroethane	5		µg/L		<20				<50						<0.1		<0.2
1,2-Dichloropropane	5		µg/L		<20				<50						<0.1		<0.2
1,3-Dichlorobenzene	630		µg/L		<20				<50						<0.2		<0.2
1,4-Dichlorobenzene	5		µg/L		<20				<50						<0.2		<0.2
2-Hexanone			µg/L		<20				<100						<5		
Acetone	3 000		µg/L		<40				<100						<10		
Benzene	5		µg/L		<40				<100						<0.1		<0.2
Bromodichloromethane	5		µg/L		<20				<100						<0.1		<0.2
Bromoform	5		µg/L		<1000				<3000						<0.2		<0.2
Bromomethane	10		µg/L		<2000				<5000						<0.5		<0.5
Carbon Tetrachloride	5		µg/L		<20				<50						<0.1		<0.2
Chlorobenzene	30		µg/L		<40				<100						<0.1		<0.2
Chloroethane			µg/L		<100				<300						<0.2		<0.5
Chloroform	5		µg/L												<0.1		<0.2
Chloromethane			µg/L		<20				<50						<0.5		<0.5
cis-1,2-Dichloroethylene	70		µg/L		<20				<50						<0.1		<0.2
cis-1,3-Dichloropropene	1.4		µg/L		<40				<100						<0.2		<0.2
Dibromochloromethane	5		µg/L		<20				<50						<0.2		<0.2
Dichlorodifluoromethane			µg/L		<100				<300								
Dichloromethane(Methylene Chloride)	50		µg/L		<40				<100						<0.5		<0.2
Ethylbenzene	2.4		µg/L												<0.1		<0.2
Methyl isobutyl ketone	350		µg/L		<100				<300						<5		
Methyl t-butyl ether (MTBE)	700		µg/L		1800				1800						<0.2		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<1000				<3000						<5		
Styrene	100		µg/L		<40				<100						<0.1		<0.2
Tetrachloroethylene	30		µg/L		<1000				<3000						<0.1		<0.2
Toluene	24		µg/L		89				<90						<0.2		<0.2
trans-1,2-Dichloroethylene	100		µg/L		<20				<50						<0.1		<0.2
trans-1,3-Dichloropropene	1.4		µg/L		60				<100						<0.2		<0.2
Trichloroethylene	5		µg/L		<20				<50						<0.1		<0.2
Trichlorofluoromethane (FREON 11)			µg/L		<40										<0.2		<0.5
Vinyl Chloride	2		µg/L		<40				<100						<0.2		
Xylene, o-	300		µg/L		2590				2900						<0.1		<0.2
Xylene, *p-* + *m-*	300		µg/L		2390				3200						<0.1		<0.2
Xylenes (total)	300		µg/L		4980				6100						<0.1		<0.2
PAHs																	
2-Methylnaphthalene			µg/L														<0.2
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L	579	<3	<3			<50						<0.05		<0.2
Acenaphthylene	1	Table 2	µg/L	<5	160	<3			2900						<0.05		<0.2
Anthracene	2.4	Table 2	µg/L	<5	480	630			8800						<0.05		<0.2
Benzo(a)anthracene	1	Table 2	µg/L	878	230	330			3400						<0.05		<0.2
Benzo(a)pyrene	0.01	MAC	µg/L	361	94	130			1100						<0.01		<0.2
Benzo(b)fluoranthene	0.1	Table 2	µg/L														<0.2
Benzo(b,j)fluoranthene			µg/L	340					840						<0.05		
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	331	96	110			1200						<0.1		<0.2
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	51.3	10	15			140						<0.05		<0.2
Chrysene	0.1	Table 2	µg/L	641	82	140			1700						<0.05		<0.2
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	46	12	16			120						<0.1		<0.5
Fluoranthene	0.41	Table 2	µg/L	975	280	420			3800						<0.05		<0.2
Fluorene	120	Table 2	µg/L	2100	710	1000			<50						<0.05		<0.2
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	76	23	29			250						<0.1		<0.5
Naphthalene	11	Table 2	µg/L	57000	15000	18000			140000						0.06		<0.2
Phenanthrene	1	Table 2	µg/L	7060	1200	1500			25000						<0.05		<0.2
Pyrene	4.1	Table 2	µg/L	2180	570	940			6000						<0.05		<0.2

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard			Sample Location	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5B-06	OW5C-91	OW5C-91	OW5C-91
				Sampling Date	2009/07/23	2009/11/25	2011/01/07	2011/05/30	2011/05/30	2011/05/30	2011/07/07	2011/07/07	2011/07/07	2011/11/15	2004/06/07	2006/05/29	2006/07/19
	ODWQS			Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units		GW Comprehensive	GW Indicator	GW Indicator	GW Indicator	Lab Replicate	QA/QC Check	GW Comprehensive	Lab Replicate	QA/QC Check	GW Indicator	GW Comprehensive	GW Indicator	GW Comprehensive
Field Parameters																	
Conductivity			µS/cm					1100			1250			1670			
pH	6.5-8.5	OG						7.81			7.53			7.38			
Temperature			°C					10.4			11.6			12.2			
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	738	766	638	460			551			420	757	753	760	
Ammonia (as N)			mg/L	0.23	<0.050	<0.02	<0.02			<0.02			0.093	<0.05	<0.05	0.08	
Biological Oxygen Demand (BOD_5)			mg/L	<6.0						<5				<3		<3	
Calcium (Ca)			mg/L	58.7	60.2	52.8	61.4			64.4			159	64	71	71	
Chemical Oxygen Demand (COD)			mg/L	<10	18	14	<5			15.4			16.5	17	20	14	
Chloride (Cl)	250	AO	mg/L	22.5	13.8	9.3	11.7	11.7	0.00	11.6	11.6	0.00	23.5	17.9	24	23	
Conductivity			µS/cm	1690	1720	1160	1010			1160			1580	2430	2540	2570	
Dissolved Organic Carbon (DOC)	5	AO	mg/L	6.6	5.8	6.5	6.07			7.2			8.7	7.6	5.2	5	
Hardness ($CaCO_3$)	80-100	OG	mg/L	893						618				1320		1300	
Nitrate (as N)	10	MAC	mg/L	<1.0	<0.10	<0.05	0.159	0.165	0.01	0.152	0.158	0.006	0.653	<1	0.2	0.3	
Nitrite (as N)	1	MAC	mg/L	<1.0						<0.05	<0.05	0.00		<0.1		<0.1	
pH	6.5-8.5	OG		7.87	7.88	8.1	8.07			8.26			8.04	8.03	8.20	8.1	
Phenol 4AAP			mg/L	0.0034						<0.001				<0.001		<0.001	
Potassium (K)			mg/L	<10						2.96			3	6		6.1	
Sulphates (SO_4)	500	AO	mg/L	282	290	127	176	174	1.14	173	173	0.00	474	922	780	812	
Total Dissolved Solids (TDS)	500	AO	mg/L	1090	1150	794	718			770			1140	1910	1650	1750	
Total Kjeldahl Nitrogen (TKN)			mg/L	<0.15						0.15				0.4		0.2	
Total Phosphorus (P)			mg/L	0.159						0.29				0.04		0.009	
Total Suspended Solids (TSS)			mg/L	237						408				81		43	
Metals																	
Arsenic	0.025	IMAC	mg/L	<0.010						<0.003				<0.0014		<0.001	
Barium	1	MAC	mg/L	<0.10	0.026	0.029	0.0292			0.0384			0.0603	0.027	0.024	0.02	
Beryllium			mg/L	<0.010						<0.001				<0.0014		<0.0005	
Boron	5	IMAC	mg/L	<0.50	0.067	0.041	0.0362			0.0358			0.0495	0.044	0.037	0.032	
Cadmium	0.005	MAC	mg/L	<0.0010						<0.0001				<0.001		<0.0001	
Chromium	0.05	MAC	mg/L	<0.010						0.0066				<0.0016		<0.005	
Cobalt			mg/L	<0.0080						<0.0005				<0.001		<0.0005	
Copper	1	AO	mg/L	<0.010						0.0024				<0.003		<0.002	
Iron	0.3	AO	mg/L	<0.50	<0.050	<0.010	0.0112			<0.01			<0.01	<0.011	<0.05	<0.05	
Lead	0.01	MAC	mg/L	<0.010						<0.001				0.0024		<0.0005	
Magnesium			mg/L	181	133	126	86.1			111			102	270	280	280	
Manganese	0.05	AO	mg/L	0.021						0.0053				<0.0014		<0.002	
Mercury	0.001	MAC	mg/L	<0.00010						<0.00005				<0.0001		<0.0001	
Molybdenum			mg/L	<0.010						0.0049				0.0016		0.003	
Nickel			mg/L	<0.020						<0.003				<0.001		<0.001	
Silver			mg/L	<0.0010						<0.0001				<0.0006		<0.0001	
Sodium	200	AO	mg/L	110	72	66.5	51.5			61.8			64.1	200	180	180	
Thallium			mg/L	<0.0030						<0.0003				<0.001		<0.00005	
Vanadium			mg/L	<0.010						<0.002				<0.001		<0.001	
Zinc	5	AO	mg/L	<0.030						0.0135				0.005		<0.03	
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5						<0.10				<0.5		<0.1	
1,1,1-Trichloroethane	200		µg/L	<0.5						<0.30				<0.5		<0.1	
1,1,2,2-Tetrachloroethane	1		µg/L	<0.5						<0.10				<1		<0.1	
1,1,2-Trichloroethane	5		µg/L	<0.5						<0.20				<0.5		<0.2	
1,1-Dichloroethane	70		µg/L	<0.5						<0.30				<0.4		<0.1	
1,1-Dichloroethylene	14		µg/L	<0.5						<0.30				<0.5		<0.1	
1,2-Dibromoethane (EDB)	1		µg/L	<0.5										<0.5		<0.2	
1,2-Dichlorobenzene	3		µg/L	<0.5						<0.10				<0.5		<0.2	
1,2-Dichloroethane	5		µg/L	<0.5						<0.20				<0.5		<0.1	
1,2-Dichloropropane	5		µg/L	<0.5						<0.20				<0.5		<0.1	
1,3-Dichlorobenzene	630		µg/L	<0.5						<0.10				<0.5		<0.2	
1,4-Dichlorobenzene	5		µg/L	<0.5						<0.10				<0.5		<0.2	
2-Hexanone			µg/L	<20						<0.30				<10		<5	
Acetone	3 000		µg/L	<20						<1.0				<10		<10	
Benzene	5		µg/L	<0.5						<0.20				<0.5		<0.1	
Bromodichloromethane	5		µg/L	<0.5						<0.20				<0.2		<0.1	
Bromoform	5		µg/L	<0.5						<0.10				<0.2		<0.2	
Bromomethane	10		µg/L	2.35						<0.20				<3		<0.5	
Carbon Tetrachloride	5		µg/L	<0.5						<0.20				<0.5		<0.1	
Chlorobenzene	30		µg/L	<0.5						<0.10				<0.5		<0.1	
Chloroethane			µg/L	<1						<0.20				<1		<0.2	
Chloroform	5		µg/L	<0.5						<0.20				<0.2		<0.1	
Chloromethane			µg/L	<1						<0.40				<2		<0.5	
cis-1,2-Dichloroethylene	70		µg/L	<0.5										<1		<0.1	
cis-1,3-Dichloropropene	1.4		µg/L	<0.5						<0.20				<0.14		<0.2	
Dibromochloromethane	5		µg/L	<0.5						<0.10				<0.2		<0.2	
Dichlorodifluoromethane			µg/L	<1						<0.20							
Dichloromethane(Methylene Chloride)	50		µg/L	<0.5										<1		<0.5	
Ethylbenzene	2.4		µg/L	<0.5						<0.10				<0.5		<0.1	
Methyl isobutyl ketone	350		µg/L	<20										<10		<5	
Methyl t-butyl ether (MTBE)	700		µg/L	0.5										<2		<0.2	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<20										<15		<5	
Styrene	100		µg/L	<0.5						<0.10				<0.5		<0.1	
Tetrachloroethylene	30		µg/L	<0.5						<0.20				<0.5		<0.1	
Toluene	24		µg/L	<0.5						<0.20				<0.5		<0.2	
trans-1,2-Dichloroethylene	100		µg/L	<0.5						<0.20				<1		<0.1	
trans-1,3-Dichloropropene	1.4		µg/L	<0.5						<0.30				<0.14		<0.2	
Trichloroethylene	5		µg/L	<0.5						<0.20				<0.5		<0.1	
Trichlorofluoromethane (FREON 11)			µg/L	<1										<2			
Vinyl Chloride	2		µg/L	<0.5						<0.17				<0.2		<0.2	
Xylene, o-	300		µg/L	<0.5						<0.10				<0.5		<0.1	
Xylene, *p-* + *m-*	300		µg/L	<1						<0.20				<0.5		<0.1	
Xylenes (total)	300		µg/L	<1.5						<0.20				<1		<0.1	
PAHs																	
2-Methylnaphthalene			µg/L	<0.02													
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L							<0.20							
Acenaphthene	4.1	Table 2	µg/L	<0.02						<0.10				<0.05		<0.05	
Acenaphthylene	1	Table 2	µg/L	<0.02						<0.11				<0.05		<0.05	
Anthracene	2.4	Table 2	µg/L	<0.02						<0.05				<0.05		<0.05	
Benzo(a)anthracene	1	Table 2	µg/L	<0.02						<0.08				<0.05		<0.05	
Benzo(a)pyrene	0.01	MAC	µg/L	<0.005						<0.01				<0.01		<0.01	
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.02						<0.05							
Benzo(b,j)fluoranthene			µg/L											<0.05		<0.05	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.02						<0.06				<0.1		<0.1	
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.02						<0.05				<0.05		<0.05	
Chrysene	0.1	Table 2	µg/L	<0.02						<0.05				<0.05		<0.05	
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.02						<0.09				<0.1		<0.1	
Fluoranthene	0.41	Table 2	µg/L	<0.02						<0.12				<0.05		<0.05	
Fluorene	120	Table 2	µg/L	<0.02						<0.09				<0.05		<0.05	
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.02						<0.06				<0.1		<0.1	
Naphthalene	11	Table 2	µg/L	<0.02						<0.12				<0.05		0.13	
Phenanthrene	1	Table 2	µg/L	<0.02						<0.10				<0.05		<0.05	
Pyrene	4.1	Table 2	µg/L	<0.02						<0.05				<0.05		<0.05	

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	OW6B-92	OW6B-92	OW6B-92	OW6B-92	OW6B-92	OW6B-92	OW6B-92	OW6B-92	OW6B-92	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06
			Sampling Date	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2006/07/19	2006/12/12	2006/12/12	2007/05/16	2007/05/16	2007/07/31	2009/04/30
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	Lab Replicate	GW Indicator	GW Indicator	GW Indicator	Lab Replicate	GW Comprehensive	MOE
Field Parameters																	
Conductivity			µS/cm														
pH	6.5-8.5	OG															
Temperature			°C														
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	764	757	733	761	807	828	820	816	822	376	633		726	684
Ammonia (as N)			mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.34		<0.05	0.06	<0.05		0.13	<0.05
Biological Oxygen Demand (BOD_5)			mg/L	<3			<3			<3						<2	
Calcium (Ca)			mg/L	44	53	58	50	50	47	48		48	170	89		90	86.8
Chemical Oxygen Demand (COD)			mg/L	15	11	15	19	21	22	18		18	140	19		4	27
Chloride (Cl)	250	AO	mg/L	96.5	92.2	88.1	90	105	99	106		110	50	45		42	40.1
Conductivity			µS/cm	2110	2260	2380	2190	2450	2380	2400	2400	2400	2120	1920		1760	1780
Dissolved Organic Carbon (DOC)	5	AO	mg/L	6.8	4.6	3.9	3.7	5.2	3.8	4.2		3.8	12.9	6.5		7.1	4.1
Hardness ($CaCO_3$)	80-100	OG	mg/L	1220			1050			1200						1100	873
Nitrate (as N)	10	MAC	mg/L	<1	<0.1	<1	<0.2	0.2	0.2	0.5	0.5	0.3	<0.1	<0.1		<0.1	<0.05
Nitrite (as N)	1	MAC	mg/L	<0.1			<0.3			0.1	0.09					<0.01	<0.005
pH	6.5-8.5	OG		8.12	8.2	8.17	8.24	8.27	8.30	8.1	8.1	8.2	7.8	8		8.10	7.94
Phenol 4AAP			mg/L	<0.001			<0.001			<0.001						<0.001	<0.0002
Potassium (K)			mg/L	7.4			6.6			6.7						5.5	3.89
Sulphates (SO_4)	500	AO	mg/L	597	580	572	615	583	453	473		565	827	367		383	
Total Dissolved Solids (TDS)	500	AO	mg/L	1350	1450	1680	1660	1570	1550	1670		1240	1690	1170	1130	1070	1320
Total Kjeldahl Nitrogen (TKN)			mg/L	0.7			0.4			0.6						0.7	0.33
Total Phosphorus (P)			mg/L	0.23			0.138			0.17						0.095	0.1
Total Suspended Solids (TSS)			mg/L	153			66			31						260	693
Metals																	
Arsenic	0.025	IMAC	mg/L	<0.0014	<0.0014		<0.001			<0.001						0.004	<0.0005
Barium	1	MAC	mg/L	0.016	0.017	0.019	0.026	0.017	0.016	0.015		0.017	0.007	0.006		0.006	0.021
Beryllium			mg/L	<0.0014	<0.0014		<0.0005			<0.0005						<0.0005	<0.001
Boron	5	IMAC	mg/L	0.87	0.93	0.85	0.64	0.84	0.64	0.53		0.62	0.095	0.66		0.55	2.3
Cadmium	0.005	MAC	mg/L	<0.001	<0.001		<0.0001			<0.0001						<0.0001	<0.001
Chromium	0.05	MAC	mg/L	<0.0016	0.0056		<0.005			<0.005						<0.005	<0.002
Cobalt			mg/L	<0.001	<0.001		<0.0005			<0.0005						0.001	<0.001
Copper	1	AO	mg/L	<0.003	0.004		<0.001			0.002						<0.001	<0.001
Iron	0.3	AO	mg/L	<0.011	0.054	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	1.3	1.3		3	0.092
Lead	0.01	MAC	mg/L	<0.0022	<0.0022		<0.0002			<0.0005						<0.0005	<0.005
Magnesium			mg/L	270	270	260	250	230	260	260		270	190	180		220	206
Manganese	0.05	AO	mg/L	<0.0014	<0.0014		<0.002			<0.002						0.16	0.077
Mercury	0.001	MAC	mg/L	<0.0001	<0.0001		<0.0001			<0.0001						<0.0001	<0.02
Molybdenum			mg/L	0.0044	0.006		0.0052			0.005						0.013	<0.008
Nickel			mg/L	<0.001	<0.001		0.0049			<0.001						0.002	<0.006
Silver			mg/L	<0.0006	<0.0006		<0.0005			<0.0001						<0.0001	<0.003
Sodium	200	AO	mg/L	190	190	200	190	180	180	180		210	100	82		96	111
Thallium			mg/L	<0.001	<0.001		<0.00005			<0.00005						<0.00005	
Vanadium			mg/L	<0.001	0.001		0.0015			<0.001						<0.001	<0.001
Zinc	5	AO	mg/L	<0.005	0.008		0.013			0.01						<0.005	<0.009
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
1,1,1-Trichloroethane	200		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
1,1,2,2-Tetrachloroethane	1		µg/L	<1			<0.1			0.1						<0.1	<0.2
1,1,2-Trichloroethane	5		µg/L	<0.5			<0.2			0.2						<0.2	<0.2
1,1-Dichloroethane	70		µg/L	<0.4			<0.1			0.1						<0.1	<0.2
1,1-Dichloroethylene	14		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
1,2-Dibromoethane (EDB)	1		µg/L	<0.5			<0.2			<0.2						<0.2	<0.2
1,2-Dichlorobenzene	3		µg/L	<0.5			<0.1			0.2						<0.2	<0.2
1,2-Dichloroethane	5		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
1,2-Dichloropropane	5		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
1,3-Dichlorobenzene	630		µg/L	<0.5			<0.1			0.2						<0.2	<0.2
1,4-Dichlorobenzene	5		µg/L	<0.5			<0.1			0.2						<0.2	<0.2
2-Hexanone			µg/L	<10			<5			5						<5	
Acetone	3 000		µg/L	<10			<10			10						<10	
Benzene	5		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Bromodichloromethane	5		µg/L	<0.2			<0.1			0.1						<0.1	<0.2
Bromoform	5		µg/L	<0.2			<0.2			0.2						<0.2	<0.2
Bromomethane	10		µg/L	<3			<0.5			0.5						<0.5	<0.5
Carbon Tetrachloride	5		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Chlorobenzene	30		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Chloroethane			µg/L	<1			<0.2			0.2						<0.2	<0.5
Chloroform	5		µg/L	<0.2			<0.1			0.1						<0.1	<0.2
Chloromethane			µg/L	<2			<0.5			0.5						<0.5	<0.5
cis-1,2-Dichloroethylene	70		µg/L	<1			<0.1			0.1						<0.1	<0.2
cis-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2			0.2						<0.2	<0.2
Dibromochloromethane	5		µg/L	<0.2			<0.2			0.2						<0.2	<0.2
Dichlorodifluoromethane			µg/L														
Dichloromethane(Methylene Chloride)	50		µg/L	<1			<0.5			0.5						<0.5	<0.2
Ethylbenzene	2.4		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Methyl isobutyl ketone	350		µg/L	<10			<5			5						<5	
Methyl t-butyl ether (MTBE)	700		µg/L	<2			<0.2			0.2						<0.2	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<15			<5			5						<5	
Styrene	100		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Tetrachloroethylene	30		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Toluene	24		µg/L	<0.5			<0.2			0.2						<0.2	<0.2
trans-1,2-Dichloroethylene	100		µg/L	<1			<0.1			0.1						<0.1	<0.2
trans-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2			0.2						<0.2	<0.2
Trichloroethylene	5		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Trichlorofluoromethane (FREON 11)			µg/L	<2			<0.2									<0.2	<0.5
Vinyl Chloride	2		µg/L	<0.2			<0.2			0.2						<0.2	
Xylene, o-	300		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Xylene, *p-* + *m-*	300		µg/L	<0.5			<0.1			0.1						<0.1	<0.2
Xylenes (total)	300		µg/L	<1			<0.1			0.1						<0.1	<0.2
PAHs																	
2-Methylnaphthalene			µg/L														<0.2
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Acenaphthylene	1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Anthracene	2.4	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Benzo(a)anthracene	1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01			<0.01	<0.01		<0.01						0.01	<0.2
Benzo(b)fluoranthene	0.1	Table 2	µg/L														<0.2
Benzo(b,j)fluoranthene			µg/L	<0.05			<0.05			<0.05						<0.05	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1						<0.1	<0.2
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Chrysene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1						<0.1	<0.5
Fluoranthene	0.41	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Fluorene	120	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1		<0.1						<0.1	<0.5
Naphthalene	11	Table 2	µg/L	<0.05			0.06	0.05		5.5						0.07	<0.2
Phenanthrene	1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2
Pyrene	4.1	Table 2	µg/L	<0.05			<0.05	<0.05		<0.05						<0.05	<0.2

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-06	OW8B-92	OW8B-92
			Sampling Date	2009/07/23	2009/11/25	2009/12/03	2011/01/07	2011/05/30	2011/07/05	2011/07/05	2011/07/05	2011/11/15	2011/11/15	2011/11/15	2004/06/07	2004/11/29
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Comprehensive	GW Indicator	MOE	GW Indicator	GW Indicator	GW Comprehensive	Lab Replicate	QA/QC Check	GW Indicator	Lab Replicate	QA/QC Check	GW Comprehensive	GW Indicator + Metals
Field Parameters																
Conductivity			µS/cm					1710	1553			1860				
pH	6.5-8.5	OG						7.57	8.53			7				
Temperature			°C					10	11.9			13				
General																
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	704	666	725	676	567	658			554			739	679
Ammonia (as N)			mg/L	<0.050	<0.050	<0.05	0.02	<0.02	<0.02			<0.02			<0.05	<0.05
Biological Oxygen Demand (BOD_5)			mg/L	<6.0					<5						<3	
Calcium (Ca)			mg/L	67.3	75	62.8	84.8	76.8	72			105			44	48
Chemical Oxygen Demand (COD)			mg/L	<10	23	15	<5	<5	6.31			<5			9	6
Chloride (Cl)	250	AO	mg/L	42.1	34.7	33.5	32.2	58.1	61.1			90.5			22.5	6.37
Conductivity			µS/cm	1780	1800	1750	1540	1550	1680			1770			1550	1520
Dissolved Organic Carbon (DOC)	5	AO	mg/L	6.3	4.8	3.8	3.3	3.64	6.9			18.3	18	1.65	5.7	3
Hardness ($CaCO_3$)	80-100	OG	mg/L	1060		976			810						869	
Nitrate (as N)	10	MAC	mg/L	<1.0	<0.10	<0.005	0.08	<0.1	<0.05			<0.25			<1	0.4
Nitrite (as N)	1	MAC	mg/L	<1.0		<0.05			<0.05						<0.1	
pH	6.5-8.5	OG		7.96	7.83	8.11	8.25	7.99	8.09			8.19			8.09	8.25
Phenol 4AAP			mg/L	0.0024		<0.0002			<0.001						<0.001	
Potassium (K)			mg/L	<10		5.69			3.49			2.42			6.8	
Sulphates (SO_4)	500	AO	mg/L	363	385	343	363	371	324			341			316	201
Total Dissolved Solids (TDS)	500	AO	mg/L	1180	1170	1300	1170	1110	1100	1160	5.31	1090			1000	840
Total Kjeldahl Nitrogen (TKN)			mg/L	<0.15		<0.16			0.11						1.3	
Total Phosphorus (P)			mg/L	0.097		<0.04			0.044						0.62	
Total Suspended Solids (TSS)			mg/L	230		85.6			41						400	
Metals																
Arsenic	0.025	IMAC	mg/L	<0.010		<0.0005			<0.003						<0.0014	<0.0014
Barium	1	MAC	mg/L	<0.10	0.018	0.018	0.02	0.0157	0.0187			0.019			0.02	0.022
Beryllium			mg/L	<0.010		<0.001			<0.001						<0.0014	<0.0014
Boron	5	IMAC	mg/L	0.8	1.15	0.78	1.02	1.01	0.839			1.61			0.16	0.13
Cadmium	0.005	MAC	mg/L	<0.0010		<0.001			<0.0001						<0.001	<0.001
Chromium	0.05	MAC	mg/L	<0.010		<0.002			0.0032						<0.0016	<0.0016
Cobalt			mg/L	<0.0080		<0.001			<0.0005						<0.001	<0.001
Copper	1	AO	mg/L	<0.010		<0.002			0.0022						<0.003	<0.003
Iron	0.3	AO	mg/L	<0.50	<0.050	<0.005	<0.010	<0.01	<0.01			<0.01			<0.011	0.18
Lead	0.01	MAC	mg/L	<0.010		<0.005			<0.001						0.0025	0.0022
Magnesium			mg/L	216	172	225	159	145	153			102			170	150
Manganese	0.05	AO	mg/L	0.074		0.054			0.0042						0.0081	0.068
Mercury	0.001	MAC	mg/L	<0.00010		<0.02			<0.00005						<0.0001	<0.0001
Molybdenum			mg/L	<0.010		<0.007			0.0063						0.0027	0.0034
Nickel			mg/L	<0.020		<0.006			<0.003						<0.001	<0.001
Silver			mg/L	<0.0010		<0.003			<0.0001						<0.0006	<0.0006
Sodium	200	AO	mg/L	90.1	91.1	93.7	110	98.7	95.1			133			110	120
Thallium			mg/L	<0.0030					<0.0003						<0.001	<0.001
Vanadium			mg/L	<0.010		<0.001			<0.002						<0.001	<0.001
Zinc	5	AO	mg/L	<0.030		<0.005			0.0213						0.012	0.02
VOCs																
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5		<0.2			<0.10						<0.5	
1,1,1-Trichloroethane	200		µg/L	<0.5		<0.2			<0.30						<0.5	
1,1,2,2-Tetrachloroethane	1		µg/L	<0.5		<0.2			<0.10						<1	
1,1,2-Trichloroethane	5		µg/L	<0.5		<0.2			<0.20						<0.5	
1,1-Dichloroethane	70		µg/L	<0.5		<0.2			<0.30						<0.4	
1,1-Dichloroethylene	14		µg/L	<0.5		<0.2			<0.30						<0.5	
1,2-Dibromoethane (EDB)	1		µg/L	<0.5		<0.2									<0.5	
1,2-Dichlorobenzene	3		µg/L	<0.5		<0.2			<0.10						<0.5	
1,2-Dichloroethane	5		µg/L	<0.5		<0.2			<0.20						<0.5	
1,2-Dichloropropane	5		µg/L	<0.5		<0.2			<0.20						<0.5	
1,3-Dichlorobenzene	630		µg/L	<0.5		<0.2			<0.10						<0.5	
1,4-Dichlorobenzene	5		µg/L	<0.5		<0.2			<0.10						<0.5	
2-Hexanone			µg/L	<20					<0.30						<10	
Acetone	3 000		µg/L	<20					<1.0						<10	
Benzene	5		µg/L	<0.5		<0.2			<0.20						<0.5	
Bromodichloromethane	5		µg/L	<0.5		<0.2			<0.20						<0.2	
Bromoform	5		µg/L	<0.5		<0.2			<0.10						<0.2	
Bromomethane	10		µg/L	3.08		<0.5			<0.20						<3	
Carbon Tetrachloride	5		µg/L	<0.5		<0.2			<0.20						<0.5	
Chlorobenzene	30		µg/L	<0.5		<0.2			<0.10						<0.5	
Chloroethane			µg/L	<1		<0.5			<0.20						<1	
Chloroform	5		µg/L	<0.5		<0.2			<0.20						<0.2	
Chloromethane			µg/L	<1		<0.5			<0.40						<2	
cis-1,2-Dichloroethylene	70		µg/L	<0.5		<0.2									<1	
cis-1,3-Dichloropropene	1.4		µg/L	<0.5		<0.2			<0.20						<0.14	
Dibromochloromethane	5		µg/L	<0.5		<0.2			<0.10						<0.2	
Dichlorodifluoromethane			µg/L	<1		<0.5			<0.20							
Dichloromethane(Methylene Chloride)	50		µg/L	<0.5		<0.2									<1	
Ethylbenzene	2.4		µg/L	<0.5		<0.2			<0.10						<0.5	
Methyl isobutyl ketone	350		µg/L	<20											<10	
Methyl t-butyl ether (MTBE)	700		µg/L	<0.5											<2	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<20											<15	
Styrene	100		µg/L	<0.5		<0.2			<0.10						<0.5	
Tetrachloroethylene	30		µg/L	<0.5		<0.2			<0.20						<0.5	
Toluene	24		µg/L	<0.5		<0.2			<0.20						<0.5	
trans-1,2-Dichloroethylene	100		µg/L	<0.5		<0.2			<0.20						<1	
trans-1,3-Dichloropropene	1.4		µg/L	<0.5		<0.2			<0.30						<0.14	
Trichloroethylene	5		µg/L	<0.5		<0.2			<0.20						<0.5	
Trichlorofluoromethane (FREON 11)			µg/L	<1		<0.5									<2	
Vinyl Chloride	2		µg/L	<0.5					<0.17						<0.2	
Xylene, *o*-	300		µg/L	<0.5		<0.2			<0.10						<0.5	
Xylene, *p*- + *m*-	300		µg/L	<1		<0.2			<0.20						<0.5	
Xylenes (total)	300		µg/L	<1.5		<0.2			<0.20						<1	
PAHs																
2-Methylnaphthalene			µg/L	<0.02		<0.2										
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L						<0.20							
Acenaphthene	4.1	Table 2	µg/L	<0.02		<0.2			<0.10						<0.05	
Acenaphthylene	1	Table 2	µg/L	<0.02		<0.2			<0.11						<0.05	
Anthracene	2.4	Table 2	µg/L	0.042		<0.2			<0.05						<0.05	
Benzo(a)anthracene	1	Table 2	µg/L	<0.02		<0.2			<0.08						<0.05	
Benzo(a)pyrene	0.01	MAC	µg/L	<0.005		<0.2			<0.01						<0.01	
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.02		<0.2										
Benzo(b,j)fluoranthene			µg/L												<0.05	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.02		<0.2			<0.06						<0.1	
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L													
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.02		<0.2			<0.05						<0.05	
Chrysene	0.1	Table 2	µg/L	0.025		<0.2			<0.05						<0.05	
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.02		<0.5			<0.09						<0.1	
Fluoranthene	0.41	Table 2	µg/L	<0.02		<0.2			<0.12						<0.05	
Fluorene	120	Table 2	µg/L	<0.02		<0.2			<0.09						<0.05	
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.02		<0.5			<0.06						<0.1	
Naphthalene	11	Table 2	µg/L	<0.02		<0.2			<0.12						<0.05	
Phenanthrene	1	Table 2	µg/L	<0.02		<0.2			<0.10						<0.05	
Pyrene	4.1	Table 2	µg/L	<0.02		<0.2			<0.05						<0.05	

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-2 Groundwater Quality - Shallow Overburden
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	OW8B-92	OW8B-92	OW8B-92	OW8B-92	OW8B-92	OW9B-92	OW9B-92	OW9B-92	OW9B-92	OW9B-92	OW9B-92	OW9B-92	OW9B-06	OW9B-06
			Sampling Date	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2006/12/12	2006/12/12
	ODWQS		Formation	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden	Shallow Overburden
	Value	Type	Units	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Comprehensive	GW Indicator GW VOC	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Indicator	Lab Replicate
Field Parameters																	
Conductivity			µS/cm														
pH	6.5-8.5	OG															
Temperature			°C														
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	674	711	735	758	844	724	707	687	711	761	757	768	390	
Ammonia (as N)			mg/L	<0.05	0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.12	<0.05	
Biological Oxygen Demand (BOD_5)			mg/L		<3			<3	<3			<3			<3		
Calcium (Ca)			mg/L	52	46	49	45	44	220	270	290	270	260	270	270	150	
Chemical Oxygen Demand (COD)			mg/L	5	9	4	5	6	14	17	7	19	16	14	35	35	
Chloride (Cl)	250	AO	mg/L	8	7	8	9	8	36.8	24.4	24	30	25	28	27	23	
Conductivity			µS/cm	1630	1510	1630	1630	1960	5280	5640	6110	5740	6400	6280	6400	1590	
Dissolved Organic Carbon (DOC)	5	AO	mg/L	2.3	2.2	2.5	2.2	2.3	8.4	6.8	5.8	5.8	6.2	6.1	7.1	11	
Hardness ($CaCO_3$)	80-100	OG	mg/L		760			740	4140			4510			5000		
Nitrate (as N)	10	MAC	mg/L	<1	0.5	0.6	0.3	0.1	<1	<0.1	<1	<0.2	<0.1	0.2	0.3	<0.1	
Nitrite (as N)	1	MAC	mg/L		<0.3			<0.3	<0.1			<0.3			<0.3		
pH	6.5-8.5	OG		8.06	8.47	8.35	8.2	8.00	7.78	8.04	7.9	8.12	7.98	8	7.9	7.8	
Phenol 4AAP			mg/L		<0.001			<0.001	<0.001			<0.001			<0.001		
Potassium (K)			mg/L		6.1			6	16			16			17		
Sulphates (SO_4)	500	AO	mg/L	269	284	262	287	381	3830	3930	4060	3380	4120	3440	4040	561	
Total Dissolved Solids (TDS)	500	AO	mg/L	1050	1170	974	1060	1270	6320	6060	6720	6840	6630	4080	4200	1050	1020
Total Kjeldahl Nitrogen (TKN)			mg/L		0.4			0.2	0.9			0.4			0.4		
Total Phosphorus (P)			mg/L		0.176			0.068	0.08			0.036			0.055		
Total Suspended Solids (TSS)			mg/L		420			49	129			56			77		
Metals																	
Arsenic	0.025	IMAC	mg/L		<0.001			<0.001	<0.0014	<0.0014		<0.001			<0.001		
Barium	1	MAC	mg/L	0.021	0.022	0.022	0.02	0.019	0.0086	0.0081	<0.05	<0.005	0.008	<0.03	0.007	0.009	
Beryllium			mg/L		<0.0005			<0.0005	<0.0014	<0.0014		<0.0005			<0.0005		
Boron	5	IMAC	mg/L	0.16	0.13	0.16	0.14	0.12	0.24	0.3	0.3	0.24	0.28	0.23	0.24	0.1	
Cadmium	0.005	MAC	mg/L		<0.0001			<0.0001	<0.001	<0.001		<0.0001			<0.0001		
Chromium	0.05	MAC	mg/L		<0.005			<0.005	<0.0016	0.0025		<0.005			<0.005		
Cobalt			mg/L		<0.0005			<0.003	<0.001	<0.001		<0.0005			<0.0005		
Copper	1	AO	mg/L		0.0015			0.003	<0.003	0.01		<0.001			0.005		
Iron	0.3	AO	mg/L	0.2	<0.05	<0.05	<0.05	<0.05	<0.011	0.36	<0.5	0.73	<0.05	<0.05	0.11	0.37	
Lead	0.01	MAC	mg/L		0.0003			<0.0005	0.003	<0.0022		<0.0002			<0.0005		
Magnesium			mg/L	170	140	180	150	150	880	1000	1000	970	1000	950	1000	140	
Manganese	0.05	AO	mg/L		<0.002			<0.002	<0.0014	<0.0014		<0.002			<0.002		
Mercury	0.001	MAC	mg/L		<0.0001			<0.0001	<0.0001	<0.0001		<0.0001			<0.0001		
Molybdenum			mg/L		0.0039			0.004	0.0016	0.0023		<0.001			0.002		
Nickel			mg/L		<0.001			<0.005	<0.001	<0.001		<0.001			0.003		
Silver			mg/L		<0.0005			0.0005	<0.0006	<0.0006		<0.0005			<0.0001		
Sodium	200	AO	mg/L	120	110	130	120	120	310	340	360	310	340	320	310	43	
Thallium			mg/L		<0.00005			<0.00005	<0.001	<0.001		<0.00005			<0.00005		
Vanadium			mg/L		<0.001			<0.001	<0.001	<0.001		<0.001			<0.001		
Zinc	5	AO	mg/L		0.0098			0.005	<0.005	0.086		<0.005			<0.05		
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
1,1,1-Trichloroethane	200		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
1,1,2,2-Tetrachloroethane	1		µg/L		<0.1			<0.1	<1			<0.1			<0.1		
1,1,2-Trichloroethane	5		µg/L		<0.2			<0.2	<0.5			<0.2			<0.2		
1,1-Dichloroethane	70		µg/L		<0.1			<0.1	<0.4			<0.1			<0.1		
1,1-Dichloroethylene	14		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
1,2-Dibromoethane (EDB)	1		µg/L		<0.2			<0.2	<0.5			<0.2			<0.2		
1,2-Dichlorobenzene	3		µg/L		<0.1			<0.2	<0.5			<0.1			<0.2		
1,2-Dichloroethane	5		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
1,2-Dichloropropane	5		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
1,3-Dichlorobenzene	630		µg/L		<0.1			<0.2	<0.5			<0.1			<0.2		
1,4-Dichlorobenzene	5		µg/L		<0.1			<0.2	<0.5			<0.1			<0.2		
2-Hexanone			µg/L		<5			<5	<10			<5			<5		
Acetone	3 000		µg/L		<10			<10	<10			<10			<10		
Benzene	5		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Bromodichloromethane	5		µg/L		<0.1			<0.1	<0.2			<0.1			<0.1		
Bromoform	5		µg/L		<0.2			<0.2	<0.2			<0.2			<0.2		
Bromomethane	10		µg/L		<0.5			<0.5	<3			<0.5			<0.5		
Carbon Tetrachloride	5		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Chlorobenzene	30		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Chloroethane			µg/L		<0.2			<0.2	<1			<0.2			<0.2		
Chloroform	5		µg/L		<0.1			<0.1	<0.2			<0.1			<0.1		
Chloromethane			µg/L		<0.5			<0.5	<2			<0.5			<0.5		
cis-1,2-Dichloroethylene	70		µg/L		<0.1			<0.1	<1			<0.1			<0.1		
cis-1,3-Dichloropropene	1.4		µg/L		<0.2			<0.2	<0.14			<0.2			<0.2		
Dibromochloromethane	5		µg/L		<0.2			<0.2	<0.2			<0.2			<0.2		
Dichlorodifluoromethane			µg/L														
Dichloromethane(Methylene Chloride)	50		µg/L		<0.5			<0.5	<1			<0.5			<0.5		
Ethylbenzene	2.4		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Methyl isobutyl ketone	350		µg/L		<5			<5	<10			<5			<5		
Methyl t-butyl ether (MTBE)	700		µg/L		<0.2			<0.2	<2			<0.2			<0.2		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<5			<5	<15			<5			<5		
Styrene	100		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Tetrachloroethylene	30		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Toluene	24		µg/L		<0.2			<0.2	<0.5			<0.2			<0.2		
trans-1,2-Dichloroethylene	100		µg/L		<0.1			<0.1	<1			<0.1			<0.1		
trans-1,3-Dichloropropene	1.4		µg/L		<0.2			<0.2	<0.14			<0.2			<0.2		
Trichloroethylene	5		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Trichlorofluoromethane (FREON 11)			µg/L		<0.2				<2			<0.2					
Vinyl Chloride	2		µg/L		<0.2			<0.2	<0.2			<0.2			<0.2		
Xylene, *o*-	300		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Xylene, *p*- + *m*-	300		µg/L		<0.1			<0.1	<0.5			<0.1			<0.1		
Xylenes (total)	300		µg/L		<0.1			<0.1	<1			<0.1			<0.1		
PAHs																	
2-Methylnaphthalene			µg/L														
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Acenaphthylene	1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Anthracene	2.4	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Benzo(a)anthracene	1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Benzo(a)pyrene	0.01	MAC	µg/L	0.01	<0.01			<0.01	<0.02			<0.01	<0.01			<0.01	
Benzo(b)fluoranthene	0.1	Table 2	µg/L														
Benzo(b,j)fluoranthene			µg/L	0.06	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1	<0.1			<0.1	<0.2			<0.1	<0.1			<0.1	
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Chrysene	0.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1	<0.1			<0.1	<0.2			<0.1	<0.1			<0.1	
Fluoranthene	0.41	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Fluorene	120	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1	<0.1			<0.1	<0.2			<0.1	<0.1			<0.1	
Naphthalene	11	Table 2	µg/L	2.3	0.07			0.09	<0.1			<0.05	0.06			<0.05	
Phenanthrene	1	Table 2	µg/L	0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	
Pyrene	4.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.1			<0.05	<0.05			<0.05	

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW1A-01	MW1A-01	MW1A-01	MW1A-01	MW1A-01	MW1A-01	MW1A-07	MW1A-07	MW1A-07	MW1A-07	MW1A-07	MW1A-07	MW1A-07	MW1A-07
			Sampling Date	2004/06/07	2004/11/29	2005/12/02	2006/05/29	2006/07/19	2006/12/12	2007/05/16	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/04	2011/01/10	2011/05/30
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Comprehensive	GW Indicator + Metals	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator + GW PAH	GW Comprehensive	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator
Field Parameters																	
Conductivity			µS/cm														743
pH	6.5-8.5	OG															11.31
Temperature			°C														23.5
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	417	326	291	256	149	238	118	202	154	151	140		154	128
Ammonia (as N)			mg/L	<0.05	<0.05	0.1	0.11	0.19	0.12	0.84	3.73	0.61	0.087	0.571		0.45	0.281
Biological Oxygen Demand (BOD_5)			mg/L	<3		7		<2			7		<6.0				
Calcium (Ca)			mg/L	450	530	580	500	510	510	13	3.7	33.6	49.3	65.4		63.3	58
Chemical Oxygen Demand (COD)			mg/L	10	<4	440	260	350	50	34	17	49	<10	25		<5	<5
Chloride (Cl)	250	AO	mg/L	28.1	18.8	23	30	40	25	13	6	24.4	30	23.7		21.5	20.3
Conductivity			µS/cm	3620	3710	2970	3550	3730	3650	772	942	797	921	857		824	737
Dissolved Organic Carbon (DOC)	5	AO	mg/L	3.1	3.7	7.6	4.7	4.1	3.2	4.8	6.4	2.5	2.6	2.9		2.4	2.3
Hardness ($CaCO_3$)	80-100	OG	mg/L	2020		1900		1800			9	86.2	129				
Nitrate (as N)	10	MAC	mg/L	<1	0.1	0.4	0.6	1.5	3.2	<0.1	<0.1	<0.05	0.58	<0.10		<0.05	<0.05
Nitrite (as N)	1	MAC	mg/L	<0.1		0.4		<0.1			0.1	<0.009	<0.10				
pH	6.5-8.5	OG		7.75	7.83	7.83	7.8	7.8	8.00	8.1	11	11.3	11.51	11.39		11.4	11
Phenol 4AAP			mg/L	<0.001		<0.001		<0.001			<0.001	0.0078	0.0124				
Potassium (K)			mg/L	13				6.1			5.8	9.75	<10				
Sulphates (SO_4)	500	AO	mg/L	2140	2240	1860	1870	2000	1630	223	135	68	65	74.9		79.1	84.4
Total Dissolved Solids (TDS)	500	AO	mg/L	2490	3540	4720	2310	2460	3080	440	655	518	298	324		530	276
Total Kjeldahl Nitrogen (TKN)			mg/L	1		18		0.4			33	2.36	1.06				
Total Phosphorus (P)			mg/L	1.43		15		0.76			19	1.81	0.888				
Total Suspended Solids (TSS)			mg/L	11400		38000		60000			79000	1670	4170				
Metals																	
Arsenic	0.025	IMAC	mg/L	<0.0014	<0.0014			<0.005			0.004	0.0025	<0.010		<0.001		
Barium	1	MAC	mg/L	0.013	0.013	0.043	0.026	<0.03		0.008	0.01	0.242	0.17	0.211	0.212	0.203	0.183
Beryllium			mg/L	<0.0014	<0.0014			<0.003			<0.0005	<0.001	<0.010		<0.001		
Boron	5	IMAC	mg/L	0.28	0.41	0.17	0.2	0.23	0.25	0.091	0.05	<0.015	<0.50	<0.050	0.03	0.042	0.0389
Cadmium	0.005	MAC	mg/L	<0.001	<0.001			0.0005			<0.0001	<0.001	<0.0010		<0.001		
Chromium	0.05	MAC	mg/L	<0.0016	0.0042			<0.03			<0.005	<0.002	<0.010		<0.004		
Cobalt			mg/L	0.002	0.003			<0.003			<0.0005	<0.002	<0.0080		<0.001		
Copper	1	AO	mg/L	<0.003	0.007			0.006			0.017	<0.008	0.01		0.01		
Iron	0.3	AO	mg/L	1.1	2.3	<0.05	<0.05	<0.03	<0.05	<0.05	0.26	0.268	<0.50	0.24	0.214	0.039	0.0582
Lead	0.01	MAC	mg/L	0.0023	<0.0022			<0.003			<0.0005	<0.005	<0.010		<0.005		
Magnesium			mg/L	200	280	97	130	140	150	8.9	<0.05	0.651	<5.0	0.96	0.055	0.11	0.06
Manganese	0.05	AO	mg/L	0.055	0.093	0.061		<0.01			<0.002	<0.008	<0.010		<0.001		
Mercury	0.001	MAC	mg/L	<0.0001	<0.0001			<0.0003			<0.0001	<0.03	<0.00010				
Molybdenum			mg/L	0.021	0.026			0.028			0.026	<0.009	0.011		<0.009		
Nickel			mg/L	0.005	0.008			0.006			0.005	<0.01	<0.020		<0.006		
Silver			mg/L	<0.0006	<0.0006			0.0015			<0.0001	<0.003	<0.0010		<0.003		
Sodium	200	AO	mg/L	290	300	190	210	320	280	130	180	80.9	74.2	64.6	83.1	56.9	56.3
Thallium			mg/L	<0.001	<0.001			<0.0003			<0.00005		<0.0030				
Vanadium			mg/L	<0.001	<0.001			<0.005			0.063	0.124	0.02		0.004		
Zinc	5	AO	mg/L	<0.005	<0.005			<0.03			<0.005	<0.002	<0.030		0.01		
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
1,1,1-Trichloroethane	200		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
1,1,2,2-Tetrachloroethane	1		µg/L	<1				<0.1			<0.2	<0.2	<0.5				
1,1,2-Trichloroethane	5		µg/L	<0.5				<0.2			<0.2	<0.2	<0.5				
1,1-Dichloroethane	70		µg/L	<0.4				<0.1			<0.1	<0.2	<0.5				
1,1-Dichloroethylene	14		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
1,2-Dibromoethane (EDB)	1		µg/L	<0.5				<0.2			<0.2	<0.2	<0.5				
1,2-Dichlorobenzene	3		µg/L	<0.5				<0.2			<0.2	<0.2	<0.5				
1,2-Dichloroethane	5		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
1,2-Dichloropropane	5		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
1,3-Dichlorobenzene	630		µg/L	<0.5				<0.2			<0.2	<0.2	<0.5				
1,4-Dichlorobenzene	5		µg/L	<0.5				<0.2			<0.2	<0.2	<0.5				
2-Hexanone			µg/L	<10				<5			<5		<20				
Acetone	3 000		µg/L	<10				<10			**59**		<20				
Benzene	5		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Bromodichloromethane	5		µg/L	<0.2				<0.1			<0.1	<0.2	<0.5				
Bromoform	5		µg/L	<0.2				<0.2			<0.2	<0.2	<0.5				
Bromomethane	10		µg/L	<3				<0.5			<0.5	<0.5	**3.21**				
Carbon Tetrachloride	5		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Chlorobenzene	30		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Chloroethane			µg/L	<1				<0.2			<0.2	<0.5	<1				
Chloroform	5		µg/L	<0.2				<0.1			**0.3**	<0.2	<0.5				
Chloromethane			µg/L	<2				<0.5			<0.5	<0.5	<1				
cis-1,2-Dichloroethylene	70		µg/L	<1				<0.1			<0.1	<0.2	<0.5				
cis-1,3-Dichloropropene	1.4		µg/L	<0.14				<0.2			<0.2	<0.2	<0.5				
Dibromochloromethane	5		µg/L	<0.2				<0.2			<0.2	<0.2	<0.5				
Dichlorodifluoromethane			µg/L										<1				
Dichloromethane(Methylene Chloride)	50		µg/L	<1				<0.5			<0.5	<0.2	<0.5				
Ethylbenzene	2.4		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Methyl isobutyl ketone	350		µg/L	<10				<5			<5		<20				
Methyl t-butyl ether (MTBE)	700		µg/L	<2				<0.2			<0.2		<0.5				
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<15				<5			**5**		<20				
Styrene	100		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Tetrachloroethylene	30		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Toluene	24		µg/L	<0.5				<0.2			**0.3**	<0.2	<0.5				
trans-1,2-Dichloroethylene	100		µg/L	<1				<0.1			<0.1	<0.2	<0.5				
trans-1,3-Dichloropropene	1.4		µg/L	<0.14				<0.2			<0.2	<0.2	<0.5				
Trichloroethylene	5		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Trichlorofluoromethane (FREON 11)			µg/L	<2							<0.2	<0.5	<1				
Vinyl Chloride	2		µg/L	<0.2				<0.2			<0.2		<0.5				
Xylene, *o*-	300		µg/L	<0.5				<0.1			<0.1	<0.2	<0.5				
Xylene, *p*- + *m*-	300		µg/L	<0.5				<0.1			<0.1	<0.2	<1				
Xylenes (total)	300		µg/L	<1				<0.1			<0.1	<0.2	<1.5				
PAHs																	
2-Methylnaphthalene			µg/L									<0.2	<0.02	<0.02	<0.2		
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05	<0.2	<0.02	<0.02	<0.2		
Acenaphthylene	1	Table 2	µg/L	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05	<0.2	<0.02	<0.02	<0.2		
Anthracene	2.4	Table 2	µg/L	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05	<0.2	<0.02	<0.02	<0.2		
Benzo(a)anthracene	1	Table 2	µg/L	<0.05		<0.05		<0.05	<0.05	<0.05	**0.2**	<0.2	<0.02	<0.02	<0.2		
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01		<0.01		**0.01**	<0.01	<0.01	**0.01**	<0.2	<0.005	<0.005	<0.2		
Benzo(b)fluoranthene	0.1	Table 2	µg/L									<0.2	<0.02	<0.02	<0.2		
Benzo(b,j)fluoranthene			µg/L	<0.05		<0.05		<0.05	<0.05	<0.05	0.05						
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.2	<0.02	<0.02	<0.2		
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05	<0.2	<0.02	<0.02	<0.2		
Chrysene	0.1	Table 2	µg/L	<0.05		<0.05		**0.06**	<0.05	<0.05	**0.1**	<0.2	<0.02	<0.02	<0.2		
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.5	<0.02	<0.02	<0.5		
Fluoranthene	0.41	Table 2	µg/L	<0.05		<0.05		**0.05**	<0.05	<0.05	**0.07**	<0.2	<0.02	<0.02	<0.2		
Fluorene	120	Table 2	µg/L	<0.05		<0.05		**0.06**	<0.05	<0.05	**0.08**	<0.2	<0.02	<0.02	<0.2		
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.5	<0.02	<0.02	<0.5		
Naphthalene	11	Table 2	µg/L	<0.05		<0.05		<0.05	<0.05	<0.05	**0.8**	<0.2	<0.02	<0.02	<0.2		
Phenanthrene	1	Table 2	µg/L	<0.05		<0.05		**0.2**	<0.05	**0.07**	**0.8**	<0.2	<0.02	<0.02	<0.2		
Pyrene	4.1	Table 2	µg/L	<0.05		<0.05		**0.09**	<0.05	<0.05	**0.2**	<0.2	<0.02	<0.02	<0.2		

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW1A-07	MW1A-07	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01
			Sampling Date	2011/07/06	2011/11/14	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2006/12/11	2006/12/12	2007/05/16	2007/07/31	2009/04/30
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Comprehensive	GW Indicator	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW PAH	GW Indicator	GW Indicator + GW PAH	GW Comprehensive	MOE
Field Parameters																	
Conductivity			µS/cm	840	830												
pH	6.5-8.5	OG		12	11.9												
Temperature			°C	13	12.3												
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L		91	392	381	375	391	416	455	427		426	404	299	408
Ammonia (as N)			mg/L		0.365	0.12	<0.05	0.21	0.16	0.16	0.08	0.19		0.11	0.13	0.17	<0.12
Biological Oxygen Demand (BOD_5)			mg/L			<3			<2			<2				<2	
Calcium (Ca)			mg/L		45.7	420	530	510	500	530	450	510		190	540	550	487
Chemical Oxygen Demand (COD)			mg/L		<5	6	7	<4	6	5	8	<4		<4	<4	<4	<8
Chloride (Cl)	250	AO	mg/L		19.2	12.5	10.8	11.8	11.8	11	18	14		12	12	23	13.2
Conductivity			µS/cm		659	3560	3800	4090	3780	4090	4610	4170		4170	4050	3890	4220
Dissolved Organic Carbon (DOC)	5	AO	mg/L		3	4.3	2.1	1.6	1.5	1.3	2	1.8		1.6	1.6	1.7	<8
Hardness ($CaCO_3$)	80-100	OG	mg/L			2750			2640			3200				3300	2810
Nitrate (as N)	10	MAC	mg/L		<0.25	<0.1	<0.1	<1	<0.2	<0.1	1.1	0.2		0.1	<0.1	<0.1	<0.05
Nitrite (as N)	1	MAC	mg/L			<0.1			<0.3			0.01				<0.01	<0.005
pH	6.5-8.5	OG			10.9	7.27	7.92	7.73	8.01	7.95	7.8	7.60		7.9	7.7	8	7.62
Phenol 4AAP			mg/L			0.001			<0.001			<0.001				<0.001	<0.0002
Potassium (K)			mg/L		5.73	5.8			5.9			7.3				9.5	6.96
Sulphates (SO_4)	500	AO	mg/L		94.8	2470	2320	2480	2540	2430	2800	2440		2430	2670	2800	2700
Total Dissolved Solids (TDS)	500	AO	mg/L		274	4020	3760	4210	4470	4120	3000	2790		4020	3220	1870	4620
Total Kjeldahl Nitrogen (TKN)			mg/L			0.7			0.6			0.4				1.6	<0.2
Total Phosphorus (P)			mg/L			0.08			0.152			0.059				1.1	<0.02
Total Suspended Solids (TSS)			mg/L			467			160			55				2300	339
Metals																	
Arsenic	0.025	IMAC	mg/L			<0.0014	<0.0014		0.0057			<0.001				<0.001	<0.0005
Barium	1	MAC	mg/L		0.126	0.0046	0.0047	<0.005	0.009	<0.005	<0.005	<0.005		<0.03	<0.03	0.01	<0.006
Beryllium			mg/L			<0.0014	<0.0014		<0.0005			<0.0005				<0.0005	<0.001
Boron	5	IMAC	mg/L		0.0328	0.46	0.45	0.49	0.49	0.45	0.37	0.38		0.44	0.49	0.24	0.49
Cadmium	0.005	MAC	mg/L			<0.001	<0.001		<0.0001			<0.0001				<0.0001	<0.001
Chromium	0.05	MAC	mg/L			<0.0016	<0.0016		<0.005			<0.005				<0.005	<0.002
Cobalt			mg/L			0.004	0.005		0.0029			<0.003				0.0016	<0.003
Copper	1	AO	mg/L			<0.003	0.005		<0.001			0.003				<0.005	<0.001
Iron	0.3	AO	mg/L		0.0396	0.86	1.8	<0.05	3.9	<0.05	<0.05	<0.05		<0.3	<0.3	<0.05	<0.032
Lead	0.01	MAC	mg/L			0.0024	<0.0022		<0.0002			<0.0005				<0.0005	<0.005
Magnesium			mg/L		<0.05	370	410	380	380	420	460	460		480	400	470	452
Manganese	0.05	AO	mg/L			0.22	0.23		0.12			0.14				0.1	0.216
Mercury	0.001	MAC	mg/L			<0.0001	<0.0001		<0.0001			<0.0001				<0.0001	<0.06
Molybdenum			mg/L			0.0051	0.0072		0.0052			0.006				0.008	<0.005
Nickel			mg/L			<0.001	0.011		0.006			0.016				0.021	<0.016
Silver			mg/L			<0.0006	<0.0006		<0.0005			<0.0001				<0.0001	<0.003
Sodium	200	AO	mg/L		53.4	110	130	130	120	130	160	140		150	120	140	150
Thallium			mg/L			<0.001	<0.001		<0.00005			<0.00005				0.00011	
Vanadium			mg/L			<0.001	<0.001		<0.001			<0.001				<0.0001	<0.001
Zinc	5	AO	mg/L			<0.005	0.015		<0.05			<0.05				<0.03	<0.005
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.10		<0.5			<0.1			<0.1				<0.1	<0.2
1,1,1-Trichloroethane	200		µg/L	<0.30		<0.5			<0.1			<0.1				<0.1	<0.2
1,1,2,2-Tetrachloroethane	1		µg/L	<0.10		<1			<0.1			<0.1				<0.1	<0.2
1,1,2-Trichloroethane	5		µg/L	<0.20		<0.5			<0.2			<0.2				<0.2	<0.2
1,1-Dichloroethane	70		µg/L	<0.30		<0.4			<0.1			<0.1				<0.1	<0.2
1,1-Dichloroethylene	14		µg/L	<0.30		<0.5			<0.1			<0.1				<0.1	<0.2
1,2-Dibromoethane (EDB)	1		µg/L	<0.20		<0.5			<0.2			<0.2				<0.2	<0.2
1,2-Dichlorobenzene	3		µg/L	<0.10		<0.5			<0.1			<0.2				<0.2	<0.2
1,2-Dichloroethane	5		µg/L	<0.20		<0.5			<0.1			<0.1				<0.1	<0.2
1,2-Dichloropropane	5		µg/L	<0.20		<0.5			<0.1			<0.1				<0.1	<0.2
1,3-Dichlorobenzene	630		µg/L	<0.10		<0.5			<0.1			<0.2				<0.2	<0.2
1,4-Dichlorobenzene	5		µg/L	<0.10		<0.5			<0.1			<0.2				<0.2	<0.2
2-Hexanone			µg/L	<0.30		<10			<5			<5				<5	
Acetone	3 000		µg/L	<1.0		<10			<10			<10				<10	
Benzene	5		µg/L	<0.20		<0.5			<0.1			<0.1				<0.1	<0.2
Bromodichloromethane	5		µg/L	<0.20		<0.2			<0.1			<0.1				<0.1	<0.2
Bromoform	5		µg/L	<0.10		<0.2			<0.2			<0.2				<0.2	<0.2
Bromomethane	10		µg/L	<0.20		<3			<0.5			<0.5				<0.5	<0.5
Carbon Tetrachloride	5		µg/L	<0.20		<0.5			<0.1			<0.1				<0.1	<0.2
Chlorobenzene	30		µg/L	<0.10		<0.5			<0.1			<0.1				<0.1	<0.2
Chloroethane			µg/L	<0.20		<1			<0.2			<0.2				<0.2	<0.5
Chloroform	5		µg/L	<0.20		<0.2			<0.1			<0.1				<0.1	<0.2
Chloromethane			µg/L	<0.40		<2			<0.5			<0.5				0.4	<0.5
cis-1,2-Dichloroethylene	70		µg/L	<0.20		<1			<0.1			<0.1				<0.1	<0.2
cis-1,3-Dichloropropene	1.4		µg/L	<0.20		<0.14			<0.2			<0.2				<0.2	<0.2
Dibromochloromethane	5		µg/L	<0.10		<0.2			<0.2			<0.2				<0.2	<0.2
Dichlorodifluoromethane			µg/L	<0.20													
Dichloromethane(Methylene Chloride)	50		µg/L	<0.30		<1			<0.5			<0.5				<0.5	<0.2
Ethylbenzene	2.4		µg/L	<0.10		<0.5			<0.1			<0.1				<0.1	<0.2
Methyl isobutyl ketone	350		µg/L	<1.0		<10			<5			<5				<5	
Methyl t-butyl ether (MTBE)	700		µg/L	<0.20		<2			<0.2			<0.2				<0.2	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<1.0		<15			<5			<5				<5	
Styrene	100		µg/L	<0.10		<0.5			<0.1			<0.1				<0.1	<0.2
Tetrachloroethylene	30		µg/L	<0.20		<0.5			<0.1			<0.1				<0.1	<0.2
Toluene	24		µg/L	**0.55**		<0.5			<0.2			<0.2				<0.2	<0.2
trans-1,2-Dichloroethylene	100		µg/L	<0.20		<1			<0.1			<0.1				<0.1	<0.2
trans-1,3-Dichloropropene	1.4		µg/L	<0.30		<0.14			<0.2			<0.2				<0.2	<0.2
Trichloroethylene	5		µg/L	<0.20		<0.5			<0.1			<0.1				<0.1	<0.2
Trichlorofluoromethane (FREON 11)			µg/L	<0.40		<2			<0.2							<0.2	<0.5
Vinyl Chloride	2		µg/L	<0.17		<0.5			<0.2			<0.2				<0.2	
Xylene, *o*-	300		µg/L	<0.10		<0.5			<0.1			<0.1				<0.1	<0.2
Xylene, *p*- + *m*-	300		µg/L	<0.20		<0.5			<0.1			<0.1				<0.1	<0.2
Xylenes (total)	300		µg/L	<0.20		<1			<0.1			<0.1				<0.1	<0.2
PAHs																	
2-Methylnaphthalene			µg/L														<0.2
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L	<0.20													
Acenaphthene	4.1	Table 2	µg/L	<0.10		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	<0.3	<0.2
Acenaphthylene	1	Table 2	µg/L	<0.11		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	<0.2
Anthracene	2.4	Table 2	µg/L	<0.05		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	<0.2
Benzo(a)anthracene	1	Table 2	µg/L	<0.08		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	<0.2
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01		<0.02			<0.01	<0.01		**0.01**	**0.01**		<0.01	**0.02**	<0.2
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.05													<0.2
Benzo(b,j)fluoranthene			µg/L			<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	0.06	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.06		<0.2			<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.2
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	<0.2
Chrysene	0.1	Table 2	µg/L	<0.05		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	**0.06**	<0.2
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.09		<0.2			<0.1	<0.1		<0.1	<0.1			<0.1	<0.5
Fluoranthene	0.41	Table 2	µg/L	<0.12		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	**0.05**	<0.2
Fluorene	120	Table 2	µg/L	<0.09		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	**0.05**	<0.2
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.06		<0.2			<0.1	<0.1		<0.1	<0.1		<0.1	<0.1	<0.5
Naphthalene	11	Table 2	µg/L	<0.12		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	**0.3**	<0.2
Phenanthrene	1	Table 2	µg/L	<0.10		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	**0.1**	<0.2
Pyrene	4.1	Table 2	µg/L	<0.05		<0.1			<0.05	<0.05		<0.05	<0.05		<0.05	**0.09**	<0.2

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW2A-01	MW4A-09	MW4A-09	MW4A-09	MW4A-09	MW4A-09	MW4A-09
			Sampling Date	**2009/07/23**	**2009/11/25**	**2009/12/03**	**2011/01/07**	**2011/05/30**	**2011/07/06**	**2011/07/06**	**2011/11/14**	**2009/07/23**	**2009/11/25**	**2009/12/04**	**2011/01/10**	**2011/05/30**	**2011/07/05**
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehsive	QA/QC Check	GW Indicator	GW Comprehsive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehsive
Field Parameters																	
Conductivity			µS/cm					3618	4200		4500					3098	3720
pH	6.5-8.5	OG						6.9	7.03		7.03					7.15	6.97
Temperature			°C					10.9	11		10.4					11.5	13.1
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	438	406	394	389	382	388	2.0	357	500	358	366	342	372	390
Ammonia (as N)			mg/L	0.14	0.087	<0.05	0.08	0.057	0.026	0.0	0.085	0.34	0.069	<0.05	0.09	<0.02	<0.02
Biological Oxygen Demand (BOD_5)			mg/L	<6.0					<5	0.0		<6.0					<5
Calcium (Ca)			mg/L	500	473	494	510	490	472	4.8	502	531	504	532	508	523	528
Chemical Oxygen Demand (COD)			mg/L	<10	<10	21	<5	<5	5	0.0	<5	10	20	60	<5	<5	5.04
Chloride (Cl)	250	AO	mg/L	21.4	11.6	12.2	13.7	14.9	14.5	4.2	13.8	<20	17.1	12.2	11.6	14.3	13.3
Conductivity			µS/cm	4200	4080	4060	3530	3700	4040	0.2	4290	3890	3870	3680	3340	3400	3590
Dissolved Organic Carbon (DOC)	5	AO	mg/L	7.5	2.6	2.1	3.2	2.2	2.4	0.4	1.4	5.4	4.5	1.8	15.2	7.43	6.1
Hardness ($CaCO_3$)	80-100	OG	mg/L	3260		2990			2860	4.3		2540		2580			2470
Nitrate (as N)	10	MAC	mg/L	<1.0	<0.50	<0.005	<0.05	<0.25	<0.1	0.0	<0.25	<1.0	<0.50	<0.08	<0.10	<0.1	<0.2
Nitrite (as N)	1	MAC	mg/L	<1.0		<0.05			<0.1	0.0		<1.0	<0.007	<0.007			<0.2
pH	6.5-8.5	OG		7.55	7.56	7.59	8.04	8.08	7.84	0.5	7.98	7.66	7.77	7.71	7.82	7.87	7.96
Phenol 4AAP			mg/L	0.0015		0.0011			<0.001	0.0		0.0033		<0.0002			<0.001
Potassium (K)			mg/L	<10		7.14			6.82	4.0	7.12	20		8.13			8.13
Sulphates (SO_4)	500	AO	mg/L	3240	3050	2720	2650	2880	2700	0.4	2940	2470	2960	2330	2460	2640	<0.4
Total Dissolved Solids (TDS)	500	AO	mg/L	4630	4390	4440	4330	4170	4500	6.4	4360	3830	3960	3850	3620	3660	3460
Total Kjeldahl Nitrogen (TKN)			mg/L	<0.15		<0.15			0.22	0.1		0.404		0.96			0.18
Total Phosphorus (P)			mg/L	0.188		0.12			<0.02	0.0		0.304		1.71			0.474
Total Suspended Solids (TSS)			mg/L	474		198			64.5	11.0		6230		8740			555
Metals																	
Arsenic	0.025	IMAC	mg/L	<0.010		<0.0005			<0.003	0.00		<0.010		<0.0005			<0.003
Barium	1	MAC	mg/L	<0.10	<0.010	<0.005	<0.020	0.0065	0.0054	0.00	0.0041	<0.10	0.017	<0.009	0.006	0.0086	0.0105
Beryllium			mg/L	<0.010		<0.001			<0.001	0.00		<0.010		<0.001			<0.001
Boron	5	IMAC	mg/L	0.51	0.365	0.41	2.29	0.367	0.387	6.02	0.354	0.51	0.302	0.41	0.353	0.34	0.342
Cadmium	0.005	MAC	mg/L	<0.0010		<0.001			<0.0001	0.00		<0.0010		<0.001			<0.0001
Chromium	0.05	MAC	mg/L	<0.010		<0.002			<0.003	0.00		<0.010		<0.002			<0.003
Cobalt			mg/L	<0.0080		<0.002			0.00285	5.13		<0.0080		<0.001			0.0013
Copper	1	AO	mg/L	<0.010		<0.001			0.00261	0.00		<0.010		<0.001			0.00226
Iron	0.3	AO	mg/L	<0.50	<0.050	<0.032	0.888	<0.01	<0.01	0.00	<0.01	<0.50	<0.050	<0.005	<0.010	0.04	0.0408
Lead	0.01	MAC	mg/L	<0.010		<0.005			<0.001	0.00		<0.010		<0.005			<0.001
Magnesium			mg/L	489	370	436	396	410	408	3.75	445	295	222	342	312	266	280
Manganese	0.05	AO	mg/L	0.246		0.165			0.146	3.37		0.19		0.187			0.151
Mercury	0.001	MAC	mg/L	<0.00010		<0.03			<0.00005	0.00		<0.00010		0.0017			<0.00005
Molybdenum			mg/L	<0.010		<0.005			0.0064	0.00		0.012		<0.008			0.0102
Nickel			mg/L	0.039		<0.016			0.012	0.00		0.025		<0.012			0.0046
Silver			mg/L	<0.0010		<0.003			<0.0001	0.00		<0.0010		<0.003			<0.0001
Sodium	200	AO	mg/L	151	112	132	121	135	133	12.80	134	171	172	142	114	131	117
Thallium			mg/L	<0.0030					<0.0003	0.00		<0.0030					<0.0003
Vanadium			mg/L	<0.010		<0.001			<0.002	0.00		<0.010		<0.001			<0.002
Zinc	5	AO	mg/L	<0.030		<0.003			0.0215	0.02		<0.030		0.016			0.0149
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
1,1,1-Trichloroethane	200		µg/L	<0.5		<0.2			<0.30	0.00		<0.5		<0.2			<0.30
1,1,2,2-Tetrachloroethane	1		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
1,1,2-Trichloroethane	5		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
1,1-Dichloroethane	70		µg/L	<0.5		<0.2			<0.30	0.00		<0.5		<0.2			<0.30
1,1-Dichloroethylene	14		µg/L	<0.5		<0.2			<0.30	0.00		<0.5		<0.2			<0.30
1,2-Dibromoethane (EDB)	1		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			
1,2-Dichlorobenzene	3		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
1,2-Dichloroethane	5		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
1,2-Dichloropropane	5		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
1,3-Dichlorobenzene	630		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
1,4-Dichlorobenzene	5		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
2-Hexanone			µg/L	<20					<0.30	0.00		<20					<0.30
Acetone	3 000		µg/L	<20					<1.0	0.00		<20					<1.0
Benzene	5		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		**0.3**			<0.20
Bromodichloromethane	5		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
Bromoform	5		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
Bromomethane	10		µg/L	**1.74**		<0.5			<0.20	0.00		**1.38**		<0.5			<0.20
Carbon Tetrachloride	5		µg/L	**0.5**		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
Chlorobenzene	30		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
Chloroethane			µg/L	<1		<0.5			<0.20	0.00		<1		<0.5			<0.20
Chloroform	5		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		**0.2**			<0.20
Chloromethane			µg/L	<1		<0.5			<0.40	0.00		<1		<0.5			<0.40
cis-1,2-Dichloroethylene	70		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			
cis-1,3-Dichloropropene	1.4		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
Dibromochloromethane	5		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
Dichlorodifluoromethane			µg/L	<1		<0.5			<0.20	0.00		<1		<0.5			<0.20
Dichloromethane(Methylene Chloride)	50		µg/L	<0.5		<0.2			<0.30	0.00		<0.5		<0.2			
Ethylbenzene	2.4		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
Methyl isobutyl ketone	350		µg/L	<20					<1.0	0.00		<20					
Methyl t-butyl ether (MTBE)	700		µg/L	<0.5					<0.20	0.00		<0.5					
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<20					<1.0	0.00		<20					
Styrene	100		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
Tetrachloroethylene	30		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
Toluene	24		µg/L	<0.5		<0.2			<0.20	0.00		**0.76**		**0.5**			<0.20
trans-1,2-Dichloroethylene	100		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
trans-1,3-Dichloropropene	1.4		µg/L	<0.5		<0.2			<0.30	0.00		<0.5		<0.2			<0.30
Trichloroethylene	5		µg/L	<0.5		<0.2			<0.20	0.00		<0.5		<0.2			<0.20
Trichlorofluoromethane (FREON 11)			µg/L	<1		<0.5			<0.40	0.00		<1		<0.5			
Vinyl Chloride	2		µg/L	<0.5					<0.17	0.00		<0.5					<0.17
Xylene, *o*-	300		µg/L	<0.5		<0.2			<0.10	0.00		<0.5		<0.2			<0.10
Xylene, *p*- + *m*-	300		µg/L	<1		<0.2			<0.20	0.00		<1		**0.2**			<0.20
Xylenes (total)	300		µg/L	<1.5		<0.2			<0.20	0.00		<1.5		**0.2**			<0.20
PAHs																	
2-Methylnaphthalene			µg/L	<0.02	<0.02	<0.2						0.044	<0.02	<0.2			
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L						<0.20	0.00							<0.20
Acenaphthene	4.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.10	0.00		<0.02	<0.02	<0.2			<0.10
Acenaphthylene	1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.11	0.00		<0.02	<0.02	<0.2			<0.11
Anthracene	2.4	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05	0.00		<0.02	<0.02	<0.2			<0.05
Benzo(a)anthracene	1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.08	0.00		<0.02	<0.02	<0.2			<0.08
Benzo(a)pyrene	0.01	MAC	µg/L	<0.005	<0.005	<0.2			<0.01	0.00		<0.005	<0.005	<0.2			<0.01
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05	0.00		<0.02	<0.02	<0.2			
Benzo(b,j)fluoranthene			µg/L														
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.02	<0.02	<0.2			<0.06	0.00		<0.02	<0.02	<0.2			<0.06
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05	0.00		<0.02	<0.02	<0.2			<0.05
Chrysene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05	0.00		<0.02	<0.02	<0.2			<0.05
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.02	<0.02	<0.5			<0.09	0.00		<0.02	<0.02	<0.5			<0.09
Fluoranthene	0.41	Table 2	µg/L	<0.02	<0.02	<0.2			<0.12	0.00		<0.02	<0.02	<0.2			<0.12
Fluorene	120	Table 2	µg/L	<0.02	<0.02	<0.2			<0.09	0.00		<0.02	<0.02	<0.2			<0.09
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.02	<0.02	<0.5			<0.06	0.00		<0.02	<0.02	<0.5			<0.06
Naphthalene	11	Table 2	µg/L	<0.02	<0.02	<0.2			<0.12	0.00		**0.058**	<0.02	<0.2			<0.12
Phenanthrene	1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.10	0.00		**0.036**	<0.02	<0.2			<0.10
Pyrene	4.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05	0.00		<0.02	<0.02	<0.2			<0.05

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW4A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09	MW6A-07	MW6A-07	MW6A-07	MW6A-07	MW6A-07
			Sampling Date	2011/11/16	2009/07/23	2009/11/24	2009/12/03	2009/12/17	2011/01/10	2011/05/30	2011/07/05	2011/11/16	2009/04/30	2009/07/23	2009/11/24	2009/12/03	2011/01/10
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	MOE	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator
Field Parameters																	
Conductivity			µS/cm	3800						3495	3563	4360					
pH	6.5-8.5	OG		6.43						7.03	8.19	6.67					
Temperature			°C	10.5						10.9	11.4	9.9					
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	346	418	412	404		382	394	390	393	431	451	434	425	411
Ammonia (as N)			mg/L	0.042	0.755	0.442	0.45		0.58	0.295	0.45	0.478	0.41	0.564	0.235	<0.18	0.93
Biological Oxygen Demand (BOD_5)			mg/L		<6.0						<5			<6.0			
Calcium (Ca)			mg/L	509	502	504	498		533	536	503	472	535	541	521	529	545
Chemical Oxygen Demand (COD)			mg/L	<5	<10	14	<50		<5	<5	7.58	<5	47	10	20	50	10
Chloride (Cl)	250	AO	mg/L	12	<20	13.3	19.5		13.2	50.4	15.5	14.3	9.5	<20	10	16.3	10.2
Conductivity			µS/cm	3700	4200	4180	4280		3680	3710	4040	4210	3890	3700	3760	3860	3410
Dissolved Organic Carbon (DOC)	5	AO	mg/L	30.2	4.7	5.4	2.2		1.8	1.7	3.9	29.6	5.3	4.1	4.3	3.7	2.2
Hardness ($CaCO_3$)	80-100	OG	mg/L		3100		2900				2890		2630	2710		2640	
Nitrate (as N)	10	MAC	mg/L	<0.25	<1.0	0.5	<0.005		<0.10	<0.25	<0.2	<0.25	<0.05	<1.0	0.5	<0.014	<0.10
Nitrite (as N)	1	MAC	mg/L		<1.0		<0.05				<0.2		<0.005	<1.0		<0.05	
pH	6.5-8.5	OG		7.92	7.6	7.5	8.00		7.78	7.91	7.79	7.84	7.54	7.51	7.51	7.43	7.79
Phenol 4AAP			mg/L		0.0011		<0.0002				<0.001		<0.0002	0.0064		<0.0002	
Potassium (K)			mg/L	7	<10		5.74				5.51	5.31	4.62	<10		4.85	
Sulphates (SO_4)	500	AO	mg/L	2390	3200	2910	2780		2760	2880	2890	2780	2380	2600	2550	2420	2500
Total Dissolved Solids (TDS)	500	AO	mg/L	3580	4510	4450	4690		3860	4480	4280	4350	4210	3790	4000	4080	3820
Total Kjeldahl Nitrogen (TKN)			mg/L		0.9		2.3				0.59		0.91	0.61		1.2	
Total Phosphorus (P)			mg/L		0.508		2.93				0.366		0.56	0.183		1.4	
Total Suspended Solids (TSS)			mg/L		4670		7360				463		655	5620		2050	
Metals																	
Arsenic	0.025	IMAC	mg/L		<0.010		0.0095				0.0151		<0.0005	<0.010		<0.0005	
Barium	1	MAC	mg/L	0.0066	<0.10	<0.010	<0.008		0.008	0.0073	0.0082	0.0062	<0.008	<0.10	<0.010	<0.007	0.009
Beryllium			mg/L		<0.010		<0.001				<0.001		<0.001	<0.010		<0.001	
Boron	5	IMAC	mg/L	0.402	0.81	0.577	0.7		0.546	0.518	0.523	0.677	0.55	0.65	0.455	0.57	0.413
Cadmium	0.005	MAC	mg/L		<0.0010		<0.001				<0.0001		<0.001	<0.0010		<0.001	
Chromium	0.05	MAC	mg/L		<0.010		<0.002				<0.003		<0.002	<0.010		<0.002	
Cobalt			mg/L		<0.0080		<0.001				0.00089		<0.001	<0.0080		<0.001	
Copper	1	AO	mg/L		<0.010		<0.001				0.00172		<0.001	<0.010		<0.001	
Iron	0.3	AO	mg/L	0.0102	4.2	2.87	4.49		3.12	3.36	3.69	3.37	7.61	7.67	6.47	7.27	4.94
Lead	0.01	MAC	mg/L		<0.010		<0.005				<0.001		<0.005	<0.010		<0.005	
Magnesium			mg/L	282	448	418	483		429	417	396	385	322	331	318	374	349
Manganese	0.05	AO	mg/L		0.089		0.061				0.0458		0.12	0.103		0.128	
Mercury	0.001	MAC	mg/L		<0.00010		0.0016	<0.0002			<0.00005		<0.03	<0.00010		0.21	
Molybdenum			mg/L		<0.010		<0.005				0.0062		<0.005	<0.010		<0.005	
Nickel			mg/L		<0.020		<0.006				<0.003		<0.006	<0.020		<0.006	
Silver			mg/L		<0.0010		<0.003				<0.0001		<0.003	<0.0010		<0.003	
Sodium	200	AO	mg/L	108	166	155	157		154	150	139	138	138	150	133	128	130
Thallium			mg/L		<0.0030						<0.0003			<0.0030			
Vanadium			mg/L		<0.010		<0.001				<0.002		<0.001	<0.010		<0.001	
Zinc	5	AO	mg/L		<0.030		0.015				0.0178		<0.003	<0.030		<0.002	
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
1,1,1-Trichloroethane	200		µg/L		<0.5		<0.2				<0.30		<0.2	<0.5		<0.2	
1,1,2,2-Tetrachloroethane	1		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
1,1,2-Trichloroethane	5		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
1,1-Dichloroethane	70		µg/L		<0.5		<0.2				<0.30		<0.2	<0.5		<0.2	
1,1-Dichloroethylene	14		µg/L		<0.5		<0.2				<0.30		<0.2	<0.5		<0.2	
1,2-Dibromoethane (EDB)	1		µg/L		<0.5		<0.2						<0.2	<0.5		<0.2	
1,2-Dichlorobenzene	3		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
1,2-Dichloroethane	5		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
1,2-Dichloropropane	5		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
1,3-Dichlorobenzene	630		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
1,4-Dichlorobenzene	5		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
2-Hexanone			µg/L		<20						<0.30			<20			
Acetone	3 000		µg/L		<20						<1.0			<20			
Benzene	5		µg/L		<0.5		**0.2**				<0.20		<0.2	<0.5		**0.2**	
Bromodichloromethane	5		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
Bromoform	5		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
Bromomethane	10		µg/L		**2.04**		<0.5				<0.20		0	**2.33**		<0.5	
Carbon Tetrachloride	5		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
Chlorobenzene	30		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
Chloroethane			µg/L		<1		<0.5				<0.20		<0.5	<1		<0.5	
Chloroform	5		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
Chloromethane			µg/L		<1		<0.5				<0.40		<0.5	<1		<0.5	
cis-1,2-Dichloroethylene	70		µg/L		<0.5		<0.2						<0.2	<0.5		<0.2	
cis-1,3-Dichloropropene	1.4		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
Dibromochloromethane	5		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
Dichlorodifluoromethane			µg/L		<1		<0.5				<0.20			<1		<0.5	
Dichloromethane(Methylene Chloride)	50		µg/L		<0.5		<0.2						<0.2	<0.5		<0.2	
Ethylbenzene	2.4		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
Methyl isobutyl ketone	350		µg/L		<20									<20			
Methyl t-butyl ether (MTBE)	700		µg/L		<0.5									<0.5			
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<20									<20			
Styrene	100		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
Tetrachloroethylene	30		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
Toluene	24		µg/L		<0.5		**0.4**				<0.20		**2.5**	**3.15**		**0.5**	
trans-1,2-Dichloroethylene	100		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
trans-1,3-Dichloropropene	1.4		µg/L		<0.5		<0.2				<0.30		<0.2	<0.5		<0.2	
Trichloroethylene	5		µg/L		<0.5		<0.2				<0.20		<0.2	<0.5		<0.2	
Trichlorofluoromethane (FREON 11)			µg/L		<1		<0.5							<1		<0.5	
Vinyl Chloride	2		µg/L		<0.5						<0.17			<0.5			
Xylene, *o*-	300		µg/L		<0.5		<0.2				<0.10		<0.2	<0.5		<0.2	
Xylene, *p*- + *m*-	300		µg/L		<1		**0.3**				<0.20		<0.2	<1		**0.4**	
Xylenes (total)	300		µg/L		<1.5		**0.3**				<0.20		<0.2	<1.5		**0.4**	
PAHs																	
2-Methylnaphthalene			µg/L	0.04	<0.02		<0.2						<0.2	<0.02	<0.02	<0.2	
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L								<0.20						
Acenaphthene	4.1	Table 2	µg/L	<0.02	<0.02	<0.2					<0.10		<0.2	<0.02	<0.02	<0.2	
Acenaphthylene	1	Table 2	µg/L	<0.02	<0.02	<0.2					<0.11		<0.2	<0.02	<0.02	<0.2	
Anthracene	2.4	Table 2	µg/L	<0.02	<0.02	<0.2					<0.05		<0.2	<0.02	<0.02	<0.2	
Benzo(a)anthracene	1	Table 2	µg/L	<0.02	<0.02	<0.2					<0.08		<0.2	<0.02	<0.02	<0.2	
Benzo(a)pyrene	0.01	MAC	µg/L	<0.005	<0.005	<0.2					<0.01		<0.2	<0.005	<0.005	<0.2	
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2							<0.2	<0.02	<0.02	<0.2	
Benzo(b,j)fluoranthene			µg/L														
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.02	<0.02	<0.2					<0.06		<0.2	<0.02	<0.02	<0.2	
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2					<0.05		<0.2	<0.02	<0.02	<0.2	
Chrysene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2					<0.05		<0.2	<0.02	<0.02	<0.2	
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.02	<0.02	<0.5					<0.09		<0.5	<0.02	<0.02	<0.5	
Fluoranthene	0.41	Table 2	µg/L	<0.02	<0.02	<0.2					<0.12		<0.2	<0.02	<0.02	<0.2	
Fluorene	120	Table 2	µg/L	<0.02	<0.02	<0.2					<0.09		<0.2	<0.02	<0.02	<0.2	
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.02	<0.02	<0.5					<0.06		<0.5	<0.02	<0.02	<0.5	
Naphthalene	11	Table 2	µg/L	**0.047**	<0.02	<0.2					<0.12		<0.2	<0.02	<0.02	<0.2	
Phenanthrene	1	Table 2	µg/L	**0.094**	<0.02	<0.2					<0.10		<0.2	<0.02	<0.02	<0.2	
Pyrene	4.1	Table 2	µg/L	<0.02	<0.02	<0.2					<0.05		<0.2	<0.02	<0.02	<0.2	

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	MW6A-07	MW6A-07	MW6A-07	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06	OW1A-06
			Sampling Date	2011/05/30	2011/07/05	2011/11/15	2006/12/12	2007/05/16	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/04	2011/01/07	2011/05/30	2011/07/06	2011/11/15
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Indicator	GW Comprehensive	GW Indicator	GW Indicator + GW PAH	GW Indicator + GW PAH	GW Comprehensive	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator
Field Parameters																	
Conductivity			µS/cm	3850	3870	4100									3475	4060	4260
pH	6.5-8.5	OG		7.12	6.96	6.95									7.07	6.96	6.97
Temperature			°C	11.3	10.9	10.6									10.9	10.3	10.1
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	402	428	414	374	351	379	415	459	516	478	395	326	411	407
Ammonia (as N)			mg/L	0.228	0.31	0.563	0.71	0.56	0.72	0.42	0.44	0.283	0.28	0.25	0.22	0.368	0.366
Biological Oxygen Demand (BOD_5)			mg/L		<5				<2		<6.0					<5	
Calcium (Ca)			mg/L	528	526	490	500	480	550	503	419	384	448	514	475	462	456
Chemical Oxygen Demand (COD)			mg/L	<5	5.67	<5	420	9	<4	36	<10	27	13	<5	<5	<5	<5
Chloride (Cl)	250	AO	mg/L	11.1	11.7	10.6	12	12	12	11.4	<20	10.6	14.1	12.7	12.5	11.7	11.6
Conductivity			µS/cm	3620	3740	3940	4450	4330	3840	4220	4010	4030	3930	3540	3700	3850	4110
Dissolved Organic Carbon (DOC)	5	AO	mg/L	2.26	3.3	3.1	5.7	2.7	2	2	3.8	3	2.1	2.3	3.88	4.7	2.7
Hardness ($CaCO_3$)	80-100	OG	mg/L		2640				3100	2850	2860		2770			2710	
Nitrate (as N)	10	MAC	mg/L	<0.1	<0.2	<0.25	<0.1	<0.1	<0.1	<0.05	<1.0	<0.50	<0.05	<0.05	<0.1	<0.1	<0.25
Nitrite (as N)	1	MAC	mg/L		<0.2				<0.01	<0.009	<1.0		<0.024			<0.1	
pH	6.5-8.5	OG		7.76	7.77	7.84	7.8	7.80	8	7.64	7.72	7.74	7.84	7.82	7.69	7.84	7.95
Phenol 4AAP			mg/L		<0.001				<0.001	<0.0002	0.0018		<0.0004			<0.001	
Potassium (K)			mg/L		4.76	4.84			6	4.91	<10		4.86			4.65	4.79
Sulphates (SO_4)	500	AO	mg/L	2890	2580	2570	2680	2400	2800J	406	2800	2680	2450	2670	2970	2520	2620
Total Dissolved Solids (TDS)	500	AO	mg/L	3780	3110	3890	4320	4240	1810	4480	4120	4070	4330	4280	3970	2390	4020
Total Kjeldahl Nitrogen (TKN)			mg/L		0.46				3	0.79	0.465		0.84			0.57	
Total Phosphorus (P)			mg/L		1.91				3.4	0.41	0.406		0.64			0.213	
Total Suspended Solids (TSS)			mg/L		4290				5500	1850	710		1090			1460	
Metals																	
Arsenic	0.025	IMAC	mg/L		<0.003				0.008	0.0045	<0.010		0.0035			0.0068	
Barium	1	MAC	mg/L	0.0058	0.0083	0.0056	<0.005	<0.03	0.005	<0.008	<0.10	<0.010	<0.006	0.009	0.0065	0.0069	0.0059
Beryllium			mg/L		<0.001				<0.0005	<0.001	<0.010		<0.001			<0.001	
Boron	5	IMAC	mg/L	0.431	0.443	0.501	0.54	0.62	0.53	0.73	0.73	0.546	0.59	0.391	0.551	0.48	0.558
Cadmium	0.005	MAC	mg/L		<0.0001				<0.0001	<0.001	<0.0010		<0.001			<0.0001	
Chromium	0.05	MAC	mg/L		<0.003				<0.005	<0.002	<0.010		<0.002			0.0041	
Cobalt			mg/L		0.00063				<0.0005	<0.001	<0.0080		<0.001			0.00098	
Copper	1	AO	mg/L		0.0016				<0.005	<0.001	<0.010		<0.001			0.00249	
Iron	0.3	AO	mg/L	3.75	4.82	3.96	7.7	3.5	4.7	2.78	2.11	1.85	2.2	3.22	2.65	2.75	2.52
Lead	0.01	MAC	mg/L		<0.001				<0.0005	<0.005	<0.010		<0.005			<0.001	
Magnesium			mg/L	340	322	330	400	360	430	462	439	389	413	403	374	379	383
Manganese	0.05	AO	mg/L		0.114				0.12	0.139	0.112		0.117			0.118	
Mercury	0.001	MAC	mg/L		<0.00005				<0.0001	0.51	<0.00010		0.00029			<0.00005	
Molybdenum			mg/L		0.0029				0.01	<0.007	<0.010		<0.005			0.0055	
Nickel			mg/L		<0.003				<0.001	<0.006	<0.020		<0.006			<0.003	
Silver			mg/L		<0.0001				<0.0001	<0.003	<0.0010		<0.003			<0.0001	
Sodium	200	AO	mg/L	118	116	117	230	340	180	187	204	187	179	140	135	136	136
Thallium			mg/L		<0.0003				<0.00005		<0.0030					<0.0003	
Vanadium			mg/L		<0.002				<0.001	<0.001	<0.010		<0.001			<0.002	
Zinc	5	AO	mg/L		0.0249				<0.03	<0.005	<0.030		<0.004			0.0183	
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<0.10				<0.1	<0.2	<0.5		<0.2			<0.10	
1,1,1-Trichloroethane	200		µg/L		<0.30				<0.1	<0.2	<0.5		<0.2			<0.30	
1,1,2,2-Tetrachloroethane	1		µg/L		<0.10				<0.1	<0.2	<0.5		<0.2			<0.10	
1,1,2-Trichloroethane	5		µg/L		<0.20				<0.2	<0.2	<0.5		<0.2			<0.20	
1,1-Dichloroethane	70		µg/L		<0.30				<0.1	<0.2	<0.5		<0.2			<0.30	
1,1-Dichloroethylene	14		µg/L		<0.30				<0.1	<0.2	<0.5		<0.2			<0.30	
1,2-Dibromoethane (EDB)	1		µg/L						<0.2	<0.2	<0.5		<0.2			<0.20	
1,2-Dichlorobenzene	3		µg/L		<0.10				<0.2	<0.2	<0.5		<0.2			<0.10	
1,2-Dichloroethane	5		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
1,2-Dichloropropane	5		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
1,3-Dichlorobenzene	630		µg/L		<0.10				<0.2	<0.2	<0.5		<0.2			<0.10	
1,4-Dichlorobenzene	5		µg/L		<0.10				<0.2	<0.2	<0.5		<0.2			<0.10	
2-Hexanone			µg/L		<0.30				<5		<20					<0.30	
Acetone	3 000		µg/L		<1.0				<10		<20					<1.0	
Benzene	5		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
Bromodichloromethane	5		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
Bromoform	5		µg/L		<0.10				<0.2	<0.2	<0.5		<0.2			<0.10	
Bromomethane	10		µg/L		<0.20				<0.5	<0.5	**2.78**		<0.5			<0.20	
Carbon Tetrachloride	5		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
Chlorobenzene	30		µg/L		<0.10				<0.1	<0.2	<0.5		<0.2			<0.10	
Chloroethane			µg/L		<0.20				<0.2	<0.5	<1		<0.5			<0.20	
Chloroform	5		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
Chloromethane			µg/L		<0.40				<0.5	<0.5	<1		0.6			<0.40	
cis-1,2-Dichloroethylene	70		µg/L						<0.1	<0.2	<0.5		<0.2			<0.20	
cis-1,3-Dichloropropene	1.4		µg/L		<0.20				<0.2	<0.2	<0.5		<0.2			<0.20	
Dibromochloromethane	5		µg/L		<0.10				<0.2	<0.2	<0.5		<0.2			<0.10	
Dichlorodifluoromethane			µg/L		<0.20						<1		<0.5			<0.20	
Dichloromethane(Methylene Chloride)	50		µg/L						<0.5	<0.2	<0.5		<0.2			<0.30	
Ethylbenzene	2.4		µg/L		<0.10				<0.1	<0.2	<0.5		<0.2			<0.10	
Methyl isobutyl ketone	350		µg/L						<5		<20					<1.0	
Methyl t-butyl ether (MTBE)	700		µg/L						<0.2		<0.5					<0.20	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L						<5		<20					<1.0	
Styrene	100		µg/L		<0.10				<0.1	<0.2	<0.5		<0.2			<0.10	
Tetrachloroethylene	30		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
Toluene	24		µg/L		<0.20				<0.2	**0.2**	<0.5		<0.2			<0.20	
trans-1,2-Dichloroethylene	100		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
trans-1,3-Dichloropropene	1.4		µg/L		<0.30				<0.2	<0.2	<0.5		<0.2			<0.30	
Trichloroethylene	5		µg/L		<0.20				<0.1	<0.2	<0.5		<0.2			<0.20	
Trichlorofluoromethane (FREON 11)			µg/L						<0.2	<0.5	<1		<0.5			<0.40	
Vinyl Chloride	2		µg/L		<0.17				<0.2		<0.5					<0.17	
Xylene, o-	300		µg/L		<0.10				<0.1	<0.2	<0.5		<0.2			<0.10	
Xylene, *p-* + *m-*	300		µg/L		<0.20				<0.1	<0.2	<1		<0.2			<0.20	
Xylenes (total)	300		µg/L		<0.20				<0.1	<0.2	<1.5		<0.2			<0.20	
PAHs																	
2-Methylnaphthalene			µg/L							<0.2	<0.02	<0.02	<0.2				
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L		<0.20											<0.20	
Acenaphthene	4.1	Table 2	µg/L		<0.10		<0.1	<0.05	<0.05	<0.2	<0.02	<0.02	<0.2			<0.10	
Acenaphthylene	1	Table 2	µg/L		<0.11		<0.1	<0.05	<0.05	<0.2	<0.02	<0.02	<0.2			<0.11	
Anthracene	2.4	Table 2	µg/L		<0.05		**0.1**	**0.1**	<0.05	<0.2	<0.02	<0.02	<0.2			<0.05	
Benzo(a)anthracene	1	Table 2	µg/L		<0.08		**0.1**	**0.09**	<0.05	<0.2	<0.02	<0.02	<0.2			<0.08	
Benzo(a)pyrene	0.01	MAC	µg/L		<0.01		**0.09**	**0.04**	**0.02**	<0.2	<0.005	<0.005	<0.2			<0.01	
Benzo(b)fluoranthene	0.1	Table 2	µg/L							<0.2	<0.02	<0.02	<0.2			<0.05	
Benzo(b,j)fluoranthene			µg/L				0.2	0.1	0.06								
Benzo(g,h,i)perylene	0.2	Table 2	µg/L		<0.06		<0.2	<0.1	<0.1	<0.2	<0.02	<0.02	<0.2			<0.06	
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L		<0.05		<0.1	<0.05	<0.05	<0.2	<0.02	<0.02	<0.2			<0.05	
Chrysene	0.1	Table 2	µg/L		<0.05		**0.2**	**0.2**	**0.1**	<0.2	<0.02	**0.02**	<0.2			<0.05	
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L		<0.09		<0.2		<0.1	<0.5	<0.02	<0.02	<0.5			<0.09	
Fluoranthene	0.41	Table 2	µg/L		<0.12		**0.3**	**0.2**	**0.08**	<0.2	<0.02	<0.02	<0.2			<0.12	
Fluorene	120	Table 2	µg/L		<0.09		**0.2**	**0.2**	**0.06**	<0.2	<0.02	<0.02	<0.2			<0.09	
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L		<0.06		<0.2	<0.1	<0.1	<0.5	<0.02	<0.02	<0.5			<0.06	
Naphthalene	11	Table 2	µg/L		<0.12		**0.3**	**0.1**	**0.3**	<0.2	<0.02	<0.02	<0.2			<0.12	
Phenanthrene	1	Table 2	µg/L		<0.10		**1.6**	**2**	<0.05	<0.2	<0.02	**0.038**	<0.2			<0.10	
Pyrene	4.1	Table 2	µg/L		<0.05		**0.4**	**0.4**	**0.1**	<0.2	<0.02	<0.02	<0.2			<0.05	

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	OW1A-85	OW1A-85	OW1A-85	OW1A-85	OW1A-85	OW1A-85	OW1A-85	OW1A-85	OW3A-07	OW3A-07	OW3A-07	OW3A-07	OW3A-07	OW3A-07
			Sampling Date	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/03/30	2006/05/29	2006/07/19	2007/05/16	2007/07/31	2007/07/31	2009/07/23	2009/11/25	2009/12/04
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW PAH	GW Indicator + GW PAH	GW Comprehensive	GW Indicator + GW PAH	GW Comprehensive	GW VOC + GW PAH + DOC	GW Comprehensive	GW Indicator + GW PAH	MOE
Field Parameters																	
Conductivity			µS/cm														
pH	6.5-8.5	OG															
Temperature			°C														
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	358	352	335	373	389		374	381	409	390		423	446	398
Ammonia (as N)			mg/L	0.53	0.25	0.12	0.42	28.7		0.54	0.74	0.19	0.27		0.083	<0.050	<0.06
Biological Oxygen Demand (BOD_5)			mg/L	<3			<2				<2		<2		<6.0		
Calcium (Ca)			mg/L	510	590	560	580	610		570	580	280	440		277	188	362
Chemical Oxygen Demand (COD)			mg/L	11	<4	42	17	1000		69	27	32	<4		10	16	26
Chloride (Cl)	250	AO	mg/L	22.1	5.39	9.4	8	7		6	7	6	5		<20	2.7	4.3
Conductivity			µS/cm	2660	2870	2950	2910	3190		3010	3080	2130	2300		2230	1770	2370
Dissolved Organic Carbon (DOC)	5	AO	mg/L	3.2	2.5	1.8	2	130		3.1	1.9	10.3	4.6	4.7	6	6.8	3.8
Hardness ($CaCO_3$)	80-100	OG	mg/L	1670			1980				2000		1800		1210		1450
Nitrate (as N)	10	MAC	mg/L	<1	0.3	<1	<0.2	<0.1		<0.1	<0.1	<0.1	<0.1		<1.0	<0.10	<0.05
Nitrite (as N)	1	MAC	mg/L	<0.1			<0.3				0.01		<0.01		<1.0		<0.005
pH	6.5-8.5	OG		7.67	7.89	7.81	7.82	7.97		7.7	7.7	7.9	7.9		7.74	7.75	7.7
Phenol 4AAP			mg/L	<0.001			<0.001				<0.001		<0.001		0.001		<0.0002
Potassium (K)			mg/L	4.3			2.8				3.5		4.6		<10		3.67
Sulphates (SO_4)	500	AO	mg/L	1810	1650	1770	1870	1920		1440	1630	852	1190		1270	717	1180
Total Dissolved Solids (TDS)	500	AO	mg/L	2650	2980	3810	3150	3390		1950	2010	1280	1310		1880	1450	2240
Total Kjeldahl Nitrogen (TKN)			mg/L	1.2			0.9				0.8		1.3		<0.15		0.38
Total Phosphorus (P)			mg/L	2.9			0.76				1.6		1.5		0.97		0.53
Total Suspended Solids (TSS)			mg/L	5520			2000				2700		3100		1570		1350
Metals																	
Arsenic	0.025	IMAC	mg/L	0.014	0.011		<0.01				0.007		<0.001		<0.010		<0.0005
Barium	1	MAC	mg/L	0.008	0.0081	0.008	<0.05	<0.05		0.008	0.008	0.043	0.032		0.11	0.156	0.11
Beryllium			mg/L	<0.0014	<0.0014		<0.005				<0.0005		<0.0005		<0.010		<0.001
Boron	5	IMAC	mg/L	0.31	0.22	0.22	0.28	0.29		0.22	0.19	0.36	0.46		0.53	0.373	0.46
Cadmium	0.005	MAC	mg/L	<0.001	<0.001		<0.001				<0.0001		<0.0001		<0.0010		<0.001
Chromium	0.05	MAC	mg/L	<0.0016	0.0029		<0.05				<0.005		<0.005		<0.010		<0.004
Cobalt			mg/L	<0.001	<0.001		<0.005				<0.003		0.0033		<0.0080		<0.001
Copper	1	AO	mg/L	<0.003	0.003		<0.01				0.003		<0.005		<0.010		<0.001
Iron	0.3	AO	mg/L	5.5	4.5	<0.05	<0.5	<0.5		3.7	1.8	0.12	0.36		<0.50	0.192	<0.005
Lead	0.01	MAC	mg/L	0.0033	<0.0022		<0.002				<0.0005		<0.0005		<0.010		<0.005
Magnesium			mg/L	170	140	150	170	180		140	130	120	160		125	94.1	135
Manganese	0.05	AO	mg/L	0.036	0.043		<0.02				0.037		1.2		0.548		0.794
Mercury	0.001	MAC	mg/L	<0.0001	<0.0001		<0.0001				<0.0001		<0.0001		<0.00010		0.07
Molybdenum			mg/L	0.0026	0.0037		<0.01				0.003		0.007		<0.010		<0.005
Nickel			mg/L	<0.001	<0.001		<0.01				<0.005		0.003		<0.020		<0.012
Silver			mg/L	<0.0006	<0.0006		<0.005				<0.0001		<0.0001		<0.0010		<0.003
Sodium	200	AO	mg/L	77	66	76	73	76		61	58	82	86		81.8	67.8	77.4
Thallium			mg/L	<0.001	<0.001		<0.0005				<0.00005		<0.00005		<0.0030		
Vanadium			mg/L	<0.001	<0.001		<0.01				<0.001		<0.001		<0.010		<0.001
Zinc	5	AO	mg/L	<0.005	0.008		<0.05				<0.03		<0.005		<0.030		<0.008
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
1,1,1-Trichloroethane	200		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
1,1,2,2-Tetrachloroethane	1		µg/L	<1			<0.1				<0.1		<0.2	<0.2	<0.5		<0.2
1,1,2-Trichloroethane	5		µg/L	<0.5			<0.2				<0.2		<0.2	<0.2	<0.5		<0.2
1,1-Dichloroethane	70		µg/L	<0.4			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
1,1-Dichloroethylene	14		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
1,2-Dibromoethane (EDB)	1		µg/L	<0.5			<0.2				<0.2		<0.2	<0.2	<0.5		<0.2
1,2-Dichlorobenzene	3		µg/L	<0.5			<0.1				<0.2		<0.2	<0.2	<0.5		<0.2
1,2-Dichloroethane	5		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
1,2-Dichloropropane	5		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
1,3-Dichlorobenzene	630		µg/L	<0.5			<0.1				<0.2		<0.2	<0.2	<0.5		<0.2
1,4-Dichlorobenzene	5		µg/L	<0.5			<0.1				<0.2		<0.2	<0.2	<0.5		<0.2
2-Hexanone			µg/L	<10			<5				<5		<5	<5	<20		
Acetone	3 000		µg/L	<10			<10				<10		<10	<10	<20		
Benzene	5		µg/L	<0.5			**0.1**				<0.1		<0.1	<0.1	<0.5		<0.2
Bromodichloromethane	5		µg/L	<0.2			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Bromoform	5		µg/L	<0.2			<0.2				<0.2		<0.2	<0.2	<0.5		<0.2
Bromomethane	10		µg/L	<3			<0.5				<0.5		<0.5	<0.5	**2.31**		<0.5
Carbon Tetrachloride	5		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Chlorobenzene	30		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Chloroethane			µg/L	<1			<0.2				<0.2		<0.2	<0.2	<1		<0.5
Chloroform	5		µg/L	<0.2			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Chloromethane			µg/L	<2			<0.5				<0.5		<0.5	<0.5	<1		<0.5
cis-1,2-Dichloroethylene	70		µg/L	<1			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
cis-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2				<0.2		<0.2	<0.2	<0.5		<0.2
Dibromochloromethane	5		µg/L	<0.2			<0.2				<0.2		<0.2	<0.2	<0.5		<0.2
Dichlorodifluoromethane			µg/L												<1		<0.5
Dichloromethane(Methylene Chloride)	50		µg/L	<1			<0.5				<0.5		<0.5	<0.5	<0.5		<0.2
Ethylbenzene	2.4		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Methyl isobutyl ketone	350		µg/L	<10			<5				<5		<5	<5	<20		
Methyl t-butyl ether (MTBE)	700		µg/L	<2			<0.2				<0.2		<0.2	<0.2	**0.5**		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<15			<5				<5		<5	<5	<20		
Styrene	100		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Tetrachloroethylene	30		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Toluene	24		µg/L	<0.5			**0.3**				<0.2		**0.3**	**0.3**	<0.5		<0.2
trans-1,2-Dichloroethylene	100		µg/L	<1			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
trans-1,3-Dichloropropene	1.4		µg/L	<0.14			<0.2				<0.2		<0.2	<0.2	<0.5		<0.2
Trichloroethylene	5		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Trichlorofluoromethane (FREON 11)			µg/L	<2			<0.2						<0.2	<0.2	<1		<0.5
Vinyl Chloride	2		µg/L	<0.2			<0.2				<0.2		<0.2	<0.2	<0.5		
Xylene, *o*-	300		µg/L	<0.5			<0.1				<0.1		<0.1	<0.1	<0.5		<0.2
Xylene, *p*- + *m*-	300		µg/L	<0.5			<0.1				**0.1**		**0.1**	**0.1**	<1		<0.2
Xylenes (total)	300		µg/L	<1			<0.1				**0.1**		<0.1	<0.1	<1.5		<0.2
PAHs																	
2-Methylnaphthalene			µg/L												<0.02	<0.02	<0.2
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.2
Acenaphthylene	1	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.2
Anthracene	2.4	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	**0.08**	**0.03**	<0.05	<0.02	<0.02	<0.2
Benzo(a)anthracene	1	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	**0.06**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.2
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01			**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	<0.005	<0.005	<0.2
Benzo(b)fluoranthene	0.1	Table 2	µg/L												<0.02	<0.02	<0.2
Benzo(b,j)fluoranthene			µg/L	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05			
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.1	<0.02	<0.02	<0.2
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.2
Chrysene	0.1	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	**0.1**	**0.07**	**0.06**	**0.028**	<0.02	<0.2
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1	<0.1	<0.1	<0.1		<0.02	<0.1	<0.02	<0.02	<0.5
Fluoranthene	0.41	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	**0.05**	<0.05	**0.2**	**0.04**	**0.07**	<0.02	<0.02	<0.2
Fluorene	120	Table 2	µg/L	<0.05			<0.05	<0.05	<0.05	**0.12**	<0.05	**0.2**	**0.02**	**0.05**	<0.02	<0.02	<0.2
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.1	<0.02	<0.02	<0.5
Naphthalene	11	Table 2	µg/L	<0.05			**0.05**	<0.05	<0.05	**0.25**	**0.1**	**0.08**	**0.03**	**0.3**	<0.02	<0.02	<0.2
Phenanthrene	1	Table 2	µg/L	<0.05			**0.08**	<0.05	<0.05	**0.17**	<0.05	**0.9**	**0.19**	**0.3**	**0.035**	<0.02	<0.2
Pyrene	4.1	Table 2	µg/L	<0.05			**0.06**	<0.05	<0.05	**0.07**	<0.05	**0.2**	**0.06**	**0.1**	<0.02	<0.02	<0.2

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	OW3A-07	OW3A-07	OW3A-07	OW3A-07	OW3A-85	OW3A-85	OW3A-85	OW3A-85	OW3A-85	OW3A-85	OW5A-06	OW5A-06	OW5A-06	OW5A-06
			Sampling Date	**2011/01/07**	**2011/05/30**	**2011/07/06**	**2011/11/14**	**2004/06/07**	**2004/11/29**	**2005/05/09**	**2005/12/01**	**2006/05/29**	**2006/07/19**	**2006/12/12**	**2007/05/16**	**2007/07/31**	**2009/04/30**
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator + GW PAH	GW Comprehensive	MOE
Field Parameters																	
Conductivity			µS/cm		2190	2290	2310										
pH	6.5-8.5	OG			7.3	7.22	7.22										
Temperature			°C		18.1	12	10.9										
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	398	417	396	402	660	554	626	649	733	613	399	413	411	410
Ammonia (as N)			mg/L	0.04	0.04	<0.02	0.287	0.24	0.21	0.22	0.28	0.26	0.52	0.67	0.47	0.78	0.51
Biological Oxygen Demand (BOD_5)			mg/L			<5		<3					<2			<2	
Calcium (Ca)			mg/L	303	263	340	361	78	210	110	240	220	67	580	550	620	577
Chemical Oxygen Demand (COD)			mg/L	14	<5	<5	<5	<4	<4	63	110	5	12	100	6	<4	38
Chloride (Cl)	250	AO	mg/L	5.07	4.11	4.85	5.28	21.5	4.9	7	6	7	7	61	21	16	7.9
Conductivity			µS/cm	1960	1760	2320	2360	1830	2050	1870	2030	1600	2550	3430	3790	3280	3620
Dissolved Organic Carbon (DOC)	5	AO	mg/L	5.3	4.3	7.3	4.1	3.4	2.8	1.9	5	2.6	1.9	16.7	3	4.2	38
Hardness ($CaCO_3$)	80-100	OG	mg/L			1350		1110					790			2600	2380
Nitrate (as N)	10	MAC	mg/L	0.07	<0.05	<0.1	<0.25	<1	<0.1	ND	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
Nitrite (as N)	1	MAC	mg/L			<0.1		<0.1					<0.01			<0.01	<0.005
pH	6.5-8.5	OG		7.91	7.89	7.95	8.07	7.92	8.13	8.02	8.16	8.20	7.8	7.8	7.8	7.80	7.61
Phenol 4AAP			mg/L			<0.001		<0.001					<0.001			<0.001	<0.0002
Potassium (K)			mg/L			3.58	3.87	4					3.3			6.3	4.48
Sulphates (SO_4)	500	AO	mg/L	941	824	1190	1160	660	807	549	615	260	995	1640	2170	2030	2130
Total Dissolved Solids (TDS)	500	AO	mg/L	1990	1830	1190	2020	1010	1500	1960	1320	1040	1630	3280	2670	1660	3740
Total Kjeldahl Nitrogen (TKN)			mg/L			0.24		1.7					0.8			5	0.81
Total Phosphorus (P)			mg/L			0.485		1.89					1.3			3.8	0.25
Total Suspended Solids (TSS)			mg/L			764		4190					2100			13000	1260
Metals																	
Arsenic	0.025	IMAC	mg/L			<0.003		<0.0014	0.0021				0.003			0.012	0.013
Barium	1	MAC	mg/L	0.101	0.107	0.0637	0.0684	0.025	0.028	0.032	0.025	<0.03	0.036	<0.005	0.008	0.009	<0.009
Beryllium			mg/L			<0.001		<0.0014	<0.0014				<0.0005			<0.0005	<0.001
Boron	5	IMAC	mg/L	0.313	0.372	0.381	0.381	0.32	0.47	0.29	0.4	0.34	0.27	0.31	0.44	0.38	0.49
Cadmium	0.005	MAC	mg/L			<0.0001		<0.001	<0.001				<0.0001			<0.0001	<0.001
Chromium	0.05	MAC	mg/L			<0.003		<0.0016	0.0031				<0.005			<0.005	<0.002
Cobalt			mg/L			0.00286		<0.001	<0.001				<0.0005			<0.0005	<0.001
Copper	1	AO	mg/L			0.00232		<0.003	0.003				<0.001			<0.005	<0.001
Iron	0.3	AO	mg/L	0.011	<0.01	0.0157	<0.01	0.91	0.65	0.78	<0.05	1.9	0.36	1.6	3.9	5.6	6.4
Lead	0.01	MAC	mg/L			<0.001		0.0031	<0.0022				0.0015			<0.0005	<0.005
Magnesium			mg/L	118	111	122	130	170	250	170	220	210	150	200	250	260	254
Manganese	0.05	AO	mg/L			0.879		0.036	0.0014				0.021			0.28	0.127
Mercury	0.001	MAC	mg/L			<0.00005		<0.0001	<0.0001				<0.0001			<0.0001	0.26
Molybdenum			mg/L			0.0046		0.0047	0.0063				0.006			0.009	<0.007
Nickel			mg/L			0.0047		<0.001	<0.001				<0.001			<0.001	<0.006
Silver			mg/L			<0.0001		<0.0006	<0.0006				<0.0001			<0.0001	<0.003
Sodium	200	AO	mg/L	75	73.8	66.2	76.8	90	110	88	92	96	85	130	100	120	128
Thallium			mg/L			<0.0003		<0.001	<0.001				<0.00005			<0.00005	
Vanadium			mg/L			<0.002		<0.001	<0.001				<0.001			<0.001	<0.001
Zinc	5	AO	mg/L			0.0558		<0.005	<0.005				0.006			<0.03	<0.006
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L			<0.10		<0.5					<0.1			<0.1	<0.2
1,1,1-Trichloroethane	200		µg/L			<0.30		<0.5					<0.1			<0.1	<0.2
1,1,2,2-Tetrachloroethane	1		µg/L			<0.10		<1					<0.1			<0.1	<0.2
1,1,2-Trichloroethane	5		µg/L			<0.20		<0.5					<0.2			<0.2	<0.2
1,1-Dichloroethane	70		µg/L			<0.30		<0.4					<0.1			<0.1	<0.2
1,1-Dichloroethylene	14		µg/L			<0.30		<0.5					<0.1			<0.1	<0.2
1,2-Dibromoethane (EDB)	1		µg/L			<0.20		<0.5					<0.2			<0.2	<0.2
1,2-Dichlorobenzene	3		µg/L			<0.10		<0.5					<0.2			<0.2	<0.2
1,2-Dichloroethane	5		µg/L			<0.20		<0.5					<0.1			<0.1	<0.2
1,2-Dichloropropane	5		µg/L			<0.20		<0.5					<0.1			<0.1	<0.2
1,3-Dichlorobenzene	630		µg/L			<0.10		<0.5					<0.2			<0.2	<0.2
1,4-Dichlorobenzene	5		µg/L			<0.10		<0.5					<0.2			<0.2	<0.2
2-Hexanone			µg/L			<0.30		<10					<5			<5	
Acetone	3 000		µg/L			<1.0		<10					<10			<10	
Benzene	5		µg/L			<0.20		<0.5					<0.1			<0.1	<0.2
Bromodichloromethane	5		µg/L			<0.20		<0.2					<0.1			<0.1	<0.2
Bromoform	5		µg/L			<0.10		<0.2					<0.2			<0.2	<0.2
Bromomethane	10		µg/L			<0.20		<3					<0.5			<0.5	<0.5
Carbon Tetrachloride	5		µg/L			<0.20		<0.5					<0.1			<0.1	<0.2
Chlorobenzene	30		µg/L			<0.10		<0.5					<0.1			<0.1	<0.2
Chloroethane			µg/L			<0.20		<1					<0.2			<0.2	<0.5
Chloroform	5		µg/L			<0.20		<0.2					<0.1			<0.1	<0.2
Chloromethane			µg/L			<0.40		<2					<0.5			<0.5	<0.5
cis-1,2-Dichloroethylene	70		µg/L			<0.20		<1					<0.1			<0.1	<0.2
cis-1,3-Dichloropropene	1.4		µg/L			<0.20		<0.14					<0.2			<0.2	<0.2
Dibromochloromethane	5		µg/L			<0.10		<0.2					<0.2			<0.2	<0.2
Dichlorodifluoromethane			µg/L			<0.20											
Dichloromethane(Methylene Chloride)	50		µg/L			<0.30		<1					<0.5			<0.5	<0.2
Ethylbenzene	2.4		µg/L			<0.10		<0.5					<0.1			<0.1	<0.2
Methyl isobutyl ketone	350		µg/L			<1.0		<10					<5			<5	
Methyl t-butyl ether (MTBE)	700		µg/L			<0.20		<2					<0.2			<0.2	
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L			<1.0		<15					<5			<5	
Styrene	100		µg/L			<0.10		<0.5					<0.1			<0.1	<0.2
Tetrachloroethylene	30		µg/L			<0.20		<0.5					<0.1			<0.1	<0.2
Toluene	24		µg/L			<0.20		<0.5					<0.2			<0.2	<0.2
trans-1,2-Dichloroethylene	100		µg/L			<0.20		<1					<0.1			<0.1	<0.2
trans-1,3-Dichloropropene	1.4		µg/L			<0.30		<0.14					<0.2			<0.2	<0.2
Trichloroethylene	5		µg/L			<0.20		<0.5					<0.1			<0.1	<0.2
Trichlorofluoromethane (FREON 11)			µg/L			<0.40		<2								<0.2	<0.5
Vinyl Chloride	2		µg/L			<0.17		<0.2					<0.2			<0.2	
Xylene, *o*-	300		µg/L			<0.10		<0.5					<0.1			**0.1**	<0.2
Xylene, *p*- + *m*-	300		µg/L			<0.20		<0.5					<0.1			<0.1	<0.2
Xylenes (total)	300		µg/L			<0.20		<1					<0.1			<0.1	<0.2
PAHs																	
2-Methylnaphthalene			µg/L														<0.2
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L			<0.20											
Acenaphthene	4.1	Table 2	µg/L			<0.10		<0.05				<0.05	<0.05	**0.15**	<0.05	**0.2**	<0.2
Acenaphthylene	1	Table 2	µg/L			<0.11		<0.05				<0.05	<0.05	**0.55**	<0.05	**0.3**	<0.2
Anthracene	2.4	Table 2	µg/L			<0.05		<0.05				<0.05	<0.05	<0.05	<0.05	**0.2**	<0.2
Benzo(a)anthracene	1	Table 2	µg/L			<0.08		<0.05				<0.05	<0.05	<0.05	<0.05		<0.2
Benzo(a)pyrene	0.01	MAC	µg/L			<0.01		<0.01				<0.01	<0.01	**0.01**	<0.01	**0.04**	<0.2
Benzo(b)fluoranthene	0.1	Table 2	µg/L			<0.05											<0.2
Benzo(b,j)fluoranthene			µg/L					<0.05				<0.05	<0.05	<0.05	<0.05	0.2	
Benzo(g,h,i)perylene	0.2	Table 2	µg/L			<0.06		<0.1				<0.1	<0.1	<0.1	<0.1	<0.2	<0.2
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L			<0.05		<0.05				<0.05	<0.05	<0.05	<0.05	<0.1	<0.2
Chrysene	0.1	Table 2	µg/L			<0.05		<0.05				<0.05	<0.05	<0.05	<0.05	**0.4**	<0.2
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L			<0.09		<0.1				<0.1	<0.1	<0.1		<0.2	<0.5
Fluoranthene	0.41	Table 2	µg/L			<0.12		<0.05				<0.05	<0.05	<0.05	<0.05	**0.2**	<0.2
Fluorene	120	Table 2	µg/L			<0.09		<0.05				<0.05	<0.05	<0.05	<0.05	**0.5**	<0.2
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L			<0.06		<0.1				<0.1	<0.1	<0.1	<0.1	<0.2	<0.5
Naphthalene	11	Table 2	µg/L			<0.12		<0.05				<0.05	<0.05	**0.11**	<0.05	**3**	<0.2
Phenanthrene	1	Table 2	µg/L			<0.10		<0.05				<0.05	<0.05	**0.13**	<0.05	**1**	<0.2
Pyrene	4.1	Table 2	µg/L			<0.05		<0.05				<0.05	<0.05	<0.05	<0.05	**0.3**	<0.2

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-06	OW5A-91	OW5A-91	OW5A-91	OW5A-91	OW5A-91	OW5A-91	OW5A-91
			Sampling Date	2009/07/23	2009/11/25	2009/12/03	2011/01/07	2011/05/30	2011/07/07	2011/11/15	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/03/30	2006/05/29
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW PAH	GW Indicator + GW PAH
Field Parameters																	
Conductivity			µS/cm					2960	3520	3630							
pH	6.5-8.5	OG						7.02	7.1	7.03							
Temperature			°C					11	10.5	10							
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	447	421	421	385	381	407	397	417	406	395	406	424		437
Ammonia (as N)			mg/L	0.555	0.456	0.36	0.43	0.28	0.404	0.403	0.25	0.31	0.12	0.28	0.28		0.27
Biological Oxygen Demand (BOD_5)			mg/L	<6.0					<5		<3			<2			
Calcium (Ca)			mg/L	555	550	540	567	540	561	556	410	500	540	490	550		510
Chemical Oxygen Demand (COD)			mg/L	<10	50	50	6	<5	5.98	<5	10	<4	7	<4	9		8
Chloride (Cl)	250	AO	mg/L	<20	<10	6.8	8.95	8.49	7.72	7.87	12.2	10.9	11.8	13.2	13		13
Conductivity			µS/cm	3470	3400	3310	3050	3210	3240	3510	3480	3780	4000	3680	4090		4000
Dissolved Organic Carbon (DOC)	5	AO	mg/L	4.1	3.6	2.9	3.6	3.03	5.3	2.6	3.2	2	1.5	1.5	1.6		2.2
Hardness ($CaCO_3$)	80-100	OG	mg/L	2410		2280			2410		2730			2750			
Nitrate (as N)	10	MAC	mg/L	<1.0	<0.50	<0.005	1.96	<0.1	<0.05	<0.25	<1	<0.1	ND	<0.2	<0.1		<0.1
Nitrite (as N)	1	MAC	mg/L	<1.0		<0.05			<0.05		<0.1			<0.3			
pH	6.5-8.5	OG		7.6	7.57	7.57	7.88	7.85	7.68	8	7.63	7.89	7.76	7.85	7.99		7.8
Phenol 4AAP			mg/L	0.0022		0.0011			<0.001		<0.001			0.001			
Potassium (K)			mg/L	<10		4.12			4.23	4	5.1			5.2			
Sulphates (SO_4)	500	AO	mg/L	2440	2550	2010	2110	2470	2240	2160	2420	2390	2490	1590	2530		1880
Total Dissolved Solids (TDS)	500	AO	mg/L	3520	3530	3640	3560	3390	3490	3410	4210	3860	4070	3980	4160		2600
Total Kjeldahl Nitrogen (TKN)			mg/L	0.56		1.24			0.58		0.8			0.5			
Total Phosphorus (P)			mg/L	0.575		0.78			0.333		0.07			0.027			
Total Suspended Solids (TSS)			mg/L	2630		2610			1030		165			40			
Metals																	
Arsenic	0.025	IMAC	mg/L	0.011		0.0075			0.0146		<0.0014	0.0058		0.0057			
Barium	1	MAC	mg/L	<0.10	<0.010	<0.007	0.013	0.0084	0.0076	0.0071	0.0053	0.0041	<0.005	0.009	<0.05		<0.05
Beryllium			mg/L	<0.010		<0.001			<0.001		<0.0014	<0.0014		<0.0005			
Boron	5	IMAC	mg/L	0.54	0.389	0.44	0.311	0.442	0.38	0.468	0.48	0.48	0.51	0.49	0.54		0.47
Cadmium	0.005	MAC	mg/L	<0.0010		<0.001			<0.0001		<0.001	<0.001		<0.0001			
Chromium	0.05	MAC	mg/L	<0.010		<0.002			<0.003		<0.0016	0.0034		<0.005			
Cobalt			mg/L	<0.0080		<0.001			0.00093		0.002	0.003		0.0029			
Copper	1	AO	mg/L	<0.010		<0.001			0.00172		<0.003	0.004		<0.001			
Iron	0.3	AO	mg/L	5.32	4.8	<0.046	1.65	4.82	5	4.47	4.3	6.1	3.8	3.9	<0.5		3.7
Lead	0.01	MAC	mg/L	<0.010		<0.005			<0.001		0.0065	<0.0022		<0.0002			
Magnesium			mg/L	249	189	258	253	230	244	242	350	380	390	380	420		370
Manganese	0.05	AO	mg/L	0.099		0.085			0.0748		0.12	0.12		0.12			
Mercury	0.001	MAC	mg/L	<0.00010		0.23			<0.00005		<0.0001	<0.0001		<0.0001			
Molybdenum			mg/L	<0.010		<0.005			0.005		0.0044	0.0051		0.0052			
Nickel			mg/L	<0.020		<0.006			<0.003		<0.001	<0.001		0.006			
Silver			mg/L	<0.0010		<0.003			<0.0001		<0.0006	<0.0006		<0.0005			
Sodium	200	AO	mg/L	128	96.4	110	101	94.7	100	95.6	110	120	140	120	130		120
Thallium			mg/L	<0.0030					<0.0003		<0.001	<0.001		<0.00005			
Vanadium			mg/L	<0.010		<0.001			<0.002		<0.001	<0.001		<0.001			
Zinc	5	AO	mg/L	<0.030		<0.004			0.0143		0.009	<0.005		<0.05			
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
1,1,1-Trichloroethane	200		µg/L	<0.5		<0.2			<0.30		<0.5			<0.1			
1,1,2,2-Tetrachloroethane	1		µg/L	<0.5		<0.2			<0.10		<1			<0.1			
1,1,2-Trichloroethane	5		µg/L	<0.5		<0.2			<0.20		<0.5			<0.2			
1,1-Dichloroethane	70		µg/L	<0.5		<0.2			<0.30		<0.4			<0.1			
1,1-Dichloroethylene	14		µg/L	<0.5		<0.2			<0.30		<0.5			<0.1			
1,2-Dibromoethane (EDB)	1		µg/L	<0.5		<0.2					<0.5			<0.2			
1,2-Dichlorobenzene	3		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
1,2-Dichloroethane	5		µg/L	<0.5		<0.2			<0.20		<0.5			<0.1			
1,2-Dichloropropane	5		µg/L	<0.5		<0.2			<0.20		<0.5			<0.1			
1,3-Dichlorobenzene	630		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
1,4-Dichlorobenzene	5		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
2-Hexanone			µg/L	<20					<0.30		<10			<5			
Acetone	3 000		µg/L	<20					<1.0		<10			<10			
Benzene	5		µg/L	<0.5		<0.2			<0.20		<0.5			<0.1			
Bromodichloromethane	5		µg/L	<0.5		<0.2			<0.20		<0.2			<0.1			
Bromoform	5		µg/L	<0.5		<0.2			<0.10		<0.2			<0.2			
Bromomethane	10		µg/L	**1.27**		<0.5			<0.20		<3			<0.5			
Carbon Tetrachloride	5		µg/L	<0.5		<0.2			<0.20		<0.5			<0.1			
Chlorobenzene	30		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
Chloroethane			µg/L	<1		<0.5			<0.20		<1			<0.2			
Chloroform	5		µg/L	<0.5		<0.2			<0.20		<0.2			<0.1			
Chloromethane			µg/L	<1		<0.5			<0.40		<2			<0.5			
cis-1,2-Dichloroethylene	70		µg/L	<0.5		<0.2					<1			<0.1			
cis-1,3-Dichloropropene	1.4		µg/L	<0.5		<0.2			<0.20		<0.14			<0.2			
Dibromochloromethane	5		µg/L	<0.5		<0.2			<0.10		<0.2			<0.2			
Dichlorodifluoromethane			µg/L	<1		<0.5			<0.20								
Dichloromethane(Methylene Chloride)	50		µg/L	<0.5		<0.2					<1			<0.5			
Ethylbenzene	2.4		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
Methyl isobutyl ketone	350		µg/L	<20							<10			<5			
Methyl t-butyl ether (MTBE)	700		µg/L	**0.5**							<2			<0.2			
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<20							<15			<5			
Styrene	100		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
Tetrachloroethylene	30		µg/L	<0.5		<0.2			<0.20		<0.5			<0.1			
Toluene	24		µg/L	<0.5		**0.4**			<0.20		<0.5			<0.2			
trans-1,2-Dichloroethylene	100		µg/L	<0.5		<0.2			<0.20		<1			<0.1			
trans-1,3-Dichloropropene	1.4		µg/L	<0.5		<0.2			<0.30		<0.14			<0.2			
Trichloroethylene	5		µg/L	<0.5		<0.2			<0.20		<0.5			<0.1			
Trichlorofluoromethane (FREON 11)			µg/L	<1		<0.5					<2			<0.2			
Vinyl Chloride	2		µg/L	<0.5					<0.17		<0.2			<0.2			
Xylene, *o*-	300		µg/L	<0.5		<0.2			<0.10		<0.5			<0.1			
Xylene, *p*- + *m*-	300		µg/L	<1		**0.3**			<0.20		<0.5			<0.1			
Xylenes (total)	300		µg/L	<1.5		**0.3**			<0.20		<1			<0.1			
PAHs																	
2-Methylnaphthalene			µg/L	<0.02	<0.02	<0.2											
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L						<0.20								
Acenaphthene	4.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.10		<0.05			<0.05	<0.05	<0.05	<0.05
Acenaphthylene	1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.11		<0.05			<0.05	<0.05	<0.05	<0.05
Anthracene	2.4	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05		<0.05			<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.08		<0.05			<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.01	MAC	µg/L	<0.005	<0.005	<0.2			<0.01		<0.01			**0.01**	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05								
Benzo(b,j)fluoranthene			µg/L								<0.05			<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.02	<0.02	<0.2			<0.06		<0.1			<0.1	<0.1	<0.1	<0.1
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05		<0.05			<0.05	<0.05	<0.05	<0.05
Chrysene	0.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05		<0.05			<0.05	<0.05	<0.05	<0.05
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.02	<0.02	<0.5			<0.09		<0.1			<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.41	Table 2	µg/L	<0.02	<0.02	<0.2			<0.12		<0.05			<0.05	<0.05	<0.05	<0.05
Fluorene	120	Table 2	µg/L	<0.02	<0.02	<0.2			<0.09		<0.05			<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.02	<0.02	<0.5			<0.06		<0.1			<0.1	<0.1	<0.1	<0.1
Naphthalene	11	Table 2	µg/L	<0.02	<0.02	<0.2			<0.12		<0.05			<0.05	<0.05	<0.05	<0.05
Phenanthrene	1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.10		<0.05			<0.05	<0.05	<0.05	<0.05
Pyrene	4.1	Table 2	µg/L	<0.02	<0.02	<0.2			<0.05		<0.05			<0.05	<0.05	<0.05	<0.05

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	OW5A-91	OW5B-91	OW5B-91	OW5B-91	OW5B-91	OW5B-91	OW5B-91	OW5B-91	OW6A-92	OW6A-92	OW6A-92	OW6A-92	OW6A-92	OW6A-92
			Sampling Date	2006/07/19	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/05/29	2006/07/19	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/03/30
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Comprehensive	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW Indicator	GW Comprehensive	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW PAH
Field Parameters																	
Conductivity			µS/cm														
pH	6.5-8.5	OG															
Temperature			°C														
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	437	325	284	278	292	300	312	307	940	899	764	514	751	
Ammonia (as N)			mg/L	0.39	0.59	0.57	0.7	0.76	0.71	0.67	0.82	<0.05	<0.05	<0.05	0.29	0.33	
Biological Oxygen Demand (BOD_5)			mg/L	<2	<3			<2			<2	<3			<2		
Calcium (Ca)			mg/L	510	390	380	340	330	380	320	380	250	150	350	490	580	
Chemical Oxygen Demand (COD)			mg/L	9	9	8	13	18	13	14	11	27	20	100	23	43	
Chloride (Cl)	250	AO	mg/L	13	11	11.9	8.8	8	9	10	10	242	223	20.5	71.5	184	
Conductivity			µS/cm	4010	3240	3420	3560	3350	3700	3600	3610	3010	3160	4080	3780	4170	
Dissolved Organic Carbon (DOC)	5	AO	mg/L	1.7	3.7	2.7	2.5	2.5	2.1	2.6	2.5	11.1	10.9	8.5	4.4	5.5	
Hardness ($CaCO_3$)	80-100	OG	mg/L	2700	2330			2110			2300	2020			2420		
Nitrate (as N)	10	MAC	mg/L	<0.1	<1	<0.1	<1	<0.2	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.2	<0.1	
Nitrite (as N)	1	MAC	mg/L	<0.01	<0.1			<0.3			<0.01	<0.1			<0.3		
pH	6.5-8.5	OG		7.7	7.73	7.97	7.93	8.07	7.92	8.1	7.9	7.85	8.09	7.76	7.89	7.8	
Phenol 4AAP			mg/L	<0.001	<0.001			0.002			<0.001	<0.001			<0.001		
Potassium (K)			mg/L	5.4	4.1			4			3.8	4.6			5.6		
Sulphates (SO_4)	500	AO	mg/L	2310	2090	1640	2160	1340	2100	1970	2020	1010	934	175	2320	2050	
Total Dissolved Solids (TDS)	500	AO	mg/L	2630	4990	3270	3990	3490	3530	2340	2490	2060	2360	4390	4430	4090	
Total Kjeldahl Nitrogen (TKN)			mg/L	0.5	1.8			1			0.9	1.7			0.8		
Total Phosphorus (P)			mg/L	0.094	1.13			0.387			0.12	3.7			0.81		
Total Suspended Solids (TSS)			mg/L	180	5060			910			450	11200			750		
Metals																	
Arsenic	0.025	IMAC	mg/L	0.006	0.0044	0.0043		0.0032			0.002	<0.0014	<0.0014		0.0016		
Barium	1	MAC	mg/L	<0.005	0.0074	0.0082	0.009	0.0086	<0.05	0.008	0.007	0.031	0.028	0.024	0.016	0.014	
Beryllium			mg/L	<0.0005	<0.0014	<0.0014		<0.0005			<0.0005	<0.0014	<0.0014		<0.0005		
Boron	5	IMAC	mg/L	0.45	0.58	0.54	0.57	0.57	0.56	0.55	0.5	0.79	0.92	1.1	1	0.95	
Cadmium	0.005	MAC	mg/L	<0.0001	<0.001	<0.001		<0.0001			<0.0001	<0.001	<0.001		<0.0001		
Chromium	0.05	MAC	mg/L	<0.005	<0.0016	0.0035		<0.005			<0.005	0.0019	0.0051		<0.005		
Cobalt			mg/L	0.015	<0.001	<0.001		<0.0005			<0.0005	0.001	<0.001		0.0043		
Copper	1	AO	mg/L	<0.001	<0.003	0.004		<0.001			<0.001	<0.003	0.006		<0.001		
Iron	0.3	AO	mg/L	4	7.2	5.2	2.6	4	<0.5	4	3.7	0.025	0.34	<0.05	0.21	<0.05	
Lead	0.01	MAC	mg/L	<0.0005	0.0045	<0.0022		<0.0002			<0.0005	0.003	<0.0022		<0.0002		
Magnesium			mg/L	360	320	350	360	310	390	350	330	400	390	410	350	330	
Manganese	0.05	AO	mg/L	0.12	0.083	0.1		0.16			0.18	0.42	0.21		0.46		
Mercury	0.001	MAC	mg/L	<0.0001	<0.0001	<0.0001		<0.0001			<0.0001	<0.0001	<0.0001		<0.0001		
Molybdenum			mg/L	0.005	0.0043	0.0061		0.0045			0.003	0.0017	0.0018		0.0036		
Nickel			mg/L	<0.005	<0.001	<0.001		<0.001			<0.001	0.014	0.019		0.02		
Silver			mg/L	<0.0001	<0.0006	<0.0006		<0.0005			<0.0001	<0.0006	<0.0006		<0.0005		
Sodium	200	AO	mg/L	110	140	180	200	170	200	180	160	160	160	230	170	140	
Thallium			mg/L	<0.00005	<0.001	<0.001		<0.00005			<0.00005	<0.001	<0.001		0.06		
Vanadium			mg/L	<0.001	<0.001	<0.001		<0.001			<0.001	<0.001	<0.001		<0.001		
Zinc	5	AO	mg/L	<0.05	0.13	0.13		<0.05			<0.05	<0.005	0.012		<0.05		
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
1,1,1-Trichloroethane	200		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
1,1,2,2-Tetrachloroethane	1		µg/L	<0.1	<1			<0.1			<0.1	<1			<0.1		
1,1,2-Trichloroethane	5		µg/L	<0.2	<0.5			<0.2			<0.2	<0.5			<0.2		
1,1-Dichloroethane	70		µg/L	<0.1	<0.4			<0.1			<0.1	<0.4			<0.1		
1,1-Dichloroethylene	14		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
1,2-Dibromoethane (EDB)	1		µg/L	<0.2	<0.5			<0.2			<0.2	<0.5			<0.2		
1,2-Dichlorobenzene	3		µg/L	<0.2	<0.5			<0.1			<0.2	<0.5			<0.1		
1,2-Dichloroethane	5		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
1,2-Dichloropropane	5		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
1,3-Dichlorobenzene	630		µg/L	<0.2	<0.5			<0.1			<0.2	<0.5			<0.1		
1,4-Dichlorobenzene	5		µg/L	<0.2	<0.5			<0.1			<0.2	<0.5			<0.1		
2-Hexanone			µg/L	<5	<10			<5			<5	<10			<5		
Acetone	3 000		µg/L	<10	<10			<10			<10	<10			<10		
Benzene	5		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Bromodichloromethane	5		µg/L	<0.1	<0.2			<0.1			<0.1	<0.2			<0.1		
Bromoform	5		µg/L	<0.2	<0.2			<0.2			<0.2	<0.2			<0.2		
Bromomethane	10		µg/L	<0.5	<3			<0.5			<0.5	<3			<0.5		
Carbon Tetrachloride	5		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Chlorobenzene	30		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Chloroethane			µg/L	<0.2	<1			<0.2			<0.2	<1			<0.2		
Chloroform	5		µg/L	<0.1	<0.2			<0.1			<0.1	<0.2			<0.1		
Chloromethane			µg/L	<0.5	<2			<0.5			<0.5	<2			<0.5		
cis-1,2-Dichloroethylene	70		µg/L	<0.1	<1			<0.1			<0.1	<1			<0.1		
cis-1,3-Dichloropropene	1.4		µg/L	<0.2	<0.14			<0.2			<0.2	<0.14			<0.2		
Dibromochloromethane	5		µg/L	<0.2	<0.2			<0.2			<0.2	<0.2			<0.2		
Dichlorodifluoromethane			µg/L														
Dichloromethane(Methylene Chloride)	50		µg/L	<0.5	<1			<0.5			<0.5	<1			<0.5		
Ethylbenzene	2.4		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Methyl isobutyl ketone	350		µg/L	<5	<10			<5			<5	<10			<5		
Methyl t-butyl ether (MTBE)	700		µg/L	<0.2	<2			<0.2			<0.2	<2			<0.2		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<5	<15			<5			<5	<15			<5		
Styrene	100		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Tetrachloroethylene	30		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Toluene	24		µg/L	<0.2	<0.5			<0.2			<0.2	<0.5			<0.2		
trans-1,2-Dichloroethylene	100		µg/L	<0.1	<1			<0.1			<0.1	<1			<0.1		
trans-1,3-Dichloropropene	1.4		µg/L	<0.2	<0.14			<0.2			<0.2	<0.14			<0.2		
Trichloroethylene	5		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Trichlorofluoromethane (FREON 11)			µg/L		<2			<0.2				<2			<0.2		
Vinyl Chloride	2		µg/L	<0.2	<0.2			<0.2			<0.2	<0.2			<0.2		
Xylene, *o*-	300		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			<0.1		
Xylene, *p*- + *m*-	300		µg/L	<0.1	<0.5			<0.1			<0.1	<0.5			**0.1**		
Xylenes (total)	300		µg/L	<0.1	<1			<0.1			<0.1	<1			<0.1		
PAHs																	
2-Methylnaphthalene			µg/L														
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05	<0.05	<0.05
Acenaphthylene	1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05	<0.05	<0.05
Anthracene	2.4	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05	<0.05	<0.05
Benzo(a)anthracene	1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			**0.08**	**0.07**	<0.05
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01	<0.01			**0.01**	<0.01		<0.01	<0.01			**0.01**	<0.01	<0.01
Benzo(b)fluoranthene	0.1	Table 2	µg/L														
Benzo(b,j)fluoranthene			µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05		<0.05
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1	<0.1			<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05	<0.05	<0.05
Chrysene	0.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05	**0.06**	<0.05
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1	<0.1			<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Fluoranthene	0.41	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05	<0.05	<0.05
Fluorene	120	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			<0.05	**0.08**	<0.05
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1	<0.1			<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Naphthalene	11	Table 2	µg/L	<0.05	<0.05			**0.08**	**0.09**		**0.08**	<0.05			**0.11**	**0.2**	**0.09**
Phenanthrene	1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			**0.08**	**0.11**	<0.05
Pyrene	4.1	Table 2	µg/L	<0.05	<0.05			<0.05	<0.05		<0.05	<0.05			**0.05**	**0.06**	<0.05

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	OW6A-92	OW6A-92	OW6A-92	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06	OW8A-06
			Sampling Date	2006/05/29	2006/07/19	2006/12/12	2006/12/12	2007/05/16	2007/07/31	2009/04/30	2009/07/23	2009/11/25	2009/12/03	2009/12/17	2011/01/07	2011/05/30	2011/07/05
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Indicator + GW PAH	GW Comprehensive	GW Indicator + GW PAH	GW Indicator + GW PAH	GW Indicator + GW PAH	GW Comprehensive	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	MOE	GW Indicator	GW Indicator	GW Comprehensive
Field Parameters																	
Conductivity			µS/cm													3870	3325
pH	6.5-8.5	OG														7.2	8.31
Temperature			°C													12	12.1
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	608	595	699	377	404	398	411	431	418	425		410	399	422
Ammonia (as N)			mg/L	0.28	0.37	0.18	0.69	0.41	0.62	0.37	0.065	0.26	0.37		0.58	0.237	0.242
Biological Oxygen Demand (BOD_5)			mg/L		ND				<2		<6.0						<5
Calcium (Ca)			mg/L	410	530	400	540	540	540	532	521	523	525		538	504	532
Chemical Oxygen Demand (COD)			mg/L	13	23	20	160	5	<4	38	<10	14	250		6	<5	7.26
Chloride (Cl)	250	AO	mg/L	103	99	150	48	16	14	11.8	<20	10.9	17		13.7	12.6	14.4
Conductivity			µS/cm	4170	4180	3780	3720	3970	3580	3960	3810	3890	3890		3350	3560	3800
Dissolved Organic Carbon (DOC)	5	AO	mg/L	5	4.8	6.8	4.3	2.3	2.7	2.3	5.1	2.8	2		6.9	2.76	2.4
Hardness ($CaCO_3$)	80-100	OG	mg/L		2800				2700	2680	2780		2700				2720
Nitrate (as N)	10	MAC	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<1.0	<0.50	<0.012		<0.05	<0.1	<0.2
Nitrite (as N)	1	MAC	mg/L		<0.01				<0.01	<0.005	<1.0		<0.05				<0.2
pH	6.5-8.5	OG		8	7.7	8.00	7.90	7.6	7.90	7.42	7.51	7.59	7.49		7.80	7.78	7.79
Phenol 4AAP			mg/L		<0.001				<0.001	0.0014	0.004		<0.0002				<0.001
Potassium (K)			mg/L		5.2				6.1	5.48	<10		6.1				5.4
Sulphates (SO_4)	500	AO	mg/L	2070	1820	1580	2010	2230	2280J		2680	2670	2490		2680	2840	2640
Total Dissolved Solids (TDS)	500	AO	mg/L	2700	3060	3420	3630	3160	1730	4610	4040	4130	3510		4100	3910	3760
Total Kjeldahl Nitrogen (TKN)			mg/L		0.6				2	0.65	0.592		5.78				0.53
Total Phosphorus (P)			mg/L		0.38				2.9	0.28	0.154		4.82				0.501
Total Suspended Solids (TSS)			mg/L		420				8600	2800	7920		22700				1210
Metals																	
Arsenic	0.025	IMAC	mg/L		0.002				0.002	0.003	<0.010		0.004				0.0033
Barium	1	MAC	mg/L	0.015	0.005		0.011	<0.03	0.007	<0.007	<0.10	<0.010	<0.009		0.007	0.0057	0.0062
Beryllium			mg/L		<0.003				<0.0005	<0.001	<0.010		<0.001				<0.001
Boron	5	IMAC	mg/L	0.78	1	0.92	0.43	0.55	0.5	0.61	0.63	0.41	0.55		0.368	0.507	0.457
Cadmium	0.005	MAC	mg/L		<0.0001				<0.0001	<0.001	<0.0010		<0.001				<0.0001
Chromium	0.05	MAC	mg/L		<0.005				<0.005	<0.002	<0.010		<0.002				<0.003
Cobalt			mg/L		<0.003				<0.003	<0.001	<0.0080		<0.001				0.00147
Copper	1	AO	mg/L		0.002				<0.001	<0.001	<0.010		<0.001				0.00136
Iron	0.3	AO	mg/L	0.66	1.1	0.34	6	2.8	8.1	8.74	6.93	8.05	8.71		4.74	3.73	4.25
Lead	0.01	MAC	mg/L		<0.0005				<0.0005	<0.005	<0.010		<0.005				<0.001
Magnesium			mg/L	340	360	360	320	380	330	356	359	258	410		352	326	339
Manganese	0.05	AO	mg/L		0.099				0.1	0.12	0.103		0.137				0.104
Mercury	0.001	MAC	mg/L		<0.0001				<0.0001	0.12	<0.00010		1.8	<0.0002			<0.00005
Molybdenum			mg/L		0.004				0.004	<0.007	<0.010		<0.01				0.005
Nickel			mg/L		0.012				<0.005	<0.006	<0.020		<0.01				<0.003
Silver			mg/L		<0.0001				<0.0001	<0.003	<0.0010		<0.003				<0.0001
Sodium	200	AO	mg/L	160	160	160	110	130	120	148	138	131	135		126	114	116
Thallium			mg/L		<0.00005				<0.00005		<0.0030						<0.0003
Vanadium			mg/L		<0.001				<0.001	<0.001	<0.010		<0.001				<0.002
Zinc	5	AO	mg/L		<0.05				<0.03	<0.004	<0.030		<0.004				<0.005
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.10
1,1,1-Trichloroethane	200		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.30
1,1,2,2-Tetrachloroethane	1		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.10
1,1,2-Trichloroethane	5		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.20
1,1-Dichloroethane	70		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.30
1,1-Dichloroethylene	14		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.30
1,2-Dibromoethane (EDB)	1		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				
1,2-Dichlorobenzene	3		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.10
1,2-Dichloroethane	5		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
1,2-Dichloropropane	5		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
1,3-Dichlorobenzene	630		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.10
1,4-Dichlorobenzene	5		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.10
2-Hexanone			µg/L		<5				<5		<20						<0.30
Acetone	3 000		µg/L		<10				<10		<20						<1.0
Benzene	5		µg/L		<0.1				**0.3**	**0.4**	<0.5		<0.2				<0.20
Bromodichloromethane	5		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
Bromoform	5		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.10
Bromomethane	10		µg/L		<0.5				<0.5	<0.5	**2.7**		<0.5				<0.20
Carbon Tetrachloride	5		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
Chlorobenzene	30		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.10
Chloroethane			µg/L		<0.2				<0.2	<0.5	<1		<0.5				<0.20
Chloroform	5		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
Chloromethane			µg/L		<0.5				<0.5	<0.5	<1		0.7				<0.40
cis-1,2-Dichloroethylene	70		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				
cis-1,3-Dichloropropene	1.4		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.20
Dibromochloromethane	5		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.10
Dichlorodifluoromethane			µg/L								<1		<0.5				<0.20
Dichloromethane(Methylene Chloride)	50		µg/L		<0.5				<0.5	<0.2	<0.5		<0.2				
Ethylbenzene	2.4		µg/L		<0.1				<0.1	**0.3**	<0.5		<0.2				<0.10
Methyl isobutyl ketone	350		µg/L		<5				<5		<20						
Methyl t-butyl ether (MTBE)	700		µg/L		<0.2				<0.2		<0.5						
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<5				<5		<20						
Styrene	100		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.10
Tetrachloroethylene	30		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
Toluene	24		µg/L		<0.2				**0.5**	**0.7**	<0.5		**0.5**				<0.20
trans-1,2-Dichloroethylene	100		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
trans-1,3-Dichloropropene	1.4		µg/L		<0.2				<0.2	<0.2	<0.5		<0.2				<0.30
Trichloroethylene	5		µg/L		<0.1				<0.1	<0.2	<0.5		<0.2				<0.20
Trichlorofluoromethane (FREON 11)			µg/L						<0.2	<0.5	<1		<0.5				
Vinyl Chloride	2		µg/L		<0.2				<0.2		<0.5						<0.17
Xylene, *o*-	300		µg/L		<0.1				<0.1	**0.2**	<0.5		<0.2				<0.10
Xylene, *p*- + *m*-	300		µg/L		<0.1				**0.2**	**0.5**	<1		**0.4**				<0.20
Xylenes (total)	300		µg/L		<0.1				<0.1	**0.7**	<1.5		**0.4**				<0.20
PAHs																	
2-Methylnaphthalene			µg/L							<0.2	<0.02	<0.02	<0.2				
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														<0.20
Acenaphthene	4.1	Table 2	µg/L	<0.05	<0.05	<0.05	<0.5	**0.06**	<0.02	<0.2	<0.02	<0.02	<0.2				<0.10
Acenaphthylene	1	Table 2	µg/L	<0.05	<0.05	<0.05	<0.05	**0.06**	<0.02	<0.2	<0.02	<0.02	<0.2				<0.11
Anthracene	2.4	Table 2	µg/L	<0.05	<0.05	**0.06**	<0.05	**0.1**	<0.02	<0.2	<0.02	<0.02	<0.2				<0.05
Benzo(a)anthracene	1	Table 2	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.2	<0.02	<0.02	<0.2				<0.08
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01	<0.01	**0.01**	<0.01	**0.02**	<0.01	<0.2	<0.005	<0.005	<0.2				<0.01
Benzo(b)fluoranthene	0.1	Table 2	µg/L							<0.2	<0.02	<0.02	<0.2				
Benzo(b,j)fluoranthene			µg/L	<0.05	<0.05	<0.05	<0.05	0.06	<0.02								
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.2	<0.02	<0.02	<0.2				<0.06
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05	<0.05		<0.05	<0.05	<0.02	<0.2	<0.02	<0.02	<0.2				<0.05
Chrysene	0.1	Table 2	µg/L	**0.05**	<0.05	<0.05	<0.05	**0.1**	<0.02	<0.2	<0.02	<0.02	<0.2				<0.05
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.1	<0.1	<0.1	<0.1		<0.02	<0.5	<0.02	<0.02	<0.5				<0.09
Fluoranthene	0.41	Table 2	µg/L	<0.05	<0.05	**0.06**	<0.05	**0.1**	<0.02	<0.2	<0.02	<0.02	<0.2				<0.12
Fluorene	120	Table 2	µg/L	**0.06**	**0.07**	**0.08**	<0.05	**0.3**	<0.02	<0.2	<0.02	<0.02	<0.2				<0.09
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.5	<0.02	<0.02	<0.5				<0.06
Naphthalene	11	Table 2	µg/L	**0.14**	**12**	**0.36**	**0.09**	**0.4**	**0.03**	<0.2	**0.03**	<0.02	<0.2				<0.12
Phenanthrene	1	Table 2	µg/L	**0.11**	**0.06**	**0.16**	**0.11**	**0.9**	<0.02	<0.2	**0.022**	<0.02	<0.2				<0.10
Pyrene	4.1	Table 2	µg/L	**0.07**	<0.05	**0.07**	**0.05**	**0.2**	<0.2	<0.2	<0.02	<0.02	<0.2				<0.05

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-3 Groundwater Quality - Basal Overburden/Shallow Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	OW8A-06	OW8A-92	OW8A-92	OW8A-92	OW8A-92	OW8A-92	OW8A-92	OW8A-92	OW8A-92	OW9A-06	OW9A-06	OW9A-06	OW9A-06	OW9A-06
			Sampling Date	2011/11/15	2004/06/07	2004/11/29	2005/05/09	2005/07/28	2005/12/01	2006/03/30	2006/05/29	2006/07/19	2006/12/12	2007/05/16	2007/07/31	2009/04/30	2009/07/23
	ODWQS		Formation	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock
	Value	Type	Units	GW Indicator	GW Comprehensive	GW Indicator + Metals	GW Indicator	GW Comprehensive	GW Indicator + GW PAH	GW PAH	GW Indicator + GW PAH	GW Comprehensive	GW Indicator + GW PAH	GW Indicator + GW PAH	GW Comprehensive	MOE	GW Comprehensive
Field Parameters																	
Conductivity			µS/cm	4120													
pH	6.5-8.5	OG		6.74													
Temperature			°C	10.3													
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	401	445	418	411	432	447		459	453	442	403	406	397	417
Ammonia (as N)			mg/L	0.737	0.51	0.59	0.52	0.4	0.58		0.58	0.65	0.33	0.21	0.36	<0.16	0.319
Biological Oxygen Demand (BOD_5)			mg/L		<3			<2				<2			<2		<6.0
Calcium (Ca)			mg/L	499	420	550	510	490	550		430	510	570	540	600	551	506
Chemical Oxygen Demand (COD)			mg/L	<5	9	<4	<4	8	10		<4	6	520	10	<4	14	<10
Chloride (Cl)	250	AO	mg/L	11.3	25.2	10.7	8.7	8	9		10	10	24	13	16	11.9	<20
Conductivity			µS/cm	3950	3240	3730	3960	3460	3960		3890	3900	3950	4020	3610	4050	3810
Dissolved Organic Carbon (DOC)	5	AO	mg/L	6.2	3.7	3.2	2.1	2.2	2.4		2.3	2.2	4.2	1.9	2.4	14	2.8
Hardness ($CaCO_3$)	80-100	OG	mg/L		2350			2330				2600			3200	2870	2850
Nitrate (as N)	10	MAC	mg/L	<0.25	<1	<0.1	<1	<0.2	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<1.0
Nitrite (as N)	1	MAC	mg/L		<0.1			<0.3				0.02			<0.01	<0.005	<1.0
pH	6.5-8.5	OG		7.91	7.70	7.92	7.77	7.71	8.02		7.9	7.8	7.90	7.8	7.9	7.62	7.54
Phenol 4AAP			mg/L		<0.001			<0.001				<0.001			<0.001	<0.0002	<0.0010
Potassium (K)			mg/L	5.52	5.7			4.9				4.7			7	6.41	<10
Sulphates (SO_4)	500	AO	mg/L	2590	2010	2210	2370	2310	2240		1850	2150	2520	2290	2450	2590	2600
Total Dissolved Solids (TDS)	500	AO	mg/L	3880	3710	3670	4200	3780	4010		2530	2580	3410	3890	1740	4320	4000
Total Kjeldahl Nitrogen (TKN)			mg/L		1.1			0.8				0.8			1	0.35	0.239
Total Phosphorus (P)			mg/L		0.52			0.25				0.026			0.56	0.15	0.204
Total Suspended Solids (TSS)			mg/L		547			860				37			1100	482	650
Metals																	
Arsenic	0.025	IMAC	mg/L		<0.0014	0.0064		0.005				0.005			0.001	<0.001	<0.010
Barium	1	MAC	mg/L	0.0057	0.0056	0.005	0.007	0.0053	<0.05		0.006	<0.005	0.03	<0.03	0.005	<0.006	<0.10
Beryllium			mg/L		<0.0014	<0.0014		<0.0005				<0.0005			<0.0005	<0.001	<0.010
Boron	5	IMAC	mg/L	0.544	0.9	0.73	0.71	0.7	0.7		0.75	0.63	0.46	0.51	0.52	0.52	0.68
Cadmium	0.005	MAC	mg/L		<0.001	<0.001		<0.0001				<0.0001			<0.0001	<0.001	<0.0010
Chromium	0.05	MAC	mg/L		<0.0016	0.0046		<0.005				<0.005			<0.005	<0.002	<0.010
Cobalt			mg/L		<0.001	<0.001		<0.0005				<0.003			0.0024	<0.003	<0.0080
Copper	1	AO	mg/L		<0.003	0.004		0.043				0.001			<0.005	<0.001	<0.010
Iron	0.3	AO	mg/L	6.79	3.8	6	3.2	2.8	<0.5		3.2	3	1.2	1.6	2.1	0.801	1.19
Lead	0.01	MAC	mg/L		0.0023	<0.0022		0.0005				<0.0005			<0.0005	<0.005	<0.010
Magnesium			mg/L	332	320	380	330	300	380		320	320	340	390	420	374	386
Manganese	0.05	AO	mg/L		0.041	0.048		0.046				0.04			0.21	0.196	0.191
Mercury	0.001	MAC	mg/L		<0.0001	<0.0001		<0.0001				<0.0001			<0.0001	<0.03	<0.00010
Molybdenum			mg/L		0.0029	0.0031		0.0029				0.003			0.007	<0.005	<0.010
Nickel			mg/L		<0.001	<0.001		<0.001				<0.005			0.004	<0.006	<0.020
Silver			mg/L		<0.0006	<0.0006		0.0005				<0.0001			<0.0001	<0.003	<0.0010
Sodium	200	AO	mg/L	114	130	150	150	120	150		140	130	110	120	130	132	114
Thallium			mg/L		<0.001	<0.001		<0.00005				<0.00005			<0.00005		<0.0030
Vanadium			mg/L		<0.001	<0.001		<0.001				<0.001			<0.001	<0.001	<0.010
Zinc	5	AO	mg/L		<0.005	<0.005		<0.05				<0.05			<0.005	<0.006	<0.030
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
1,1,1-Trichloroethane	200		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
1,1,2,2-Tetrachloroethane	1		µg/L		<1			<0.1				<0.1			<0.1	<0.2	<0.5
1,1,2-Trichloroethane	5		µg/L		<0.5			<0.2				<0.2			<0.2	<0.2	<0.5
1,1-Dichloroethane	70		µg/L		<0.4			<0.1				<0.1			<0.1	<0.2	<0.5
1,1-Dichloroethylene	14		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
1,2-Dibromoethane (EDB)	1		µg/L		<0.5			<0.2				<0.2			<0.2	<0.2	<0.5
1,2-Dichlorobenzene	3		µg/L		<0.5			<0.1				<0.2			<0.2	<0.2	<0.5
1,2-Dichloroethane	5		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
1,2-Dichloropropane	5		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
1,3-Dichlorobenzene	630		µg/L		<0.5			<0.1				<0.2			<0.2	<0.2	<0.5
1,4-Dichlorobenzene	5		µg/L		<0.5			<0.1				<0.2			<0.2	<0.2	<0.5
2-Hexanone			µg/L		<10			<5				<5			<5		<20
Acetone	3 000		µg/L		<10			<10				<10			<10		<20
Benzene	5		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Bromodichloromethane	5		µg/L		<0.2			<0.1				<0.1			<0.1	<0.2	<0.5
Bromoform	5		µg/L		<0.2			<0.2				<0.2			<0.2	<0.2	<0.5
Bromomethane	10		µg/L		<3			<0.5				<0.5			<0.5	<0.5	**2.39**
Carbon Tetrachloride	5		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Chlorobenzene	30		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Chloroethane			µg/L		<1			<0.2				<0.2			<0.2	<0.5	<1
Chloroform	5		µg/L		<0.2			<0.1				<0.1			<0.1	<0.2	<0.5
Chloromethane			µg/L		<2			<0.5				<0.5			<0.5	<0.5	<1
cis-1,2-Dichloroethylene	70		µg/L		<1			<0.1				<0.1			<0.1	<0.2	<0.5
cis-1,3-Dichloropropene	1.4		µg/L		<0.14			<0.2				<0.2			<0.2	<0.2	<0.5
Dibromochloromethane	5		µg/L		<0.2			<0.2				<0.2			<0.2	<0.2	<0.5
Dichlorodifluoromethane			µg/L														<1
Dichloromethane(Methylene Chloride)	50		µg/L		<1			<0.5				<0.5			<0.5	<0.2	<0.5
Ethylbenzene	2.4		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Methyl isobutyl ketone	350		µg/L		<10			<5				<5			<5		<20
Methyl t-butyl ether (MTBE)	700		µg/L		<2			<0.2				<0.2			<0.2		**0.5**
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<15			<5				<5			<5		<20
Styrene	100		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Tetrachloroethylene	30		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Toluene	24		µg/L		<0.5			<0.2				<0.2			<0.2	<0.2	<0.5
trans-1,2-Dichloroethylene	100		µg/L		<1			<0.1				<0.1			<0.1	<0.2	<0.5
trans-1,3-Dichloropropene	1.4		µg/L		<0.14			<0.2				<0.2			<0.2	<0.2	<0.5
Trichloroethylene	5		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Trichlorofluoromethane (FREON 11)			µg/L		<2			<0.2							<0.2	<0.5	<1
Vinyl Chloride	2		µg/L		<0.2			<0.2				<0.2			<0.2		<0.5
Xylene, *o*-	300		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<0.5
Xylene, *p*- + *m*-	300		µg/L		<0.5			<0.1				<0.1			<0.1	<0.2	<1
Xylenes (total)	300		µg/L		<1			<0.1				<0.1			<0.1	<0.2	<1.5
PAHs																	
2-Methylnaphthalene			µg/L													<0.2	
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L														
Acenaphthene	4.1	Table 2	µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Acenaphthylene	1	Table 2	µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Anthracene	2.4	Table 2	µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Benzo(a)anthracene	1	Table 2	µg/L		<0.05			**0.09**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Benzo(a)pyrene	0.01	MAC	µg/L		<0.01			**0.01**	<0.01	<0.01	<0.01	<0.01	<10	<10		<0.2	**0.01**
Benzo(b)fluoranthene	0.1	Table 2	µg/L													<0.2	
Benzo(b,j)fluoranthene			µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05
Benzo(g,h,i)perylene	0.2	Table 2	µg/L		<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.2	<0.1
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Chrysene	0.1	Table 2	µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L		<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.5	<0.1
Fluoranthene	0.41	Table 2	µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Fluorene	120	Table 2	µg/L		<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L		<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.5	<0.1
Naphthalene	11	Table 2	µg/L		<0.05			**3.18**	**0.1**	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	**0.07**
Phenanthrene	1	Table 2	µg/L		<0.05			**0.13**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	**0.1**
Pyrene	4.1	Table 2	µg/L		<0.05			**0.06**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.2	<0.05

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-4 Groundwater Quality - Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

GENIVAR

Parameter	Standard		Sample Location	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1D-07	MW1S-07	MW1S-07	MW1S-07	MW1S-07	MW1S-07	MW1S-07
			Sampling Date	2009/04/30	2009/07/23	2009/11/25	2009/12/04	2011/01/10	2011/05/30	2011/07/06	2011/11/16	2009/04/30	2009/07/23	2009/11/25	2009/12/04	2011/01/10	2011/05/30
	ODWQS		Formation	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
	Value	Type	Units	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator
Field Parameters																	
Conductivity			µS/cm						3100	3110	3280						3368
pH	6.5-8.5	OG							7.83	7.81	7.5						6.93
Temperature			°C						12.8	11.7	10.4						13
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	142	234	166	132	150	114	124	142	377	430	391	131	396	414
Ammonia (as N)			mg/L	3.35	2	2.10	3.36	2.41	2.61	3.60	3.04	0.35	0.43	0.222	3.23	0.26	0.15
Biological Oxygen Demand (BOD_5)			mg/L		<6.0					44			2				
Calcium (Ca)			mg/L	509	530		506	512	543	508	534	469	523		509	508	532
Chemical Oxygen Demand (COD)			mg/L	92	54	106	80	20	23.1	67	74.1	10	33	10	<6	<5	<5
Chloride (Cl)	250	AO	mg/L	65.3	<20	14.8	53.9	15.2	15.6	15.9	15.4	17.1	<20	11.6	13.4	10.6	11.1
Conductivity			µS/cm	3120	3160	3020	2950	2720	2730	2920	3110	3670	3780	3640	2940	3400	3450
Dissolved Organic Carbon (DOC)	5	AO	mg/L	1.6	3	3.1	1	5	1.8	7.7	1.3	1.9	2.8	2.8	1.8	2	1.7
Hardness ($CaCO_3$)	80-100	OG	mg/L	1980	2210		2010			2010		2430	2900		2660		
Nitrate (as N)	10	MAC	mg/L	<0.05	<1.0	<0.50	<0.05	<0.10	<0.25	<0.1	<0.25	<0.06	<1.0	<0.50		<0.10	1.25
Nitrite (as N)	1	MAC	mg/L	<0.005	<1.0		<0.005			<0.1		0.057	<1.0				
pH	6.5-8.5	OG		8.28	8.17	8.23	8.26	8.35	7.92	8.28	8.36	7.52	7.49	7.61	8.26	7.85	7.76
Phenol 4AAP			mg/L	0.012	<0.020		<0.7			0.091		<0.0002	<0.0010		<0.0002		
Potassium (K)			mg/L	28.4	30		30.4			30.3	30.5	4.85	<10		5.19		
Sulphates (SO_4)	500	AO	mg/L	1960	2400	2280	2010	2010	2050	1900	1950	1850	2800	2560	2370	2540	2570
Total Dissolved Solids (TDS)	500	AO	mg/L	3930	3970	3160	3340	3210	2930	1610	2870	3460	3110	3860	3190	3810	3960
Total Kjeldahl Nitrogen (TKN)			mg/L	3.78	2.91		3.78			3.75		0.44	0.47		3.58		
Total Phosphorus (P)			mg/L	0.45	1.61		<0.05			0.184		<0.06	0.193		<0.05		
Total Suspended Solids (TSS)			mg/L	1530	570		3510			3300		234	960		614		
Metals																	
Arsenic	0.025	IMAC	mg/L	<0.001	<0.010		<0.0010			<0.003		0.006	<0.010		0.0065		
Barium	1	MAC	mg/L	0.024	<0.10	<0.10	0.024	<0.020	0.0173	0.0132	0.0046	<0.009	<0.10	0.012	<0.007	0.004	0.0059
Beryllium			mg/L	<0.001	<0.010		<0.001			<0.001		<0.001	<0.010		<0.001		
Boron	5	IMAC	mg/L	12	12.2	9.44	0.53	13	10.2	10.6	10.7	0.63	0.73	0.502	0.53	0.428	0.433
Cadmium	0.005	MAC	mg/L	<0.001	<0.0010		<0.001			<0.0001		<0.001	<0.0010		<0.001		
Chromium	0.05	MAC	mg/L	<0.002	<0.010		<0.002			<0.003		<0.002	<0.010		<0.002		
Cobalt			mg/L	<0.001	<0.0080		<0.001			0.00078		<0.001	<0.0080		<0.001		
Copper	1	AO	mg/L	<0.001	<0.010		<0.001			<0.0008		<0.001	<0.010		<0.001		
Iron	0.3	AO	mg/L	0.143	<0.50	<0.50	<0.005	0.526	0.207	0.0416	<0.01	2.39	2.6	2.35	2.62	1.61	2.23
Lead	0.01	MAC	mg/L	<0.005	<0.010		<0.005			<0.001		<0.005	<0.010		<0.005		
Magnesium			mg/L	193	199	187	185	179	186	179	186	366	388	279	369	348	370
Manganese	0.05	AO	mg/L	0.068	0.05		0.072			0.0479		0.05	0.04		0.042		
Mercury	0.001	MAC	mg/L	<0.03	<0.00010		<0.06			<0.00005		<0.05	<0.00010		<0.02		
Molybdenum			mg/L	<0.005	<0.010		<0.005			<0.002		<0.005	<0.010		<0.005		
Nickel			mg/L	<0.006	<0.020		<0.006			<0.003		<0.006	<0.020		<0.006		
Silver			mg/L	<0.003	<0.0010		<0.003			<0.0001		<0.003	<0.0010		<0.003		
Sodium	200	AO	mg/L	73	73.2	36.3	87.2	53.7	47.4	39.5	35.9	107	123	94.1	119	112	121
Thallium			mg/L		<0.0030					<0.0003			<0.0030				
Vanadium			mg/L	<0.001	<0.010		<0.001			<0.002		<0.001	<0.010		<0.001		
Zinc	5	AO	mg/L	<0.006	<0.030		<0.001			0.0198		<0.003	<0.030		0.01		
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
1,1,1-Trichloroethane	200		µg/L	<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2		
1,1,2,2-Tetrachloroethane	1		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
1,1,2-Trichloroethane	5		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
1,1-Dichloroethane	70		µg/L	<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2		
1,1-Dichloroethylene	14		µg/L	<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2		
1,2-Dibromoethane (EDB)	1		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
1,2-Dichlorobenzene	3		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
1,2-Dichloroethane	5		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
1,2-Dichloropropane	5		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
1,3-Dichlorobenzene	630		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
1,4-Dichlorobenzene	5		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
2-Hexanone			µg/L		<20					<0.30			<20				
Acetone	3 000		µg/L		<20					<1.0			<20				
Benzene	5		µg/L	<0.2	<0.5		<0.2			<0.20		0.3	<0.5		<0.2		
Bromodichloromethane	5		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
Bromoform	5		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
Bromomethane	10		µg/L	<0.5	4.55		<0.5			<0.20		<0.5	2.52		<5		
Carbon Tetrachloride	5		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
Chlorobenzene	30		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
Chloroethane			µg/L	<0.5	<1		<0.5			<0.20		<0.5	<1		<0.5		
Chloroform	5		µg/L	<0.2	<0.5		<0.2			<0.20		0.2	<0.5		<0.2		
Chloromethane			µg/L	<0.5	<1		<0.5			<0.40		<0.5	<1		<0.5		
cis-1,2-Dichloroethylene	70		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
cis-1,3-Dichloropropene	1.4		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
Dibromochloromethane	5		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
Dichlorodifluoromethane			µg/L		<1		<0.5			<0.20			<1		<0.5		
Dichloromethane(Methylene Chloride)	50		µg/L	<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2		
Ethylbenzene	2.4		µg/L	<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2		
Methyl isobutyl ketone	350		µg/L		<20					<1.0			<20				
Methyl t-butyl ether (MTBE)	700		µg/L		0.5					<0.20			0.5				
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L		<20					<1.0			<20				
Styrene	100		µg/L	<0.2	<0.5		<0.2			<0.10		0.7	<0.5		<0.2		
Tetrachloroethylene	30		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
Toluene	24		µg/L	1.5	3.41		<0.2			<0.20		3.2	3.75		0.2		
trans-1,2-Dichloroethylene	100		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
trans-1,3-Dichloropropene	1.4		µg/L	<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2		
Trichloroethylene	5		µg/L	<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2		
Trichlorofluoromethane (FREON 11)			µg/L	<0.5	<1		<0.5			<0.40		<0.5	<1		<0.5		
Vinyl Chloride	2		µg/L		<0.5					<0.17			<0.5				
Xylene, *o-*	300		µg/L	0.3	<0.5		<0.2			<0.10		0.2	<0.5		<0.2		
Xylene, *p-* + *m-*	300		µg/L	0.5	<1		<0.2			<0.20		0.6	<1		<0.2		
Xylenes (total)	300		µg/L	0.7	<1.5		<0.2			<0.20		0.8	<1.5		<0.2		
PAHs																	
2-Methylnaphthalene			µg/L	<0.2	0.03	0.025	<0.2					<0.2	0.021	<0.02	<0.2		
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L							<0.20							
Acenaphthene	4.1	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.10		<0.2	<0.02	<0.02	<0.2		
Acenaphthylene	1	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.11		<0.2	<0.02	<0.02	<0.2		
Anthracene	2.4	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	**0.022**	<0.02	<0.2		
Benzo(a)anthracene	1	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.08		<0.2	<0.02	<0.02	<0.2		
Benzo(a)pyrene	0.01	MAC	µg/L	<0.2	<0.005	<0.005	<0.2			<0.01		<0.2	<0.005	<0.005	<0.2		
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	<0.02	<0.2		
Benzo(b,j)fluoranthene			µg/L														
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.06		<0.2	<0.02	<0.02	<0.2		
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	<0.02	<0.2		
Chrysene	0.1	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	<0.02	<0.2		
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.5	<0.02	<0.02	<0.5			<0.09		<0.5	<0.02	<0.02	<0.5		
Fluoranthene	0.41	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.12		<0.2	<0.02	**0.026**	<0.2		
Fluorene	120	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.09		<0.2	<0.02	<0.02	<0.2		
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.5	<0.02	<0.02	<0.5			<0.06		<0.5	<0.02	<0.02	<0.5		
Naphthalene	11	Table 2	µg/L	<0.2	**0.09**	**0.086**	<0.2			<0.12		<0.2	**0.046**	<0.02	<0.2		
Phenanthrene	1	Table 2	µg/L	<0.2	<0.02	**0.043**	<0.2			<0.10		<0.2	**0.02**	**0.038**	<0.2		
Pyrene	4.1	Table 2	µg/L	<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	**0.023**	<0.2		

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-4 Groundwater Quality - Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW1S-07	MW1S-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2D-07	MW2S-07	MW2S-07	MW2S-07	MW2S-07
			Sampling Date	2011/07/06	2011/11/14	2009/04/30	2009/07/23	2009/11/25	2009/12/03	2011/01/07	2011/05/30	2011/07/06	2011/11/14	2009/04/30	2009/07/23	2009/11/25	2009/12/03
	ODWQS		Formation	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
	Value	Type	Units	GW Comprehensive	GW Indicator	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE
Field Parameters																	
Conductivity			µS/cm	3830	4100						3990	3930	4200				
pH	6.5-8.5	OG		7.03	6.98						7.15	6.99	6.87				
Temperature			°C	11.3	10.5						11.5	10.9	10.4				
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	419	403	287	349	390	412	399	411	413	398	122	422	414	408
Ammonia (as N)			mg/L	0.285	0.287	1.94	1.87	0.47	0.31	0.45	0.134	0.23	0.262	<0.11	0.226	0.159	<0.05
Biological Oxygen Demand (BOD_5)			mg/L	<5			<6.0					<5			<6.0		
Calcium (Ca)			mg/L	495	498	501	516		501	520	510	486	517	128	503		502
Chemical Oxygen Demand (COD)			mg/L	7	<5	18	<10	106	23	10	<5	<5	<5	13	<10	<10	21
Chloride (Cl)	250	AO	mg/L	8.64	10.5	10.8	<20	10.4	10.2	11.6	13.4	13.2	12.2	22	<20	10.8	10.8
Conductivity			µS/cm	3750	3940	3600	3680	3850	3830	3440	3590	3800	4040	1730	3880	3950	3830
Dissolved Organic Carbon (DOC)	5	AO	mg/L	2.3	2.5	18	2.5	3.4	1.9	2.7	2.5	9.4	3	13	3.3	2.5	1.7
Hardness ($CaCO_3$)	80-100	OG	mg/L	2670		2280	2670		2760			2680		758	2930		2810
Nitrate (as N)	10	MAC	mg/L	<0.1	<0.25	<0.05	<1.0	<0.50	<0.005	2.12	<0.25	<0.1	<0.25	0.28	<1.0	<0.50	<0.005
Nitrite (as N)	1	MAC	mg/L	<0.1		<0.005	<1.0		<0.05			<0.1		<0.008	<1.0		<0.05
pH	6.5-8.5	OG		7.84	7.94	7.82	7.64	7.64	7.72	7.79	7.88	7.84	8.06	8.24	7.56	7.57	7.52
Phenol 4AAP			mg/L	<0.001		<0.0002	0.0014		0.0013			<0.001		<0.0002	0.002		0.0012
Potassium (K)			mg/L	4.83	5.2	20	16		8.78			6.23	8.15	30	<10		6.22
Sulphates (SO_4)	500	AO	mg/L	2450	2440	2220	2930	2900	2480	2550	2710	2560	2640	2240	2950	2820	2510
Total Dissolved Solids (TDS)	500	AO	mg/L	4240	3740		3860	4120	4210	4230	4070	2390	3930	3840	4170	4180	4210
Total Kjeldahl Nitrogen (TKN)			mg/L	0.41		2.2	2.03		0.88			0.44		0.44	0.295		<0.24
Total Phosphorus (P)			mg/L	0.04		0.24	0.157		0.85			0.071		<0.02	0.325		<0.08
Total Suspended Solids (TSS)			mg/L	45			2370		2440			312		273	948		217
Metals																	
Arsenic	0.025	IMAC	mg/L	0.0084		0.0025	<0.010		<0.001			<0.003		<0.0015	<0.010		<0.0015
Barium	1	MAC	mg/L	0.0046	0.0048	0.016	<0.10	0.013	<0.008	0.009	0.0084	0.0076	0.0073	0.012	<0.10	<0.010	<0.007
Beryllium			mg/L	<0.001		<0.001	<0.010		<0.001			<0.001		<0.001	<0.010		<0.001
Boron	5	IMAC	mg/L	0.478	0.511	3.6	3.38	1.47	1.2	0.812	0.555	0.64	0.992	0.49	0.62	0.471	0.49
Cadmium	0.005	MAC	mg/L	<0.0001		<0.001	<0.0010		<0.001			<0.0001		<0.001	<0.0010		<0.001
Chromium	0.05	MAC	mg/L	<0.003		<0.002	<0.010		<0.002			<0.003		<0.002	<0.010		<0.002
Cobalt			mg/L	0.00074		<0.001	<0.0080		<0.002			0.00314		<0.003	<0.0080		<0.002
Copper	1	AO	mg/L	0.00207		<0.001	<0.010		<0.001			0.0023		<0.001	<0.010		<0.001
Iron	0.3	AO	mg/L	2.26	1.64	0.773	<0.50	1.74	0.813	0.771	0.807	0.675	0.713	0.848	0.68	0.717	0.624
Lead	0.01	MAC	mg/L	<0.001		<0.005	<0.010		<0.005			<0.001		<0.005	<0.010		<0.005
Magnesium			mg/L	349	344	256	337	317	377	370	386	356	373	385	407	328	388
Manganese	0.05	AO	mg/L	0.0496		0.022	0.086		0.152			0.203		0.178	0.166		0.156
Mercury	0.001	MAC	mg/L	<0.00005		<0.02	<0.00010		0.11			<0.00005		<0.02	<0.00010		<0.02
Molybdenum			mg/L	0.0049		<0.005	<0.010		<0.005			0.0057		<0.005	<0.010		<0.005
Nickel			mg/L	<0.003		<0.006	<0.020		<0.006			0.0058		<0.006	<0.020		<0.006
Silver			mg/L	<0.0001		<0.003	<0.0010		<0.003			<0.0001		<0.003	<0.0010		<0.003
Sodium	200	AO	mg/L	111	108	155	134	110	138	115	123	112	118	144	127	104	124
Thallium			mg/L	<0.0003			<0.0030					<0.0003			<0.0030		
Vanadium			mg/L	<0.002		<0.001	<0.010		<0.001			<0.002		<0.001	<0.010		<0.001
Zinc	5	AO	mg/L	0.0064		<0.005	<0.030		0.01			0.0793		<0.006	<0.030		<0.006
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
1,1,1-Trichloroethane	200		µg/L	<0.30		<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2
1,1,2,2-Tetrachloroethane	1		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
1,1,2-Trichloroethane	5		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
1,1-Dichloroethane	70		µg/L	<0.30		<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2
1,1-Dichloroethylene	14		µg/L	<0.30		<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2
1,2-Dibromoethane (EDB)	1		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
1,2-Dichlorobenzene	3		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
1,2-Dichloroethane	5		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
1,2-Dichloropropane	5		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
1,3-Dichlorobenzene	630		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
1,4-Dichlorobenzene	5		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
2-Hexanone			µg/L	<0.30			<20					<0.30			<20		
Acetone	3 000		µg/L	<1.0			<20					<1.0			<20		
Benzene	5		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
Bromodichloromethane	5		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
Bromoform	5		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
Bromomethane	10		µg/L	<0.20		<0.5	2.29		<0.5			<0.20		<0.5	1.73		<0.5
Carbon Tetrachloride	5		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
Chlorobenzene	30		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
Chloroethane			µg/L	<0.20		<0.5	<1		<0.5			<0.20		<0.5	<1		<0.5
Chloroform	5		µg/L	<0.20		0.3	<0.5		<0.2			<0.20		0.5	<0.5		0.3
Chloromethane			µg/L	<0.40		<0.5	<1		<0.5			<0.40		<0.5	<1		<0.5
cis-1,2-Dichloroethylene	70		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
cis-1,3-Dichloropropene	1.4		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
Dibromochloromethane	5		µg/L	<0.10		0.3	<0.5		<0.2			<0.10		0.5	<0.5		<0.2
Dichlorodifluoromethane			µg/L	<0.20			<1		<0.5			<0.20			<1		<0.5
Dichloromethane(Methylene Chloride)	50		µg/L	<0.30		<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2
Ethylbenzene	2.4		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
Methyl isobutyl ketone	350		µg/L	<1.0			<20					<1.0			<20		
Methyl t-butyl ether (MTBE)	700		µg/L	<0.20			0.5					<0.20			0.5		
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L	<1.0			<20					<1.0			<20		
Styrene	100		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
Tetrachloroethylene	30		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
Toluene	24		µg/L	<0.20		<0.2	0.82		<0.2			<0.20		0.4	0.7		<0.2
trans-1,2-Dichloroethylene	100		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		<0.2	<0.5		<0.2
trans-1,3-Dichloropropene	1.4		µg/L	<0.30		<0.2	<0.5		<0.2			<0.30		<0.2	<0.5		<0.2
Trichloroethylene	5		µg/L	<0.20		<0.2	<0.5		<0.2			<0.20		0.4	<0.5		<0.2
Trichlorofluoromethane (FREON 11)			µg/L	<0.40		<0.5	<1		<0.5			<0.40		<0.5	<1		<0.5
Vinyl Chloride	2		µg/L	<0.17			<0.5					<0.17			<0.5		
Xylene, *o*-	300		µg/L	<0.10		<0.2	<0.5		<0.2			<0.10		<0.2	<0.5		<0.2
Xylene, *p*- + *m*-	300		µg/L	<0.20		<0.2	<1		<0.2			<0.20		<0.2	<1		<0.2
Xylenes (total)	300		µg/L	<0.20		<0.2	<1.5		<0.2			<0.20		<0.2	<1.5		<0.2
PAHs																	
2-Methylnaphthalene			µg/L			<0.2	<0.02	<0.02	<0.2					<0.2	<0.02	<0.02	<0.2
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L	<0.20								<0.20					
Acenaphthene	4.1	Table 2	µg/L	<0.10		<0.2	<0.02	<0.02	<0.2			<0.10		<0.2	<0.02	<0.02	<0.2
Acenaphthylene	1	Table 2	µg/L	<0.11		<0.2	<0.02	<0.02	<0.2			<0.11		<0.2	<0.02	<0.02	<0.2
Anthracene	2.4	Table 2	µg/L	<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	**0.031**	<0.02	<0.2
Benzo(a)anthracene	1	Table 2	µg/L	<0.08		<0.2	<0.02	<0.02	<0.2			<0.08		<0.2	<0.02	<0.02	<0.2
Benzo(a)pyrene	0.01	MAC	µg/L	<0.01		<0.2	<0.005	<0.005	<0.2			<0.01		<0.2	<0.005	<0.005	<0.2
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	<0.02	<0.2
Benzo(b,j)fluoranthene			µg/L														
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.06		<0.2	<0.02	<0.02	<0.2			<0.06		<0.2	<0.02	<0.02	<0.2
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	<0.02	<0.2
Chrysene	0.1	Table 2	µg/L	<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	<0.02	<0.2
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.09		<0.5	<0.02	<0.02	<0.5			<0.09		<0.5	<0.02	<0.02	<0.5
Fluoranthene	0.41	Table 2	µg/L	<0.12		<0.2	<0.02	<0.02	<0.2			<0.12		<0.2	<0.02	<0.02	<0.2
Fluorene	120	Table 2	µg/L	<0.09		<0.2	<0.02	<0.02	<0.2			<0.09		<0.2	<0.02	<0.02	<0.2
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.06		<0.5	<0.02	<0.02	<0.5			<0.06		<0.5	<0.02	<0.02	<0.5
Naphthalene	11	Table 2	µg/L	<0.12		<0.2	**0.024**	<0.02	<0.2			<0.12		<0.2	<0.02	<0.02	<0.2
Phenanthrene	1	Table 2	µg/L	<0.10		<0.2	<0.02	**0.021**	<0.2			<0.10		<0.2	<0.02	<0.02	<0.2
Pyrene	4.1	Table 2	µg/L	<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	<0.02	<0.02	<0.2

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-4 Groundwater Quality - Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard		Sample Location	MW2S-07	MW2S-07	MW2S-07	MW2S-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8D-07	OW8S-07	OW8S-07
			Sampling Date	2011/01/07	2011/05/30	2011/07/06	2011/11/14	2009/04/30	2009/07/23	2009/11/25	2009/12/03	2011/01/07	2011/05/30	2011/07/05	2011/11/15	2009/04/30	2009/07/23
	ODWQS		Formation	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
	Value	Type	Units	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	MOE	GW Comprehensive	GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator	MOE	GW Comprehensive
Field Parameters																	
Conductivity			µS/cm		3431	3950	4180						3042	2974	3510		
pH	6.5-8.5	OG			6387	7.11	6.97						7.64	8.64	7.57		
Temperature			°C		10.9	11.1	10.9						13.9	14.4	11		
General																	
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	395	391	405	389	160	161	178	138	160	134	154	155	410	431
Ammonia (as N)			mg/L	0.12	0.185	0.133	0.184	2.57	1.14	1.28	3.1	1.56	0.85	4.15	2.03	0.3	0.34
Biological Oxygen Demand (BOD_5)			mg/L			<5			44.4					90			<6.0
Calcium (Ca)			mg/L	515	522	480	498	522	281		514	554	512	527	489	521	504
Chemical Oxygen Demand (COD)			mg/L	<5	<5	7	<5	102	77	100	70	96	177	141	91.2	25	<10
Chloride (Cl)	250	AO	mg/L	13.8	12.8	12.2	13.3	53.6	35.1	25.7	76.1	25.9	31.7	34.4	24.8	13.1	<20
Conductivity			µS/cm	3480	3530	3830	3990	3090	2230	3160	3110	2750	2960	3210	3230	4100	3930
Dissolved Organic Carbon (DOC)	5	AO	mg/L	1.9	3.7	4.8	3	3.4	4.5	4.8	0.7	1.9	2.21	15.6	13.4	2	4.3
Hardness ($CaCO_3$)	80-100	OG	mg/L			2680		2000	1140		2100			2050		2780	2910
Nitrate (as N)	10	MAC	mg/L		<0.25	<0.1	<0.25	<0.05	<1.0	<0.50	<0.005	<0.05	<0.1	<0.2	<0.25	<0.05	<1.0
Nitrite (as N)	1	MAC	mg/L	3.96		<0.1		<0.005	<1.0		<0.05			<0.2		<0.005	<1.0
pH	6.5-8.5	OG		7.83	7.99	7.84	7.93	8.04	8.3	8.29	8.1	8.29	8.28	8.28	8.36	7.75	7.51
Phenol 4AAP			mg/L			<0.001		0.0112	0.0874		0.001			0.083		<0.0002	0.002
Potassium (K)			mg/L			5.45	6.86	22.9	12		28.5			34.5	27.8	6.75	<10
Sulphates (SO_4)	500	AO	mg/L	2580	2890	2520	2570	2620	1470	2150	1950	2100	2340	2390	2030		2750
Total Dissolved Solids (TDS)	500	AO	mg/L	4290	4080	4130	3870	1760	2650	3270	3210	3240	3090	3240	3040	5060	4150
Total Kjeldahl Nitrogen (TKN)			mg/L			0.29		3.1	1.74		3.39			3.94		0.75	0.405
Total Phosphorus (P)			mg/L			0.026		0.5	0.571		<0.03			1.47		0.63	1.24
Total Suspended Solids (TSS)			mg/L			133		46.3	1370		105			18100		1730	2450
Metals																	
Arsenic	0.025	IMAC	mg/L			<0.003		<0.002	<0.010		<0.002			0.0049		0.0035	<0.010
Barium	1	MAC	mg/L	0.007	0.0046	0.0054	0.0079	0.027	<0.10	<0.10	0.014	0.023	0.0149	0.0123	0.0062	<0.008	<0.10
Beryllium			mg/L			<0.001		<0.001	<0.010		<0.001			<0.001		<0.001	<0.010
Boron	5	IMAC	mg/L	0.338	0.446	0.433	0.489	10	4.01	8.23	11	10.9	9.38	10	10.6	0.57	0.7
Cadmium	0.005	MAC	mg/L			<0.0001		<0.001	<0.0010		<0.001			<0.0001		<0.001	<0.0010
Chromium	0.05	MAC	mg/L			<0.003		<0.002	<0.010		<0.002			<0.003		<0.002	<0.010
Cobalt			mg/L			0.00244		<0.002	<0.0080		<0.001			0.00079		<0.005	<0.0080
Copper	1	AO	mg/L			0.0025		<0.001	<0.010		<0.001			0.00417		<0.001	<0.010
Iron	0.3	AO	mg/L	0.564	0.506	0.579	0.513	0.07	<0.50	<0.50	<0.005	0.302	0.023	<0.01	<0.01	2.15	2.71
Lead	0.01	MAC	mg/L			<0.001		<0.005	<0.010		<0.005			<0.001		<0.005	<0.010
Magnesium			mg/L	386	388	360	367	199	108	173	232	215	170	178	192	415	400
Manganese	0.05	AO	mg/L			0.174		0.084	0.121		0.041			0.0858		0.25	0.195
Mercury	0.001	MAC	mg/L			<0.00005		<0.04	<0.00010		<0.02			<0.00005		<0.02	<0.00010
Molybdenum			mg/L			0.0057		<0.005	<0.010		<0.005			<0.002		<0.006	<0.010
Nickel			mg/L			0.0057		<0.006	<0.020		<0.006			<0.003		<0.006	<0.020
Silver			mg/L			<0.0001		<0.003	<0.0010		<0.003			<0.0001		<0.003	<0.0010
Sodium	200	AO	mg/L	119	125	113	117	42.9	46.5	89.4	52.5	48.4	103	117	52.8	138	131
Thallium			mg/L			<0.0003			<0.0030					<0.0003			<0.0030
Vanadium			mg/L			<0.002		<0.001	<0.010		<0.001			<0.002		<0.001	<0.010
Zinc	5	AO	mg/L			0.0187		<0.007	0.07		<0.003			0.0135		<0.008	<0.030
VOCs																	
1,1,1,2-Tetrachloroethane	5		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
1,1,1-Trichloroethane	200		µg/L			<0.30		<0.4	<0.5		<0.2			<0.30		<0.2	<0.5
1,1,2,2-Tetrachloroethane	1		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
1,1,2-Trichloroethane	5		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
1,1-Dichloroethane	70		µg/L			<0.30		<0.4	<0.5		<0.2			<0.30		<0.2	<0.5
1,1-Dichloroethylene	14		µg/L			<0.30		<0.4	<0.5		<0.2			<0.30		<0.2	<0.5
1,2-Dibromoethane (EDB)	1		µg/L			<0.20		<0.4	<0.5		<0.2					<0.2	<0.5
1,2-Dichlorobenzene	3		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
1,2-Dichloroethane	5		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
1,2-Dichloropropane	5		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
1,3-Dichlorobenzene	630		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
1,4-Dichlorobenzene	5		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
2-Hexanone			µg/L			<0.30			<20					<0.30			<20
Acetone	3 000		µg/L			<1.0			<20					<1.0			<20
Benzene	5		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
Bromodichloromethane	5		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		0.3	<0.5
Bromoform	5		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
Bromomethane	10		µg/L			<0.20		<1	3.51		<0.5			<0.20		<0.5	2.13
Carbon Tetrachloride	5		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
Chlorobenzene	30		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
Chloroethane			µg/L			<0.20		<1	<1		<0.5			<0.20		<0.5	<1
Chloroform	5		µg/L			<0.20		1.3	1.88		<0.2			<0.20		0.6	0.99
Chloromethane			µg/L			<0.40		<1	<1		<0.5			<0.40		<0.5	<1
cis-1,2-Dichloroethylene	70		µg/L			<0.20		<0.4	<0.5		<0.2					<0.2	<0.5
cis-1,3-Dichloropropene	1.4		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
Dibromochloromethane	5		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
Dichlorodifluoromethane			µg/L			<0.20			<1		<0.5			<0.20			<1
Dichloromethane(Methylene Chloride)	50		µg/L			<0.30		<0.4	<0.5		<0.2					<0.2	<0.5
Ethylbenzene	2.4		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
Methyl isobutyl ketone	350		µg/L			<1.0			<20								<20
Methyl t-butyl ether (MTBE)	700		µg/L			<0.20			<0.5								<0.5
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L			<1.0			<20								<20
Styrene	100		µg/L			<0.10		<0.4	<0.5		<0.2			<0.10		<0.2	<0.5
Tetrachloroethylene	30		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
Toluene	24		µg/L			<0.20		1.7	1.18		0.5			<0.20		0.3	<0.5
trans-1,2-Dichloroethylene	100		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
trans-1,3-Dichloropropene	1.4		µg/L			<0.30		<0.4	<0.5		<0.2			<0.30		<0.2	<0.5
Trichloroethylene	5		µg/L			<0.20		<0.4	<0.5		<0.2			<0.20		<0.2	<0.5
Trichlorofluoromethane (FREON 11)			µg/L			<0.40		<1	<1		<0.5					<0.5	<1
Vinyl Chloride	2		µg/L			<0.17			<0.5					<0.17			<0.5
Xylene, *o-*	300		µg/L			<0.10		0.5	<0.5		<0.2			<0.10		<0.2	<0.5
Xylene, *p-* + *m-*	300		µg/L			<0.20		0.7	<1		0.3			<0.20		<0.2	<1
Xylenes (total)	300		µg/L			<0.20		1.2	<1.5		0.3			<0.20		<0.2	<1.5
PAHs																	
2-Methylnaphthalene			µg/L					<0.2	0.035	0.022	<0.2					<0.2	0.024
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L			<0.20								<0.20			
Acenaphthene	4.1	Table 2	µg/L			<0.10		<0.2	**0.041**	<0.02	<0.2			<0.10		<0.2	<0.02
Acenaphthylene	1	Table 2	µg/L			<0.11		<0.2	<0.02	<0.02	<0.2			<0.11		<0.2	**0.036**
Anthracene	2.4	Table 2	µg/L			<0.05		<0.2	**0.028**	<0.02	<0.2			<0.05		<0.2	**0.038**
Benzo(a)anthracene	1	Table 2	µg/L			<0.08		<0.2	<0.02	<0.02	<0.2			<0.08		<0.2	**0.069**
Benzo(a)pyrene	0.01	MAC	µg/L			<0.01		<0.2	<0.005	<0.005	<0.2			<0.01		<0.2	**0.0571**
Benzo(b)fluoranthene	0.1	Table 2	µg/L			<0.05		<0.2	<0.02	<0.02	<0.2					<0.2	**0.065**
Benzo(b,j)fluoranthene			µg/L														
Benzo(g,h,i)perylene	0.2	Table 2	µg/L			<0.06		<0.2	<0.02	<0.02	<0.2			<0.06		<0.2	**0.038**
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L														
Benzo(k)fluoranthene	0.1	Table 2	µg/L			<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	**0.053**
Chrysene	0.1	Table 2	µg/L			<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	**0.116**
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L			<0.09		<0.5	<0.02	<0.02	<0.5			<0.09		<0.5	<0.02
Fluoranthene	0.41	Table 2	µg/L			<0.12		<0.2	<0.02	<0.02	<0.2			<0.12		<0.2	**0.163**
Fluorene	120	Table 2	µg/L			<0.09		<0.2	<0.02	<0.02	<0.2			<0.09		<0.2	<0.02
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L			<0.06		<0.5	<0.02	<0.02	<0.5			<0.06		<0.5	**0.037**
Naphthalene	11	Table 2	µg/L			<0.12		<0.2	**0.152**	**0.055**	<0.2			<0.12		<0.2	**0.033**
Phenanthrene	1	Table 2	µg/L			<0.10		<0.4	**0.044**	<0.02	<0.2			<0.10		<0.2	**0.139**
Pyrene	4.1	Table 2	µg/L			<0.05		<0.2	<0.02	<0.02	<0.2			<0.05		<0.2	**0.135**

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-4 Groundwater Quality - Bedrock
Compliance Monitoring Program
Brooks Road Landfill Site, Haldimand County, Ontario

Parameter	Standard			Sample Location	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07	OW8S-07
				Sampling Date	2009/11/25	2009/12/03	2011/01/07	2011/05/30	2011/07/05	2011/11/15
	ODWQS			Formation	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
	Value	Type	Units		GW Indicator + GW PAH	MOE	GW Indicator	GW Indicator	GW Comprehensive	GW Indicator
Field Parameters										
Conductivity			µS/cm					3420	3560	4230
pH	6.5-8.5	OG						6.86	7.89	6.8
Temperature			°C					13.3	11.2	10.3
General										
Alkalinity ($CaCO_3$)	30-500	OG	mg/L	412	394	392	404	410	410	
Ammonia (as N)			mg/L	0.231	<0.22	0.25	0.19	0.196	0.237	
Biological Oxygen Demand (BOD_5)			mg/L					<5		
Calcium (Ca)			mg/L		516	530	484	510	472	
Chemical Oxygen Demand (COD)			mg/L	12	<40	<5	<5	7.58	<5	
Chloride (Cl)	250	AO	mg/L	11.8	19	14.7	13.9	14	11.9	
Conductivity			µS/cm	3900	3840	3430	3670	3880	4050	
Dissolved Organic Carbon (DOC)	5	AO	mg/L	3	1.9	3.2	6.49	10.5	25.9	
Hardness ($CaCO_3$)	80-100	OG	mg/L		2730			2830		
Nitrate (as N)	10	MAC	mg/L	<0.50	<0.005	1.72	<0.1	<0.2	<0.25	
Nitrite (as N)	1	MAC	mg/L		<0.05			<0.2		
pH	6.5-8.5	OG		7.58	7.5	7.68	7.77	7.78	7.9	
Phenol 4AAP			mg/L		<0.0002			<0.001		
Potassium (K)			mg/L		5.62			5.73	5.62	
Sulphates (SO_4)	500	AO	mg/L	2820	2250	2620	3000	2720	2650	
Total Dissolved Solids (TDS)	500	AO	mg/L	4180	3840	4190	4030	3290	3980	
Total Kjeldahl Nitrogen (TKN)			mg/L		0.85			0.38		
Total Phosphorus (P)			mg/L		0.41			0.057		
Total Suspended Solids (TSS)			mg/L		406			69		
Metals										
Arsenic	0.025	IMAC	mg/L		0.003			0.0052		
Barium	1	MAC	mg/L	<0.010	0.01	0.01	0.0055	0.0069	0.0055	
Beryllium			mg/L		<0.001			<0.001		
Boron	5	IMAC	mg/L	0.525	0.58	0.491	0.465	0.504	0.592	
Cadmium	0.005	MAC	mg/L		<0.001			<0.0001		
Chromium	0.05	MAC	mg/L		<0.002			0.0077		
Cobalt			mg/L		<0.001			0.00297		
Copper	1	AO	mg/L		<0.001			0.00154		
Iron	0.3	AO	mg/L	2.41	1.83	1.94	1.79	2.03	1.68	
Lead	0.01	MAC	mg/L		<0.005			<0.001		
Magnesium			mg/L	335	382	386	366	378	355	
Manganese	0.05	AO	mg/L		0.202			0.23		
Mercury	0.001	MAC	mg/L		<0.03			<0.00005		
Molybdenum			mg/L		<0.005			0.0059		
Nickel			mg/L		<0.006			<0.003		
Silver			mg/L		<0.003			<0.0001		
Sodium	200	AO	mg/L	112	115	125	120	122	115	
Thallium			mg/L					<0.0003		
Vanadium			mg/L		<0.001			<0.002		
Zinc	5	AO	mg/L		<0.009			0.0171		
VOCs										
1,1,1,2-Tetrachloroethane	5		µg/L		<0.2			<0.10		
1,1,1-Trichloroethane	200		µg/L		<0.2			<0.30		
1,1,2,2-Tetrachloroethane	1		µg/L		<0.2			<0.10		
1,1,2-Trichloroethane	5		µg/L		<0.2			<0.20		
1,1-Dichloroethane	70		µg/L		<0.2			<0.30		
1,1-Dichloroethylene	14		µg/L		<0.2			<0.30		
1,2-Dibromoethane (EDB)	1		µg/L		<0.2					
1,2-Dichlorobenzene	3		µg/L		<0.2			<0.10		
1,2-Dichloroethane	5		µg/L		<0.2			<0.20		
1,2-Dichloropropane	5		µg/L		<0.2			<0.20		
1,3-Dichlorobenzene	630		µg/L		<0.2			<0.10		
1,4-Dichlorobenzene	5		µg/L		<0.2			<0.10		
2-Hexanone			µg/L					<0.30		
Acetone	3 000		µg/L					<1.0		
Benzene	5		µg/L		<0.2			<0.20		
Bromodichloromethane	5		µg/L		<0.2			<0.20		
Bromoform	5		µg/L		<0.2			<0.10		
Bromomethane	10		µg/L		<0.5			<0.20		
Carbon Tetrachloride	5		µg/L		<0.2			<0.20		
Chlorobenzene	30		µg/L		<0.2			<0.10		
Chloroethane			µg/L		<0.5			<0.20		
Chloroform	5		µg/L		<0.2			<0.20		
Chloromethane			µg/L		0.9			<0.40		
cis-1,2-Dichloroethylene	70		µg/L		<0.2					
cis-1,3-Dichloropropene	1.4		µg/L		<0.2			<0.20		
Dibromochloromethane	5		µg/L		<0.2			<0.10		
Dichlorodifluoromethane			µg/L		<0.5			<0.20		
Dichloromethane(Methylene Chloride)	50		µg/L		<0.2					
Ethylbenzene	2.4		µg/L		<0.2			<0.10		
Methyl isobutyl ketone	350		µg/L							
Methyl t-butyl ether (MTBE)	700		µg/L							
Methyl-ethyl ketone, MEK (2-Butanone	350		µg/L							
Styrene	100		µg/L		<0.2			<0.10		
Tetrachloroethylene	30		µg/L		<0.2			<0.20		
Toluene	24		µg/L		0.2			<0.20		
trans-1,2-Dichloroethylene	100		µg/L		<0.2			<0.20		
trans-1,3-Dichloropropene	1.4		µg/L		<0.2			<0.30		
Trichloroethylene	5		µg/L		<0.2			<0.20		
Trichlorofluoromethane (FREON 11)			µg/L		<0.5					
Vinyl Chloride	2		µg/L					<0.17		
Xylene, *o*-	300		µg/L		<0.2			<0.10		
Xylene, *p*- + *m*-	300		µg/L		<0.2			<0.20		
Xylenes (total)	300		µg/L		<0.2			<0.20		
PAHs										
2-Methylnaphthalene			µg/L	<0.02	<0.2					
1-Methyl + 2-Methylnaphthalene	3.2	Table 2	µg/L					<0.20		
Acenaphthene	4.1	Table 2	µg/L	<0.02	<0.2			<0.10		
Acenaphthylene	1	Table 2	µg/L	<0.02	<0.2			<0.11		
Anthracene	2.4	Table 2	µg/L	<0.02	<0.2			<0.05		
Benzo(a)anthracene	1	Table 2	µg/L	<0.02	<0.2			<0.08		
Benzo(a)pyrene	0.01	MAC	µg/L	<0.005	<0.2			<0.01		
Benzo(b)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.2					
Benzo(b,j)fluoranthene			µg/L							
Benzo(g,h,i)perylene	0.2	Table 2	µg/L	<0.02	<0.2			<0.06		
Benzo(j)fluoranthene (indirect, as co-elutes)			µg/L							
Benzo(k)fluoranthene	0.1	Table 2	µg/L	<0.02	<0.2			<0.05		
Chrysene	0.1	Table 2	µg/L	<0.02	<0.2			<0.05		
Dibenzo(a,h)anthracene	0.2	Table 2	µg/L	<0.02	<0.5			<0.09		
Fluoranthene	0.41	Table 2	µg/L	<0.02	<0.2			<0.12		
Fluorene	120	Table 2	µg/L	<0.02	<0.2			<0.09		
Indeno(1,2,3-cd)pyrene	0.2	Table 2	µg/L	<0.02	<0.5			<0.06		
Naphthalene	11	Table 2	µg/L	<0.02	<0.2			<0.12		
Phenanthrene	1	Table 2	µg/L	<0.02	<0.2			<0.10		
Pyrene	4.1	Table 2	µg/L	<0.02	<0.2			<0.05		

Notes:

AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
Table 2	Potable Groundwater Criteria from O. Reg. 153/04 (as amended) Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that the duplicate sample did not meet QA/QC standards

Table E-5 Groundwater Trigger and Assessment Criteria: Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Groundwater Trigger Parameter	Units	Average Median Background Level (See Notes 1,2)	Maximum Leachate Level (see Note 3)	ODWS Characterization (see Note 4)	ODWS (see Note 4)	Maximum Leachate Level to Average Median Background Level Ratio	Maximum Leachate Level to ODWS Ratio	RUC (Trigger Level)	
General Chemistry									
Chloride (Cl)	mg/L	17.97	243	NHR	250	13.53	0.97	133.98	
Sulfates (SO_4)	mg/L	271.83	615	NHR	500	2.26	1.23	385.92	
Metals									
Boron (B)	mg/L	0.065	0.93	HR	5	14.37	0.19	1.30	
Chromium (Cr)	mg/L	0.005	0.0063	HR	0.05	1.26	0.13	0.02	
Iron (Fe)	mg/L	0.57	26	NHR	0.3	45.96	86.67	0.43	
Lead (Pb)	mg/L	0.005	0.0027	HR	0.01	0.54	0.27	0.01	
PAHs (See Note 5)									
Naphthalene	µg/L	0	145000	NV	21	NV	NV	10.50	Calculated with NHR standards
Phenanthrene	µg/L	0	25000	NV	65	NV	NV	32.50	Calculated with NHR standards
Pyrene	µg/L	0	6000	NV	40	NV	NV	20.00	Calculated with NHR standards
Benzo(a)pyrene	µg/L	0	1100	HR	0.01	NV	NV	0.0025	
VOCs (See Note 5)									
Benzene	µg/L	0	510	HR	5	NV	NV	1.25	
Ethylbenzene	µg/L	0	1800	NHR	2.4	NV	NV	1.20	
Toluene	µg/L	0	100	NHR	24	NV	NV	12.00	

Notes:

1 Average median background concentrations are based on groundwater quality reported at wells MW1B-07, OW3B-07 and OW9B-06 between 2004 and 2011.
2 Where a parameter was analyzed for but was not detected at or above the Method Detection Limit (MDL), a value of half the MDL was assumed.
3 Highest reported concentration in former waste disposal area (LW1-92, LW2-92, OW4B-91, and OW6B-92) between 2001 and 2006.
4 Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Evironmental Protection Act, March 2004 (Part XV.1 Standards)
5 A value of Zero was used to calculate the RUC for PAHs and VOCs contrary to published standard RUC development guidelines, as requested by MOE in correspondence dated May 20, 2007.

Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	MW1B-07 2007/05/16	MW1B-07 2007/07/31	MW1B-07 2009/04/30	MW1B-07 2009/07/23
General Chemistry								
Chloride (Cl)	mg/L	17.97	250	133.98	28	26	14.5	<20
Sulfates (SO_4)	mg/L	271.83	500	385.92	325	**525**	320	271
Metals								
Boron (B)	mg/L	0.06	5	1.30	0.027	0.026	<0.025	<0.5
Chromium (Cr)	mg/L	0.01	0.05	0.02	-	<0.005	<0.002	<0.010
Iron (Fe)	mg/L	0.57	0.3	0.43	0.088	**1.5**	0.128	<0.50
Lead (Pb)	mg/L	0.01	0.01	0.01	-	<0.0005	<0.005	<0.01
PAHs								
Naphthalene	µg/L	0.13	21	10.50	-	0.00007	<0.0002	<0.00002
Phenanthrene	µg/L	0.05	65	32.50	-	0.0005	<0.0008	0.000086
Pyrene	µg/L	0.03	40	20.00	-	0.00005	<0.0002	<0.00002
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	-	0.00001	<0.0002	<0.000005
VOCs								
Benzene	µg/L	0.17	5	1.25	-	<0.0001	<0.0002	<0.0005
Ethylbenzene	µg/L	0.17	2.4	1.20	-	<0.0001	<0.0002	<0.0005
Toluene	µg/L	0.17	24	12.00	-	<0.0002	0.0004	<0.0005

Notes:

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1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	MW1B-07 2009/11/25	MW1B-07 2009/12/04	MW1B-07 2011/01/10	MW1B-07 2011/05/30
General Chemistry								
Chloride (Cl)	mg/L	17.97	250	133.98	13.5	11.7	10.7	8.14
Sulfates (SO_4)	mg/L	271.83	500	385.92	250	195	235	291
Metals								
Boron (B)	mg/L	0.06	5	1.30	0.062	<0.040	0.05	0.0433
Chromium (Cr)	mg/L	0.01	0.05	0.02	-	<0.002	-	-
Iron (Fe)	mg/L	0.57	0.3	0.43	<0.050	<0.0005	0.088	**0.513**
Lead (Pb)	mg/L	0.01	0.01	0.01	-	<0.005	-	-
PAHs								
Naphthalene	µg/L	0.13	21	10.50	<0.00002	<0.0002	-	-
Phenanthrene	µg/L	0.05	65	32.50	0.000028	<0.0002	-	-
Pyrene	µg/L	0.03	40	20.00	<0.00002	<0.0002	-	-
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	<0.000005	<0.0002	-	-
VOCs								
Benzene	µg/L	0.17	5	1.25	-	<0.0002	-	-
Ethylbenzene	µg/L	0.17	2.4	1.20	-	<0.0002	-	-
Toluene	µg/L	0.17	24	12.00	-	<0.0002	-	-

Notes:

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Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	MW1B-07 2011/07/06	MW1B-07 2011/11/14	MW1B-07 Median or Half of Detection Limit Concentration
General Chemistry							
Chloride (Cl)	mg/L	17.97	250	133.98	12.8	10.9	12.8
Sulfates (SO_4)	mg/L	271.83	500	385.92	264	245	267.5
Metals							
Boron (B)	mg/L	0.06	5	1.30	0.0554	0.0531	0.05
Chromium (Cr)	mg/L	0.01	0.05	0.02	<0.003	-	0.005
Iron (Fe)	mg/L	0.57	0.3	0.43	**0.687**	**0.854**	**0.513**
Lead (Pb)	mg/L	0.01	0.01	0.01	<0.001	-	0.005
PAHs							
Naphthalene	µg/L	0.13	21	10.50	<0.01	-	0.00007
Phenanthrene	µg/L	0.05	65	32.50	<0.12	-	0.000086
Pyrene	µg/L	0.03	40	20.00	<0.10	-	0.00005
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	<0.05	-	0.00001
VOCs							
Benzene	µg/L	0.17	5	1.25	<0.20	-	0.00025
Ethylbenzene	µg/L	0.17	2.4	1.20	<0.10	-	0.00025
Toluene	µg/L	0.17	24	12.00	<0.20	-	0.0004

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Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW3B-07 2007/05/16	OW3B-07 2007/07/31	OW3B-07 2009/07/23	OW3B-07 2009/11/25	OW3B-07 2009/12/03
General Chemistry									
Chloride (Cl)	mg/L	17.97	250	133.98	19	19	<20	14.1	-
Sulfates (SO_4)	mg/L	271.83	500	385.92	251	256	194	183	-
Metals									
Boron (B)	mg/L	0.06	5	1.30	0.042	0.032	<0.5	<0.05	-
Chromium (Cr)	mg/L	0.01	0.05	0.02	-	<0.005	<0.01	-	-
Iron (Fe)	mg/L	0.57	0.3	0.43	<0.05	**6**	**4.22**	**1.7**	-
Lead (Pb)	mg/L	0.01	0.01	0.01	-	<0.0005	<0.01	-	-
PAHs									
Naphthalene	µg/L	0.13	21	10.50	-	0.2	<0.02	<0.02	-
Phenanthrene	µg/L	0.05	65	32.50	-	0.2	0.033	0.093	-
Pyrene	µg/L	0.03	40	20.00	-	0.1	<0.02	0.049	-
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	-	**0.04**	<0.005	**0.0098**	-
VOCs									
Benzene	µg/L	0.17	5	1.25	-	<0.1	<0.50	-	<0.0002
Ethylbenzene	µg/L	0.17	2.4	1.20	-	<0.1	<0.50	-	<0.0002
Toluene	µg/L	0.17	24	12.00	-	<0.2	<0.50	-	<0.0002

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Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW3B-07 2009/12/04	OW3B-07 2009/12/08	OW3B-07 2011/01/07	OW3B-07 2011/05/30	OW3B-07 2011/07/06
General Chemistry									
Chloride (Cl)	mg/L	17.97	250	133.98	-	15	13.8	14.2	14.1
Sulfates (SO_4)	mg/L	271.83	500	385.92	-	195	203	201	200
Metals									
Boron (B)	mg/L	0.06	5	1.30	-	0.04	0.033	0.0346	0.0324
Chromium (Cr)	mg/L	0.01	0.05	0.02	-	<0.002	-	-	<0.003
Iron (Fe)	mg/L	0.57	0.3	0.43	-	**0.484**	0.131	0.408	<0.01
Lead (Pb)	mg/L	0.01	0.01	0.01	-	<0.005	-	-	<0.001
PAHs									
Naphthalene	µg/L	0.13	21	10.50	<0.0002	-	-	-	<0.01
Phenanthrene	µg/L	0.05	65	32.50	<0.0002	-	-	-	<0.12
Pyrene	µg/L	0.03	40	20.00	<0.0002	-	-	-	<0.10
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	<0.0002	-	-	-	<0.05
VOCs									
Benzene	µg/L	0.17	5	1.25	-	-	-	-	<0.20
Ethylbenzene	µg/L	0.17	2.4	1.20	-	-	-	-	<0.10
Toluene	µg/L	0.17	24	12.00	-	-	-	-	<0.20

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Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW3B-07 2011/11/14	OW3B-07 Median or Half of Detection Limit Concentration	OW9B-06 2006/12/12	OW9B-06 2007/05/16	OW9B-06 2007/07/31
General Chemistry									
Chloride (Cl)	mg/L	17.97	250	133.98	13.6	14.15	23	27	29
Sulfates (SO_4)	mg/L	271.83	500	385.92	204	201	**561**	338	323
Metals									
Boron (B)	mg/L	0.06	5	1.30	0.0341	0.0341	0.1	0.1	0.11
Chromium (Cr)	mg/L	0.01	0.05	0.02	-	0.005	-	-	<0.005
Iron (Fe)	mg/L	0.57	0.3	0.43	0.0285	**0.484**	0.37	**1.1**	**0.7**
Lead (Pb)	mg/L	0.01	0.01	0.01	-	0.005	-	-	<0.0005
PAHs									
Naphthalene	µg/L	0.13	21	10.50	-	0.2	-	-	0.2
Phenanthrene	µg/L	0.05	65	32.50	-	0.093	-	-	0.06
Pyrene	µg/L	0.03	40	20.00	-	0.0745	-	-	<0.05
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	-	**0.0249**	-	-	**0.01**
VOCs									
Benzene	µg/L	0.17	5	1.25	-	0.25	-	-	<0.1
Ethylbenzene	µg/L	0.17	2.4	1.20	-	0.25	-	-	<0.1
Toluene	µg/L	0.17	24	12.00	-	0.25	-	-	<0.2

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Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW9B-06 2009/07/23	OW9B-06 2009/11/25	OW9B-06 2009/12/08	OW9B-06 2011/01/10	OW9B-06 2011/05/30
General Chemistry									
Chloride (Cl)	mg/L	17.97	250	133.98	26.5	24.8	23.4	26.9	30
Sulfates (SO_4)	mg/L	271.83	500	385.92	**453**	341	332	332	353
Metals									
Boron (B)	mg/L	0.06	5	1.30	<0.50	0.119	0.11	0.117	0.104
Chromium (Cr)	mg/L	0.01	0.05	0.02	<0.01	-	<0.002	-	-
Iron (Fe)	mg/L	0.57	0.3	0.43	<0.50	<0.05	<0.005	<0.010	<0.01
Lead (Pb)	mg/L	0.01	0.01	0.01	<0.01	-	<0.005	-	-
PAHs									
Naphthalene	µg/L	0.13	21	10.50	<0.02	-	<0.0002	-	-
Phenanthrene	µg/L	0.05	65	32.50	<0.02	-	<0.0002	-	-
Pyrene	µg/L	0.03	40	20.00	<0.02	-	<0.0002	-	-
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	<0.005	-	<0.0002	-	-
VOCs									
Benzene	µg/L	0.17	5	1.25	<0.50	-	<0.0002	-	-
Ethylbenzene	µg/L	0.17	2.4	1.20	<0.50	-	<0.0002	-	-
Toluene	µg/L	0.17	24	12.00	<0.50	-	<0.0002	-	-

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Table E-6 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW9B-06 2011/07/07	OW9B-06 2011/11/14	OW9B-06 Median or Half of Detection Limit Concentration
General Chemistry							
Chloride (Cl)	mg/L	17.97	250	133.98	28.7	30.4	26.95
Sulfates (SO_4)	mg/L	271.83	500	385.92	361	**406**	347
Metals							
Boron (B)	mg/L	0.06	5	1.30	0.106	0.119	0.11
Chromium (Cr)	mg/L	0.01	0.05	0.02	<0.003	-	0.005
Iron (Fe)	mg/L	0.57	0.3	0.43	<0.01	<0.01	**0.7**
Lead (Pb)	mg/L	0.01	0.01	0.01	<0.001	-	0.005
PAHs							
Naphthalene	µg/L	0.13	21	10.50	<0.01	-	0.2
Phenanthrene	µg/L	0.05	65	32.50	<0.12	-	0.06
Pyrene	µg/L	0.03	40	20.00	<0.10	-	0.025
Benzo(a)pyrene	µg/L	0.01	0.01	0.0025	<0.05	-	**0.01**
VOCs							
Benzene	µg/L	0.17	5	1.25	<0.20	-	0.25
Ethylbenzene	µg/L	0.17	2.4	1.20	<0.10	-	0.25
Toluene	µg/L	0.17	24	12.00	<0.20	-	0.25

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Table E-7 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	RUC (Trigger Level)	OW1B-06 Southern Portion of Site 2007/05/16	OW1B-06 Southern Portion of Site 2007/07/31	OW1B-06 Southern Portion of Site 2009/07/23	OW1B-06 Southern Portion of Site 2009/11/25	OW1B-06 Southern Portion of Site 2009/12/03	OW1B-06 Southern Portion of Site 2009/12/08	OW1B-06 Southern Portion of Site 2011/01/07	OW1B-06 Southern Portion of Site 2011/05/30	OW1B-06 Southern Portion of Site 2011/07/06	OW1B-06 Southern Portion of Site 2011/11/15	OW5B-06 Southern Portion of Site 2007/05/16
General Chemistry													
Chloride (Cl)	mg/L	133.98	28	27	27.1	19.5	-	-	18.6	18.3	18.1	16.3	18
Sulfates (SO_4)	mg/L:	385.92	**596**	**683**	**553**	**596**	-	-	**621**	**869**	**605**	**812**	**408**
Metals													
Boron (B)	mg/L	1.30	0.069	0.087	<0.50	0.114	-	-	0.078	0.135	0.0828	0.158	0.046
Chromium (Cr)	mg/L	0.02	-	<0.005	<0.010	-	-	-	-	-	<0.003	-	-
Iron (Fe)	mg/L	0.43	**1.7**	0.14	<0.50	0.231	-	-	**0.456**	**1.08**	**0.0231**	**0.069**	<0.05
Lead (Pb)	mg/L	0.01	-	<0.0005	<0.010	-	-	-	-	-	<0.001	-	-
PAHs													
Naphthalene	µg/L	10.50	-	0.1	<0.020	<0.020	-	<0.0002	-	-	<0.01	-	-
Phenanthrene	µg/L	32.50	-	0.1	0.053	0.023	-	<0.0002	-	-	<0.12	-	-
Pyrene	µg/L	20.00	-	0.1	0.038	0.021	-	<0.0002	-	-	<0.10	-	-
Benzo(a)pyrene	µg/L	0.0025	-	**0.06**	**0.0296**	**0.011**	-	<0.0002	-	-	<0.05	-	-
VOCs													
Benzene	µg/L	1.25	-	<0.1	<0.50	-	<0.002	-	-	-	<0.20	-	-
Ethylbenzene	µg/L	1.20	-	<0.1	<0.50	-	<0.002	-	-	-	<0.10	-	-
Toluene	µg/L	12.00	-	<0.2	<0.50	-	<0.002	-	-	-	<0.20	-	-

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Table E-7 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	RUC (Trigger Level)	OW5B-06 Southern Portion of Site 2009/07/23	OW5B-06 Southern Portion of Site 2007/07/31	OW5B-06 Southern Portion of Site 2009/11/25	OW5B-06 Southern Portion of Site 2011/01/07	OW5B-06 Southern Portion of Site 2011/05/30	OW5B-06 Southern Portion of Site 2011/07/07	OW5B-06 Southern Portion of Site 2011/11/15	OW8B-06 Southern Portion of Site 2007/05/16	OW8B-06 Southern Portion of Site 2007/07/31	OW8B-06 Southern Portion of Site 2009/07/23	OW8B-06 Southern Portion of Site 2009/11/25
General Chemistry													
Chloride (Cl)	mg/L	133.98	22.5	20	13.8	9.3	11.7	11.6	23.5	45	42	42.1	34.7
Sulfates (SO_4)	mg/L:	385.92	282	**443**	290	127	176	173	**474**	367	383	363	385
Metals													
Boron (B)	mg/L	1.30	<0.50	0.055	0.067	0.041	0.0362	0.0358	0.0495	0.66	0.55	0.08	1.15
Chromium (Cr)	mg/L	0.02	<0.010	<0.005	-	-		0.0066		-	<0.005	<0.010	-
Iron (Fe)	mg/L	0.43	<0.50	**1.9**	<0.050	<0.010	0.0112	<0.01	<0.01	**1.3**	**3**	<0.50	<0.050
Lead (Pb)	mg/L	0.01	<0.01	<0.0005	-	-		<0.001		<0.0005	<0.0005	<0.010	-
PAHs						-	-		-				
Naphthalene	µg/L	10.50	<0.020	0.06	-	-	-	<0.01	-	-	0.07	<0.020	-
Phenanthrene	µg/L	32.50	<0.020	<0.05	-	-	-	<0.12	-	-	<0.05	<0.020	-
Pyrene	µg/L	20.00	<0.020	<0.05	-	-	-	<0.10	-	-	<0.05	<0.020	-
Benzo(a)pyrene	µg/L	0.0025	<0.005	<0.01	-	-	-	<0.05	-	-	**0.01**	<0.0050	-
VOCs													
Benzene	µg/L	1.25	<0.50	<0.1	-	-	-	<0.20	-	-	<0.1	<0.50	-
Ethylbenzene	µg/L	1.20	<0.50	<0.1	-	-	-	<0.10	-	-	<0.1	<0.50	-
Toluene	µg/L	12.00	<0.50	<0.2	-	-	-	<0.20	-	-	<0.2	<0.50	-

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Table E-7 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	RUC (Trigger Level)	OW8B-06 Southern Portion of Site 2009/12/03	OW8B-06 Southern Portion of Site 2011/01/07	OW8B-06 Southern Portion of Site 2011/05/30	OW8B-06 Southern Portion of Site 2011/07/05	OW8B-06 Southern Portion of Site 2011/11/15	MW5B-09 South of Site 2011/05/30	MW6B-07 South of Site 2011/05/30	MW6B-07 South of Site 2011/07/05	MW6B-07 South of Site 2011/11/15	MW2B-07 Eastern Portion of Site 2007/05/16	MW2B-07 Eastern Portion of Site 2009/07/23
General Chemistry													
Chloride (Cl)	mg/L	133.98	33.5	32.2	58.1	61.1	90.5	13.5	51.9	49.6	44.9	10	<20
Sulfates (SO_4)	mg/L:	385.92	343	363	371	324	341	**3140**	**1700**	**1530**	**1500**	**1590**	**753**
Metals													
Boron (B)	mg/L	1.30	0.78	1.02	1.01	0.839	**1.61**	0.16	0.0581	0.0567	0.0784	0.21	<0.50
Chromium (Cr)	mg/L	0.02	<0.002	-	-	0.0032	-	-	-	<0.003	-	-	<0.010
Iron (Fe)	mg/L	0.43	<0.005	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0299	<0.05	<0.50
Lead (Pb)	mg/L	0.01	<0.005	-	-	<0.001	-	-	-	<0.001	-	-	<0.010
PAHs													
Naphthalene	µg/L	10.50	<0.0002	-	-	<0.01	-	-	-	<0.01	-	-	<0.020
Phenanthrene	µg/L	32.50	<0.0002	-	-	<0.12	-	-	-	<0.12	-	-	<0.020
Pyrene	µg/L	20.00	<0.0002	-	-	<0.10	-	-	-	<0.10	-	-	<0.20
Benzo(a)pyrene	µg/L	0.0025	<0.0002	-	-	<0.05	-	-	-	<0.05	-	-	<0.0050
VOCs													
Benzene	µg/L	1.25	<0.0002	-	-	<0.20	-	-	-	<0.20	-	-	<0.50
Ethylbenzene	µg/L	1.20	<0.0002	-	-	<0.10	-	-	-	<0.10	-	-	<0.50
Toluene	µg/L	12.00	<0.0002	-	-	<0.20	-	-	-	<0.20	-	-	<0.50

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Table E-7 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	RUC (Trigger Level)	MW2B-07 Eastern Portion of Site 2011/05/30	MW2B-07 Eastern Portion of Site 2011/07/06	MW2B-07 Eastern Portion of Site 2011/11/14	MW2C-01 Eastern Portion of Site 2007/05/16	MW2C-01 Eastern Portion of Site 2007/07/31	MW2C-01 Eastern Portion of Site 2009/07/23	MW2C-01 Eastern Portion of Site 2009/11/25	MW2C-01 Eastern Portion of Site 2009/12/03	MW2C-01 Eastern Portion of Site 2011/01/10	MW2C-01 Eastern Portion of Site 2011/05/30	MW2C-01 Eastern Portion of Site 2011/07/06
General Chemistry													
Chloride (Cl)	mg/L	133.98	20.1	-	13.8	15	15	20.4	13	12.1	12.7	14.9	-
Sulfates (SO_4)	mg/L:	385.92	**1340**	-	**796**	**2190**	**2350**	**2650**	**2820**	**2450**	**2600**	**2860**	-
Metals													
Boron (B)	mg/L	1.30	0.0493	-	0.0635	0.35	0.31	<0.50	0.326	-	0.312	0.275	-
Chromium (Cr)	mg/L	0.02	-	-		-	<0.005	<0.010	-	-	-	-	-
Iron (Fe)	mg/L	0.43	<0.01	-	<0.01	<0.3	<0.05	<0.50	<0.050	-	<0.010	<0.01	-
Lead (Pb)	mg/L	0.01	-	-		-	<0.0005	<0.010	-	-	-	-	-
PAHs													
Naphthalene	µg/L	10.50	-	<0.01	-	-	0.1	<0.020	-	<0.0002	-	-	<0.01
Phenanthrene	µg/L	32.50	-	<0.12	-	-	<0.05	<0.020	-	<0.0002	-	-	<0.12
Pyrene	µg/L	20.00	-	<0.10	-	-	<0.05	<0.020	-	<0.0002	-	-	<0.10
Benzo(a)pyrene	µg/L	0.0025	-	<0.05	-	-	<0.02	<0.006	-	<0.0002	-	-	<0.05
VOCs													
Benzene	µg/L	1.25	-	<0.20	-	-	<0.1	<0.50	-	-	-	-	<0.20
Ethylbenzene	µg/L	1.20	-	<0.10	-	-	<0.1	<0.50	-	-	-	-	<0.10
Toluene	µg/L	12.00	-	<0.20	-	-	<0.2	<0.50	-	-	-	-	<0.20

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-7 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	RUC (Trigger Level)	MW2C-01 Eastern Portion of Site 2011/11/14	MW1-03 Immediately West of Site 2007/05/16	MW1-03 Immediately West of Site 2007/07/31	MW1-03 Immediately West of Site 2009/07/23	MW1-03 Immediately West of Site 2009/11/25	MW1-03 Immediately West of Site 2009/12/03	MW1-03 Immediately West of Site 2011/01/10	MW1-03 Immediately West of Site 2011/05/30	MW1-03 Immediately West of Site 2011/07/05	MW1-03 Immediately West of Site 2011/11/16	MW2-03 Immediately West of Site 2007/05/16
General Chemistry													
Chloride (Cl)	mg/L	133.98	14.3	24	26	51.6	31.9	48.1	84.5	96.2	101	66.2	56
Sulfates (SO_4)	mg/L:	385.92	**2680**	183	179	227	218	209	264	261	232	229	188
Metals													
Boron (B)	mg/L	1.30	0.296	0.045	0.054	<0.50	0.061	<0.04	0.041	0.0421	0.0395	0.0598	0.033
Chromium (Cr)	mg/L	0.02	-	-	<0.0005	<0.010	-	<0.005	-	-	<0.003	-	-
Iron (Fe)	mg/L	0.43	<0.01	<0.05	<0.05	<0.50	<0.050	0.062	<0.010	<0.01	<0.01	0.238	<0.050
Lead (Pb)	mg/L	0.01	-	-	<0.0005	<0.010	-	<0.005	-	-	<0.001	-	-
PAHs													
Naphthalene	µg/L	10.50	-	-	0.05	<0.020	<0.020	<0.0002	-	-	<0.01	-	-
Phenanthrene	µg/L	32.50	-	-	<0.05	<0.020	<0.020	<0.0002	-	-	<0.12	-	-
Pyrene	µg/L	20.00	-	-	<0.05	<0.020	<0.020	<0.0002	-	-	<0.10	-	-
Benzo(a)pyrene	µg/L	0.0025	-	-	**0.01**	<0.0050	<0.0050	<0.0002	-	-	<0.05	-	-
VOCs													
Benzene	µg/L	1.25	-	-	<0.1	<0.50	-	<0.0002	-	-	<0.20	-	-
Ethylbenzene	µg/L	1.20	-	-	<0.1	<0.50	-	<0.0002	-	-	<0.10	-	-
Toluene	µg/L	12.00	-	-	<0.2	<0.50	-	<0.0002	-	-	<0.20	-	-

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-7 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	RUC (Trigger Level)	MW2-03 Immediately West of Site 2007/07/31	MW2-03 Immediately West of Site 2009/07/23	MW2-03 Immediately West of Site 2009/11/25	MW2-03 Immediately West of Site 2009/12/03	MW2-03 Immediately West of Site 2011/01/10	MW2-03 Immediately West of Site 2011/05/30	MW2-03 Immediately West of Site 2011/07/05	MW2-03 Immediately West of Site 2011/11/16	MW3-03 Immediately West of Site 2007/05/16	MW3-03 Immediately West of Site 2007/07/31	MW3-03 Immediately West of Site 2009/07/23
General Chemistry													
Chloride (Cl)	mg/L	133.98	53	116	98.5	95.6	86.9	99.7	105	107	44	48	56.3
Sulfates (SO_4)	mg/L:	385.92	187	230	176	153	186	217	207	187	263	305	**429**
Metals													
Boron (B)	mg/L	1.30	0.044	<0.50	0.057	<0.025	0.035	0.0303	0.0297	0.0345	0.04	0.058	<0.50
Chromium (Cr)	mg/L	0.02	<0.005	<0.010	-	<0.002	-	-	0.0031	-	-	<0.005	<0.010
Iron (Fe)	mg/L	0.43	<0.05	<0.50	**0.64**	<0.023	<0.010	0.011	<0.01	0.219	**0.56**	0.23	**2.04**
Lead (Pb)	mg/L	0.01	<0.0005	<0.010	-	<0.005	-	-	<0.001	-	-	0.0009	<0.010
PAHs													
Naphthalene	µg/L	10.50	0.06	<0.020	<0.020	<0.0002	-	-	<0.01	-	-	0.07	<0.020
Phenanthrene	µg/L	32.50	0.05	<0.020	0.04	<0.0002	-	-	<0.12	-	-	0.07	0.099
Pyrene	µg/L	20.00	<0.05	<0.020	0.03	<0.0002	-	-	<0.10	-	-	<0.05	0.049
Benzo(a)pyrene	µg/L	0.0025	**0.01**	<0.0050	**0.0126**	<0.0002	-	-	<0.05	-	-	**0.02**	**0.0421**
VOCs													
Benzene	µg/L	1.25	<0.1	<0.50	-	-	-	-	<0.20	-	-	<0.1	<0.50
Ethylbenzene	µg/L	1.20	<0.1	<0.50	-	-	-	-	<0.10	-	-	<0.1	<0.50
Toluene	µg/L	12.00	<0.2	<0.50	-	-	-	-	<0.20	-	-	<0.2	<0.50

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-7 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Shallow Overburden Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

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Groundwater Trigger Parameter	Units	RUC (Trigger Level)	MW3-03 Immediately West of Site 2009/11/25	MW3-03 Immediately West of Site 2011/01/10	MW3-03 Immediately West of Site 2011/05/30	MW3-03 Immediately West of Site 2011/07/05	MW3-03 Immediately West of Site 2011/11/16
General Chemistry							
Chloride (Cl)	mg/L	133.98	66.5	46.3	34.6	43.7	56.9
Sulfates (SO_4)	mg/L:	385.92	219	206	150	212	192
Metals							
Boron (B)	mg/L	1.30	0.064	0.045	0.0522	0.0426	0.0529
Chromium (Cr)	mg/L	0.02	-	-	-	<0.003	-
Iron (Fe)	mg/L	0.43	0.117	0.269	**0.726**	0.254	0.275
Lead (Pb)	mg/L	0.01	-	-	-	<0.001	-
PAHs							
Naphthalene	µg/L	10.50	<0.020	-	-	<0.01	-
Phenanthrene	µg/L	32.50	0.029	-	-	<0.12	-
Pyrene	µg/L	20.00	<0.020	-	-	<0.10	-
Benzo(a)pyrene	µg/L	0.0025	**0.0072**	-	-	<0.05	-
VOCs							
Benzene	µg/L	1.25	-	-	-	<0.20	-
Ethylbenzene	µg/L	1.20	-	-	-	<0.10	-
Toluene	µg/L	12.00	-	-	-	<0.20	-

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-8 Groundwater Trigger and Assessment Criteria: Basal Overburden/Shallow Bedrock Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level (See Notes 1,2)	Maximum Leachate Level (see Note 3)	ODWS Characterization (see Note 4)	ODWS (see Note 4)	Maximum Leachate Level to Average Median Background Level Ratio	Maximum Leachate Level to ODWS Ratio	RUC (Trigger Level)
General Chemistry								
Chloride (Cl)	mg/L	12.54	243	AO	250	19.38	0.97	131.27
Sulfates (SO_4)	mg/L	1277.25	615	AO	500	0.48	1.23	888.63
Metals								
Boron (B)	mg/L	0.310	0.93	IMAC	5	3.00	0.19	1.48
Chromium (Cr)	mg/L	0.005	0.0063	IMAC	0.05	1.26	0.13	0.02
Iron (Fe)	mg/L	0.378	26	AO	0.3	68.72	86.67	0.34
Lead (Pb)	mg/L	0.005	0.0027	MAC	0.01	0.54	0.27	0.01
PAHs (See Note 5)								
Naphthalene	µg/L	0	145000		21	NV	NV	10.50
Phenanthrene	µg/L	0	25000		65	NV	NV	32.50
Pyrene	µg/L	0	6000		40	NV	NV	20.00
Benzo(a)pyrene	µg/L	0	1100	MAC	0.01	NV	NV	0.0025
VOCs (See Note 5)								
Benzene	µg/L	0	510	MAC	5	NV	NV	1.25
Ethylbenzene	µg/L	0	1800	AO	2.4	NV	NV	1.20
Toluene	µg/L	0	100	AO	24	NV	NV	12.00

Notes:

1 Average median background concentrations are based on groundwater quality reported at wells MW1A-07, OW3A-07, and OW9A-06 between 2004 and 2011.

2 Where a parameter was analyzed for but was not detected at or above the Method Detection Limit (MDL), a value of half the MDL was assumed.

3 Highest reported concentration in former waste disposal area (LW1-92, LW2-92, OW4B-91, and OW6B-92 between 2001 and 2006.

4 Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Evironmental Protection Act, March 2004 (Part XV.1 Standards)

5 A value of Zero was used to calculate the RUC for PAHs and VOCs contrary to published standard RUC development guildelines, as requested by MOE in correspondence dated May 20, 2007

Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

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Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	MW1A-07 2007/05/16	MW1A-07 2007/07/31	MW1A-07 2009/04/30	MW1A-07 2009/07/23
General Chemistry								
Chloride (Cl)	mg/L	12.54	250	131.27	13	6	24.4	30
Sulfates (SO_4)	mg/L	1277.25	500	888.63	223	135	68	65
Metals								
Boron (B)	mg/L	0.310	5	1.48	0.091	0.05	<0.015	<0.50
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	<0.005	<0.002	<0.010
Iron (Fe)	mg/L	0.378	0.3	0.34	<0.05	0.26	0.268	<0.50
Lead (Pb)	mg/L	0.005	0.01	0.006	-	<0.0005	<0.005	<0.010
PAHs								
Naphthalene	µg/L	0.00031	21	10.50	<0.00005	0.0008	<0.0002	<0.00002
Phenanthrene	µg/L	0.00023	65	32.50	0.00007	0.0008	<0.0002	<0.00002
Pyrene	µg/L	0.00014	40	20.00	<0.00005	0.0002	<0.0002	<0.00002
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.00001	0.00001	<0.0002	<0.000005
VOCs								
Benzene	µg/L	0.00025	5	1.25	-	<0.0001	<0.0002	<0.0005
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.0001	<0.0002	<0.0005
Toluene	µg/L	0.09	24	12.00	-	0.0003	<0.0002	<0.0005

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	MW1A-07 2009/11/25	MW1A-07 2009/12/04	MW1A-07 2011/01/10	MW1A-07 2011/05/30
General Chemistry								
Chloride (Cl)	mg/L	12.54	250	131.27	23.7	-	21.5	20.3
Sulfates (SO_4)	mg/L	1277.25	500	888.63	74.9	-	79.1	84.4
Metals								
Boron (B)	mg/L	0.310	5	1.48	<0.050	0.03	0.042	0.0389
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	<0.004	-	-
Iron (Fe)	mg/L	0.378	0.3	0.34	0.24	0.214	0.039	0.0582
Lead (Pb)	mg/L	0.005	0.01	0.006	-	<0.005	-	-
PAHs								
Naphthalene	µg/L	0.00031	21	10.50	<0.00002	<0.0002	-	-
Phenanthrene	µg/L	0.00023	65	32.50	<0.00002	<0.0002	-	-
Pyrene	µg/L	0.00014	40	20.00	<0.00002	<0.0002	-	-
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.000005	<0.0002	-	-
VOCs								
Benzene	µg/L	0.00025	5	1.25	-	-	-	-
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	-	-	-
Toluene	µg/L	0.09	24	12.00	-	-	-	-

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	MW1A-07 2011/07/06	MW1A-07 2011/11/14	MW1A-07 Median or Half of Detection Limit Concentration
General Chemistry							
Chloride (Cl)	mg/L	12.54	250	131.27	-	19.2	20.9
Sulfates (SO_4)	mg/L	1277.25	500	888.63	-	94.8	81.75
Metals							
Boron (B)	mg/L	0.310	5	1.48	-	0.0328	0.04045
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	-	0.005
Iron (Fe)	mg/L	0.378	0.3	0.34	-	0.0396	0.214
Lead (Pb)	mg/L	0.005	0.01	0.006	-	-	0.005
PAHs							
Naphthalene	µg/L	0.00031	21	10.50	<0.01	-	0.0008
Phenanthrene	µg/L	0.00023	65	32.50	<0.12	-	0.000435
Pyrene	µg/L	0.00014	40	20.00	<0.10	-	0.0002
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.05	-	0.00001
VOCs							
Benzene	µg/L	0.00025	5	1.25	<0.20	-	0.00025
Ethylbenzene	µg/L	0.00025	2.4	1.20	<0.10	-	0.00025
Toluene	µg/L	0.09	24	12.00	0.55	-	0.27515

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW3A-07 2007/05/16	OW3A-07 2007/07/31	OW3A-07 2009/07/23	OW3A-07 2009/11/25	OW3A-07 2009/12/04
General Chemistry									
Chloride (Cl)	mg/L	12.54	250	131.27	6	5	<20	2.7	4.3
Sulfates (SO_4)	mg/L	1277.25	500	888.63	852	**1190**	**1270**	717	**1180**
Metals									
Boron (B)	mg/L	0.310	5	1.48	0.36	0.46	0.53	0.373	0.46
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	<0.005	<0.010	-	<0.004
Iron (Fe)	mg/L	0.378	0.3	0.34	0.12	**0.36**	<0.50	0.192	<0.005
Lead (Pb)	mg/L	0.005	0.01	0.006	-	<0.0005	<0.010	-	<0.005
PAHs									
Naphthalene	µg/L	0.00031	21	10.50	0.00008	0.00003	<0.00002	<0.00002	<0.0002
Phenanthrene	µg/L	0.00023	65	32.50	0.0009	0.00019	0.000035	<0.00002	<0.0002
Pyrene	µg/L	0.00014	40	20.00	0.0002	0.00006	<0.00002	<0.00002	<0.0002
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.00001	<0.00001	<0.000005	<0.000005	<0.0002
VOCs									
Benzene	µg/L	0.00025	5	1.25	-	<0.0001	<0.0005	-	<0.0002
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.0001	<0.0005	-	<0.0002
Toluene	µg/L	0.09	24	12.00	-	0.0003	<0.0005	-	<0.0002

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW3A-07 2011/01/07	OW3A-07 2011/05/30	OW3A-07 2011/07/06	OW3A-07 2011/11/14	OW3A-07 Median or Half of Detection Limit Concentration
General Chemistry									
Chloride (Cl)	mg/L	12.54	250	131.27	5.07	4.11	4.85	5.28	4.925
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**941**	824	**1190**	**1160**	**1160**
Metals									
Boron (B)	mg/L	0.310	5	1.48	0.313	0.372	0.381	0.381	0.381
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	-	<0.003	-	0.005
Iron (Fe)	mg/L	0.378	0.3	0.34	0.011	<0.01	0.0157	<0.01	0.12
Lead (Pb)	mg/L	0.005	0.01	0.006	-	-	<0.001	-	0.005
PAHs									
Naphthalene	µg/L	0.00031	21	10.50	-	-	<0.01	-	0.000055
Phenanthrene	µg/L	0.00023	65	32.50	-	-	<0.12	-	0.00019
Pyrene	µg/L	0.00014	40	20.00	-	-	<0.10	-	0.00013
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	-	-	<0.05	-	0.0001
VOCs									
Benzene	µg/L	0.00025	5	1.25	-	-	<0.20	-	0.00025
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	-	<0.10	-	0.00025
Toluene	µg/L	0.09	24	12.00	-	-	<0.20	-	0.0003

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW9A-06 2006/12/12	OW9A-06 2007/05/16	OW9A-06 2007/07/31	OW9A-06 2009/04/30	OW9A-06 2009/07/23
General Chemistry									
Chloride (Cl)	mg/L	12.54	250	131.27	24	13	16	11.9	<20
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2520**	**2290**	**2450**	**2590**	**2600**
Metals									
Boron (B)	mg/L	0.310	5	1.48	0.46	0.51	0.52	0.52	0.68
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	-	<0.005	<0.002	<0.010
Iron (Fe)	mg/L	0.378	0.3	0.34	**1.2**	**1.6**	**2.1**	**0.801**	**1.19**
Lead (Pb)	mg/L	0.005	0.01	0.006	-	-	<0.0005	<0.005	<0.010
PAHs									
Naphthalene	µg/L	0.00031	21	10.50	<0.00005	<0.00005	-	<0.0002	0.00007
Phenanthrene	µg/L	0.00023	65	32.50	<0.00005	<0.00005	-	<0.0002	0.0001
Pyrene	µg/L	0.00014	40	20.00	<0.00005	<0.00005	-	<0.0002	<0.00005
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.01	<0.01	-	<0.0002	0.00001
VOCs									
Benzene	µg/L	0.00025	5	1.25	-	-	<0.0001	<0.0002	<0.0005
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	-	<0.0001	<0.0002	<0.0005
Toluene	µg/L	0.09	24	12.00	-	-	<0.0002	<0.0002	<0.0005

Notes:

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2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW9A-06 2009/11/25	OW9A-06 2009/12/08	OW9A-06 2011/01/10	OW9A-06 2011/05/30	OW9A-06 2011/07/07
General Chemistry									
Chloride (Cl)	mg/L	12.54	250	131.27	10.9	10.1	10.2	15.2	11.7
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2720**	**2480**	**2650**	**2680**	**2610**
Metals									
Boron (B)	mg/L	0.310	5	1.48	0.6	0.52	0.415	0.41	0.441
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	<0.002	-	-	<0.003
Iron (Fe)	mg/L	0.378	0.3	0.34	**1.05**	0.311	**0.619**	**0.457**	**0.534**
Lead (Pb)	mg/L	0.005	0.01	0.006	-	<0.005	-	-	<0.001
PAHs									
Naphthalene	µg/L	0.00031	21	10.50	<0.00002	<0.0002	-	-	<0.01
Phenanthrene	µg/L	0.00023	65	32.50	0.000038	<0.0002	-	-	<0.12
Pyrene	µg/L	0.00014	40	20.00	<0.00002	<0.0002	-	-	<0.10
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.000005	<0.0002	-	-	<0.05
VOCs									
Benzene	µg/L	0.00025	5	1.25	-	<0.0002	-	-	<0.20
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.0002	-	-	<0.10
Toluene	µg/L	0.09	24	12.00	-	<0.0002	-	-	<0.20

Notes:

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Table E-9 Groundwater Trigger and Assessment Criteria: Up-gradient and Background Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

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Groundwater Trigger Parameter	Units	Average Median Background Level	ODWS	RUC (Trigger Level)	OW9A-06 2011/11/14	OW9A-06 Median or Half of Detection Limit Concentration
General Chemistry						
Chloride (Cl)	mg/L	12.54	250	131.27	11.4	11.8
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2110**	**2590**
Metals						
Boron (B)	mg/L	0.310	5	1.48	0.423	0.51
Chromium (Cr)	mg/L	0.005	0.05	0.016	-	0.005
Iron (Fe)	mg/L	0.378	0.3	0.34	0.262	**0.801**
Lead (Pb)	mg/L	0.005	0.01	0.006	-	0.005
PAHs						
Naphthalene	µg/L	0.00031	21	10.50	-	0.00007
Phenanthrene	µg/L	0.00023	65	32.50	-	0.000069
Pyrene	µg/L	0.00014	40	20.00	-	0.0001
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	-	0.00001
VOCs						
Benzene	µg/L	0.00025	5	1.25	-	0.00025
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	0.00025
Toluene	µg/L	0.09	24	12.00	-	0.00025

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Table E-10 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWQS	RUC (Trigger Level)	OW1A-06 Southern Portion of Site 2007/05/16	OW1A-06 Southern Portion of Site 2007/07/31	OW1A-06 Southern Portion of Site 2007/07/31 (replicate)	OW1A-06 Southern Portion of Site 2009/07/23	OW1A-06 Southern Portion of Site 2009/11/25	OW1A-06 Southern Portion of Site 2009/12/04	OW1A-06 Southern Portion of Site 2011/01/07	OW1A-06 Southern Portion of Site 2011/05/30
General Chemistry												
Chloride (Cl)	mg/L	12.54	250	131.27	12	12	13	<20	10.6	14.1	12.7	12.5
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2400**	**2800**	**2690**	**2800**	**2680**	**2450**	**2670**	**2970**
Metals												
Boron (B)	mg/L	0.310	5	1.48	0.62	0.53	0.52	0.73	0.546	0.59	0.391	0.551
Chromium (Cr)	mg/L	0.005	0.05	0.02	-	<0.005	<0.005	<0.010	-	<0.002	-	-
Iron (Fe)	mg/L	0.378	0.3	0.34	**3.5**	**4.7**	**4.6**	**2.11**	**1.85**	**2.2**	**3.22**	**2.65**
Lead (Pb)	mg/L	0.005	0.01	0.01	-	<0.0005	<0.0005	<0.010	-	<0.005	-	-
PAHs												
Naphthalene	µg/L	0.00031	21	10.50	0.1	0.3	0.2	<0.020	<0.020	<0.0002	-	-
Phenanthrene	µg/L	0.00023	65	32.50	2	<0.05	0.05	<0.020	0.038	<0.0002	-	-
Pyrene	µg/L	0.00014	40	20.00	0.4	0.1	0.2	<0.020	<0.020	<0.0002	-	-
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	**0.04**	**0.02**	**0.02**	<0.0050	<0.0050	<0.0002	-	-
VOCs												
Benzene	µg/L	0.00025	5	1.25	-	<0.1	<0.1	<0.50	-	-	-	-
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.1	<0.1	<0.50	-	-	-	-
Toluene	µg/L	0.09190	24	12.00	-	<0.2	<0.2	<0.50	-	-	-	-

Notes:

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1.7 indicates that parameter concentration exceeds the respective RUC.

Table E-10 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWQS	RUC (Trigger Level)	OW1A-06 Southern Portion of Site 2011/07/06	OW1A-06 Southern Portion of Site 2011/11/15	OW5A-06 Southern Portion of Site 2007/05/16	OW5A-06 Southern Portion of Site 2007/07/31	OW5A-06 Southern Portion of Site 2009/07/23	OW5A-06 Southern Portion of Site 2009/11/25	OW5A-06 Southern Portion of Site 2009/12/03	OW5A-06 Southern Portion of Site 2011/01/07
General Chemistry												
Chloride (Cl)	mg/L	12.54	250	131.27	11.7	11.6	21	16	<20	<10	6.8	8.95
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2520**	**2620**	**2170**	**2030**	**2440**	**2550**	**2010**	**2110**
Metals												
Boron (B)	mg/L	0.310	5	1.48	0.48	0.558	0.44	0.38	0.54	0.389	0.44	0.311
Chromium (Cr)	mg/L	0.005	0.05	0.02	0.0041	-	-	<0.005	<0.010	-	<0.002	-
Iron (Fe)	mg/L	0.378	0.3	0.34	**2.75**	**2.52**	**3.9**	**5.6**	**5.32**	**4.8**	<0.046	**1.65**
Lead (Pb)	mg/L	0.005	0.01	0.01	<0.001	-	-	<0.0005	<0.010	-	<0.005	-
PAHs												
Naphthalene	µg/L	0.00031	21	10.50	<0.01	-	<0.05	3	<0.020	<0.020	<0.0002	-
Phenanthrene	µg/L	0.00023	65	32.50	<0.12	-	<0.05	1	<0.020	<0.020	<0.0002	-
Pyrene	µg/L	0.00014	40	20.00	<0.10	-	<0.05	0.3	<0.020	<0.020	<0.0002	-
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.05	-	<0.01	**0.04**	<0.0050	<0.0050	<0.0002	-
VOCs												
Benzene	µg/L	0.00025	5	1.25	<0.20	-	-	<0.1	<0.50	-	<0.0002	-
Ethylbenzene	µg/L	0.00025	2.4	1.20	<0.10	-	-	<0.1	<0.50	-	<0.0002	-
Toluene	µg/L	0.09190	24	12.00	<0.20	-	-	<0.2	<0.50	-	0.0004	-

Notes:

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Table E-10 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

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Groundwater Trigger Parameter	Units	Average Median Background Level	ODWQS	RUC (Trigger Level)	OW5A-06 Southern Portion of Site 2011/05/30	OW5A-06 Southern Portion of Site 2011/07/07	OW5A-06 Southern Portion of Site 2011/11/15	OW8A-06 Southern Portion of Site 2007/05/16	OW8A-06 Southern Portion of Site 2007/07/31	OW8A-06 Southern Portion of Site 2007/07/31 (replicate)	OW8A-06 Southern Portion of Site 2009/07/23	OW8A-06 Southern Portion of Site 2009/11/25
General Chemistry												
Chloride (Cl)	mg/L	12.54	250	131.27	8.49	7.72	7.87	16	14	-	<20	10.9
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2470**	**2240**	**2160**	**2230**	**2280**	-	**2680**	**2670**
Metals												
Boron (B)	mg/L	0.310	5	1.48	0.442	0.38	0.468	0.55	0.5	-	0.63	0.41
Chromium (Cr)	mg/L	0.005	0.05	0.02	-	<0.003	-	-	<0.005	-	<0.010	-
Iron (Fe)	mg/L	0.378	0.3	0.34	**4.82**	**5**	**4.47**	**2.8**	**8.1**	-	**6.93**	**8.05**
Lead (Pb)	mg/L	0.005	0.01	0.01	-	<0.001	-	-	<0.0005	-	<0.010	-
PAHs												
Naphthalene	µg/L	0.00031	21	10.50	-	<0.01	-	0.4	**0.03**[3]	0.3	0.03	<0.020
Phenanthrene	µg/L	0.00023	65	32.50	-	<0.12	-	0.9	<0.02[3]	0.4	0.022	<0.020
Pyrene	µg/L	0.00014	40	20.00	-	<0.10	-	0.2	<0.02[3]	0.1	<0.020	<0.020
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	-	<0.05	-	**0.02**	<0.01[3]	**0.04**	<0.0050	<0.0050
VOCs												
Benzene	µg/L	0.00025	5	1.25	-	<0.20	-	-		0.3	<0.50	-
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.10	-	-		<0.1	<0.50	-
Toluene	µg/L	0.09190	24	12.00	-	<0.20	-	-		0.5	<0.50	-

Notes:

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Table E-10 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWQS	RUC (Trigger Level)	OW8A-06 Southern Portion of Site 2009/11/25 (replicate)	OW8A-06 Southern Portion of Site 2009/12/03	OW8A-06 Southern Portion of Site 2009/12/08	OW8A-06 Southern Portion of Site 2011/01/07	OW8A-06 Southern Portion of Site 2011/05/30	OW8A-06 Southern Portion of Site 2011/07/05	OW8A-06 Southern Portion of Site 2011/11/15	MW2A-01 Eastern Portion of Site 2007/05/16
General Chemistry												
Chloride (Cl)	mg/L	12.54	250	131.27	10.9	17	-	13.7	12.6	14.4	11.3	12
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2510**	**2490**	-	**2680**	**2840**	**2640**	**2590**	**2670**
Metals												
Boron (B)	mg/L	0.310	5	1.48	0.427	0.55	-	0.368	0.507	0.457	0.544	0.49
Chromium (Cr)	mg/L	0.005	0.05	0.02	-	<0.002	-	-	-	<0.003	-	-
Iron (Fe)	mg/L	0.378	0.3	0.34	**7.54**	**8.71**	-	**4.74**	**3.73**	**4.25**	**6.79**	<0.3
Lead (Pb)	mg/L	0.005	0.01	0.01	-	<0.005	-	-	-	<0.001	-	-
PAHs												
Naphthalene	µg/L	0.00031	21	10.50	<0.020	-	<0.0002	-	-	<0.01	-	<0.05
Phenanthrene	µg/L	0.00023	65	32.50	<0.020	-	<0.0002	-	-	<0.12	-	<0.05
Pyrene	µg/L	0.00014	40	20.00	<0.020	-	<0.0002	-	-	<0.10	-	<0.05
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.0050	-	<0.0002	-	-	<0.05	-	<0.01
VOCs												
Benzene	µg/L	0.00025	5	1.25	-	<0.0002	-	-	-	<0.20	-	-
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.0002	-	-	-	<0.10	-	-
Toluene	µg/L	0.09190	24	12.00	-	0.0005	-	-	-	<0.20	-	-

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Table E-10 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWQS	RUC (Trigger Level)	MW2A-01 Eastern Portion of Site 2007/05/16 (replicate)	MW2A-01 Eastern Portion of Site 2007/07/31	MW2A-01 Eastern Portion of Site 2009/07/23	MW2A-01 Eastern Portion of Site 2009/11/25	MW2A-01 Eastern Portion of Site 2009/12/03	MW2A-01 Eastern Portion of Site 2011/01/07	MW2A-01 Eastern Portion of Site 2011/01/07 (replicate)	MW2A-01 Eastern Portion of Site 2011/05/30
General Chemistry												
Chloride (Cl)	mg/L	12.54	250	131.27	13	23	21.4	11.6	12.2	13.7	12.4	14.9
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2270**	**2800**	**3240**	**3050**	**2720**	**2650**	**2600**	**2880**
Metals												
Boron (B)	mg/L	0.310	5	1.48	0.47	0.24	0.51	0.365	0.41	**2.29**	0.349	0.367
Chromium (Cr)	mg/L	0.005	0.05	0.02	-	<0.005	<0.010	-	<0.002	-	-	-
Iron (Fe)	mg/L	0.378	0.3	0.34	<0.3	<0.05	<0.50	<0.050	<0.032	**0.888**	0.017	<0.01
Lead (Pb)	mg/L	0.005	0.01	0.01	-	<0.0005	<0.010	-	<0.005	-	-	-
PAHs												
Naphthalene	µg/L	0.00031	21	10.50	<0.05	0.3	<0.020	<0.020	<0.0002	-	-	-
Phenanthrene	µg/L	0.00023	65	32.50	<0.05	0.1	<0.020	<0.020	<0.0002	-	-	-
Pyrene	µg/L	0.00014	40	20.00	<0.05	0.09	<0.020	<0.020	<0.0002	-	-	-
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.01	**0.02**	<0.0050	<0.0050	<0.0002	-	-	-
VOCs												
Benzene	µg/L	0.00025	5	1.25	-	<0.1	<0.50	-	<0.0002	-	-	-
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.1	<0.50	-	<0.0002	-	-	-
Toluene	µg/L	0.09190	24	12.00	-	<0.2	<0.50	-	<0.0002	-	-	-

Notes:

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Table E-10 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWQS	RUC (Trigger Level)	MW2A-01 Eastern Portion of Site 2011/07/06	MW2A-01 Eastern Portion of Site 2011/11/14	MW4A-09 Western Portion of Site 2009/07/23	MW4A-09 Western Portion of Site 2009/11/25	MW4A-09 Western Portion of Site 2009/12/04	MW4A-09 Western Portion of Site 2011/01/10	MW4A-09 Western Portion of Site 2011/05/30	MW4A-09 Western Portion of Site 2011/07/05
General Chemistry												
Chloride (Cl)	mg/L	12.54	250	131.27	14.5	13.8	<20	17.1	12.2	11.6	14.3	13.3
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2700**	**2940**	**2470**	**2960**	**2330**	**2460**	**2640**	<0.4
Metals												
Boron (B)	mg/L	0.310	5	1.48	0.387	0.354	0.51	0.302	0.41	0.353	0.34	0.342
Chromium (Cr)	mg/L	0.005	0.05	0.02	<0.003	-	<0.010	-	<0.002	-	-	<0.003
Iron (Fe)	mg/L	0.378	0.3	0.34	<0.01	<0.01	<0.50	<0.050	<0.005	<0.010	0.04	0.0408
Lead (Pb)	mg/L	0.005	0.01	0.01	<0.001	-	<0.010	-	<0.005	-	-	<0.001
PAHs												
Naphthalene	µg/L	0.00031	21	10.50	<0.01	-	0.058	<0.020	<0.0002	-	-	<0.01
Phenanthrene	µg/L	0.00023	65	32.50	<0.12	-	0.096	<0.020	<0.0002	-	-	<0.12
Pyrene	µg/L	0.00014	40	20.00	<0.10	-	<0.020	<0.020	<0.0002	-	-	<0.10
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	<0.05	-	<0.0050	<0.0050	<0.0002	-	-	<0.05
VOCs												
Benzene	µg/L	0.00025	5	1.25	<0.20	-	<0.50	-	0.0002	-	-	<0.20
Ethylbenzene	µg/L	0.00025	2.4	1.20	<0.10	-	<0.50	-	<0.0002	-	-	<0.10
Toluene	µg/L	0.09190	24	12.00	<0.20	-	0.76	-	0.0004	-	-	<0.20

Notes:

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Table E-10 Groundwater Trigger and Assessment Criteria: Down-gradient and Boundary Monitoring Wells - Basal O/B/Shallow B/R Unit
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Groundwater Trigger Parameter	Units	Average Median Background Level	ODWQS	RUC (Trigger Level)	MW4A-09 Western Portion of Site	MW5A-09 Downgradient of Site	MW5A-09 Downgradient of Site	MW5A-09 Downgradient of Site	MW5A-09 Downgradient of Site	MW5A-09 Downgradient of Site
					2011/11/16	2009/07/23	2009/07/23 (replicate)	2009/11/24	2009/12/03	2011/01/10
General Chemistry										
Chloride (Cl)	mg/L	12.54	250	131.27	12	<20	<20	13.3	19.5	13.2
Sulfates (SO_4)	mg/L	1277.25	500	888.63	**2390**	**3200**	**3190**	**2910**	**2780**	**2760**
Metals										
Boron (B)	mg/L	0.310	5	1.48	0.402	0.81	0.82	0.577	0.7	0.546
Chromium (Cr)	mg/L	0.005	0.05	0.02	-	<0.010	<0.010	-	<0.002	-
Iron (Fe)	mg/L	0.378	0.3	0.34	0.0102	**4.2**	**4.16**	**2.87**	**4.49**	**3.12**
Lead (Pb)	mg/L	0.005	0.01	0.01	-	<0.010	<0.010	-	<0.005	-
PAHs										
Naphthalene	µg/L	0.00031	21	10.50	-	0.047	0.04	<0.020	<0.0002	-
Phenanthrene	µg/L	0.00023	65	32.50	-	0.094	0.067	<0.020	<0.0002	-
Pyrene	µg/L	0.00014	40	20.00	-	<0.020	<0.020	<0.0020	<0.0002	-
Benzo(a)pyrene	µg/L	0.00004	0.01	0.0025	-	<0.0050	<0.0050	<0.0050	<0.0002	-
VOCs										
Benzene	µg/L	0.00025	5	1.25	-	<0.50	-	-	0.0002	-
Ethylbenzene	µg/L	0.00025	2.4	1.20	-	<0.50	-	-	<0.0002	-
Toluene	µg/L	0.09190	24	12.00	-	<0.50	-	-	0.0004	-

Notes:

1 A value with a '<' indicates the parameter was analyzed for but not detected at or above the method detection limit.

2 A '-' indicates the parameter was not applicable.

3 RUC is Reasonable Use Criteria

1.7 indicates that parameter concentration exceeds the respective RUC.

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T497243

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 11, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T497243
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: May 30, 2011 | DATE RECEIVED: May 31, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW1-03 2439885	MW2-03 2439948	MW3-03 2439959	RDL	MW4-09 2439997	MW6A-07 2440017	MW6B-07 2440024	OW8S-07 2440033
Alkalinity (as CaCO3)	µg/L		5000	420000	383000	381000	5000	372000	402000	446000	404000
Ammonia as N	µg/L		20	<20	<20	<20	20	<20	228	73	194
Calcium	µg/L		50	186000	196000	121000	50	523000	528000	214000	484000
Chemical Oxygen Demand	µg/L		5000	<5000	<5000	<5000	5000	<5000	<5000	<5000	<5000
Chloride	µg/L	(250000)	100	96200	99700	34600	200	14300	11100	51900	13900
Electrical Conductivity	uS/cm		2	1250	1160	954	2	3400	3620	2690	3670
Dissolved Organic Carbon	µg/L	(5000)	500	15800	5870	8230	500	7430	2260	6820	6490
Nitrate as N	µg/L	10000	50	<50	<50	<50	100	<100	<100	<100	<100
pH	pH Units	(6.5-8.5)	NA	7.62	7.73	7.76	NA	7.87	7.76	7.88	7.77
Sulphate	µg/L	(500000)	100	261000	217000	150000	200	2640000	2890000	1700000	3000000
Total Dissolved Solids	µg/L	(500000)	20000	902000	884000	670000	20000	3660000	3780000	2660000	4030000
Barium	µg/L	1000	2.0	75.5	41.1	31.9	2.0	8.6	5.8	12.0	5.5
Boron	µg/L	5000	10.0	42.1	30.3	52.2	10.0	340	431	58.1	465
Iron	µg/L		10.0	<10.0	11.0	726	10.0	40	3750	<10.0	1790
Magnesium	µg/L		50	55500	42000	51000	50	266000	340000	325000	366000
Sodium	µg/L		50	43400	28900	38000	50	131000	118000	83500	120000

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T497243

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: May 30, 2011 | DATE RECEIVED: May 31, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW8D-07 2440038	OW8A-06 2440043	OW8B-06 2440049	OW1B-06 2440061	OW1A-06 2440075	OW5A-06 2440081	RDL	OW5B-06 2440086
Alkalinity (as CaCO3)	µg/L		5000	134000	399000	567000	830000	326000	381000	5000	460000
Ammonia as N	µg/L		20	850	237	<20	<20	219	277	20	<20
Calcium	µg/L		50	512000	504000	76800	76700	475000	540000	50	61400
Chemical Oxygen Demand	µg/L		5000	177000	<5000	<5000	<5000	<5000	<5000	5000	<5000
Chloride	µg/L	(250000)	200	31700	12600	58100	18300	12500	8490	100	11700
Electrical Conductivity	uS/cm		2	2960	3560	1550	2220	3700	3210	2	1010
Dissolved Organic Carbon	µg/L	(5000)	500	2210	2760	3640	4640	3880	3030	500	6070
Nitrate as N	µg/L	10000	100	<100	<100	<100	<100	<100	<100	50	159
pH	pH Units	(6.5-8.5)	NA	8.28	7.78	7.99	8.00	7.69	7.85	NA	8.07
Sulphate	µg/L	(500000)	200	2340000	2840000	371000	869000	2970000	2470000	100	176000
Total Dissolved Solids	µg/L	(500000)	20000	3090000	3910000	1110000	1910000	3970000	3390000	20000	718000
Barium	µg/L	1000	2.0	14.9	5.7	15.7	16.0	6.5	8.4	2.0	29.2
Boron	µg/L	5000	10.0	9380	507	1010	135	551	442	10.0	36.2
Iron	µg/L		10.0	23.0	3730	<10.0	1080	2650	4820	10.0	11.2
Magnesium	µg/L		50	170000	326000	145000	298000	374000	230000	50	86100
Sodium	µg/L		50	103000	114000	98700	104000	135000	94700	50	51500

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T497243
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: May 30, 2011 | DATE RECEIVED: May 31, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MWFD-1 2440091	RDL	MWFD-2 2440097	MWFD-3 2440110
Alkalinity (as CaCO3)	µg/L		5000	392000	5000	388000	353000
Ammonia as N	µg/L		20	<20	20	172	180
Calcium	µg/L		50	187000	50	510000	538000
Chemical Oxygen Demand	µg/L		5000	9000	5000	<5000	<5000
Chloride	µg/L	(250000)	100	101000	200	11200	8370
Electrical Conductivity	uS/cm		2	1160	2	3610	3220
Dissolved Organic Carbon	µg/L	(5000)	500	6210	500	2330	2870
Nitrate as N	µg/L	10000	50	<50	100	<100	<100
pH	pH Units	(6.5-8.5)	NA	7.86	NA	7.88	7.78
Sulphate	µg/L	(500000)	100	218000	200	2880000	2490000
Total Dissolved Solids	µg/L	(500000)	20000	904000	20000	3780000	3400000
Barium	µg/L	1000	2.0	46.8	2.0	6.1	7.2
Boron	µg/L	5000	10.0	33.1	10.0	492	435
Iron	µg/L		10.0	12.6	10.0	3970	4850
Magnesium	µg/L		50	40500	50	328000	233000
Sodium	µg/L		50	27400	50	114000	94900

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

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Guideline Violation

AGAT WORK ORDER: 11T497243

PROJECT NO: 111-53338-00

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CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2440038	OW8D-07	O.Reg.169/03	Brooks Landfill - GW Parameters	Boron	5000	9380

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T497243

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - GW Parameters															
Alkalinity (as CaCO3)	1	2439885	420000	422000	0.5%	< 5000	101%	80%	120%						
Ammonia as N	1	2439885	< 20	< 20	0.0%	< 20	98%	90%	110%	97%	90%	110%	114%	80%	120%
Calcium	1	2439959	121000	119000	1.7%	< 50	98%	90%	110%	96%	90%	110%	95%	70%	130%
Chemical Oxygen Demand	1		< 5000	< 5000	0.0%	< 5000	99%	90%	110%	103%	90%	110%	83%	70%	130%
Chloride	1	2440086	11700	11700	0.0%	< 100	99%	90%	110%	101%	90%	110%	92%	80%	120%
Electrical Conductivity	1	2439885	1250	1250	0.0%	< 2	101%	80%	120%						
Dissolved Organic Carbon	1	2440097	2330	2330	0.0%	< 500	98%	90%	110%	102%	80%	120%	96%	70%	130%
Nitrate as N	1	2440086	159	165	3.7%	< 50	98%	90%	110%	104%	90%	110%	103%	80%	120%
pH	1	2439885	7.62	7.72	1.3%	N/A	100%	80%	120%						
Sulphate	1	2440086	176000	174000	1.1%	< 100	100%	90%	110%	103%	90%	110%	95%	80%	120%
Total Dissolved Solids	1	2440043	3910000	3990000	2.0%	< 20000	92%	80%	120%						
Barium	1	2439885	75.5	75.2	0.4%	< 2.0	100%	90%	110%	100%	90%	110%	96%	70%	130%
Boron	1	2439885	42.1	43.2	2.6%	< 10.0	98%	90%	110%	115%	80%	120%	101%	70%	130%
Iron	1	2439885	< 10.0	< 10.0	0.0%	< 10.0	98%	90%	110%	119%	80%	120%	104%	70%	130%
Magnesium	1	2439959	51000	49700	2.6%	< 50	97%	90%	110%	96%	90%	110%	95%	70%	130%
Sodium	1	2439959	38000	38100	0.3%	< 50	100%	90%	110%	98%	90%	110%	96%	70%	130%

Certified By:

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T497243

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	TITRATION
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES

2 Lg Black cooler

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario; L4Z 1Y2
Phone: 905-712-5100; Fax: 905-712-5122
Toll free: 800-856-6261
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CHAIN OF CUSTODY RECORD

7.0

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 6.0 AGAT WO #: 11T497243
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St
Brantford, On
Phone: 519-756-9722 Fax: 519-756-6723
Project: 111-53338-00 PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? (Yes) No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☑ Other (indicate) GDWS
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☑ No (If "yes" please use the Drinking Water Chain of Custody Record)

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	6W Inorganics	Per Quote	LABORATORY USE ONLY LAB SAMPLE ID
MW1-03	30-May-11		GW	5												✓		
MW2-03																✓		
MW3-03																✓		
MW4-09																✓		
MW6A-07																✓		
MW6B-07																✓		
MW5A-09																✓		
OW8S-07																✓		
OW8D-07																✓		
OW8A-06																✓		
OW8B-06																✓		
OW1B-06																✓		
OW1A-06																✓		
OW5A-06																✓		

Samples Relinquished By (print name & sign): Matt Welsh
Date/Time: May 31/11 10:52
Samples Received By (print name & sign):
Date/Time: May. 31. 11 0.52

Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign):
Date/Time: May. 31. 11 1235

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

NO: 153489

2 Lg Black cooler

AGAT Laboratories

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CHAIN OF CUSTODY RECORD

7.0

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 6.0 AGAT WO #: 11T497243
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St
Brantford, ON
Phone: 519-756-9922 Fax: 519-756-6723
Project: PO:
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: Matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table ___ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ___ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☑ Other (indicate) OWDS
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☑ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (excl. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	GW Inorganics for Guelph				LABORATORY USE ONLY LAB SAMPLE ID
OWSB-06	30-May-11		GW	5												✓				
MW FD-1	↓		↓	↓												✓				
MW FD-2																✓				
MW FD-3	↓															✓				

Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time
Matt Welsh	May 31/11 10:52		May. 31. 11 10:52
Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time
			May. 31. 11 12:35

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 2 of 2
NO: 153486

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T497547

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 11, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES
VERSION 2:QC data was corrected for Alkalinity and DOC on December 14th, 2011.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T497547

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters - Revised Final Report

DATE SAMPLED: May 30, 2011 | DATE RECEIVED: Jun 01, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW2s-07 2442843	MW2d-07 2442854	MW2a-01 2442860	MW2b-07 2442865	MW2c-01 2442871	OW9a-06 2442887	RDL	OW9b06 2442892
Alkalinity (as CaCO3)	µg/L		5000	391000	411000	382000	646000	839000	402000	5000	630000
Ammonia as N	µg/L		20	185	134	57	34	43	121	20	22
Calcium	µg/L		50	522000	510000	490000	128000	192000	535000	50	63700
Chemical Oxygen Demand	µg/L		5000	<5000	<5000	<5000	<5000	<5000	<5000	5000	<5000
Chloride	µg/L	(250000)	500	12800	13400	14900	20100	14900	15200	100	30000
Electrical Conductivity	uS/cm		2	3530	3590	3700	2540	4140	3530	2	1450
Dissolved Organic Carbon	µg/L	(5000)	500	3700	2500	2200	14000	6100	1700	500	2600
Nitrate as N	µg/L	10000	250	<250	<250	<250	1230	1110	<250	50	<50
pH	pH Units	(6.5-8.5)	NA	7.99	7.88	8.08	8.08	8.04	7.86	NA	8.26
Sulphate	µg/L	(500000)	500	2890000	2710000	2880000	1340000	2860000	2680000	100	353000
Total Dissolved Solids	µg/L	(500000)	20000	4080000	4070000	4170000	2320000	4290000	4050000	20000	1040000
Barium	µg/L	1000	2.0	4.6	8.4	6.5	75.2	10.6	6.5	2.0	19.1
Boron	µg/L	5000	10.0	446	555	367	49.3	275	410	10.0	104
Iron	µg/L		10.0	506	807	<10.0	<10.0	<10.0	457	10.0	<10.0
Magnesium	µg/L		50	388000	386000	410000	337000	621000	379000	50	153000
Sodium	µg/L		50	125000	123000	135000	150000	317000	121000	50	103000

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T497547

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters - Revised Final Report

DATE SAMPLED: May 30, 2011 | DATE RECEIVED: Jun 01, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW3a-07 2443166	OW3b-07 2443171	MW1a-07 2443176	MW1b-07 2443181	RDL	MW1s-07 2443187	RDL	MW1d-07 2443192
Alkalinity (as CaCO3)	µg/L		5000	417000	436000	128000	560000	5000	414000	5000	114000
Ammonia as N	µg/L		20	42	113	281	71	20	154	20	2610
Calcium	µg/L		50	263000	210000	58000	140000	50	532000	50	543000
Chemical Oxygen Demand	µg/L		5000	<5000	7540	<5000	<5000	5000	<5000	5000	23100
Chloride	µg/L	(250000)	100	4110	14200	20300	8140	2500	11100	500	15600
Electrical Conductivity	uS/cm		2	1760	1010	737	1220	2	3450	2	2730
Dissolved Organic Carbon	µg/L	(5000)	500	4300	9400	2300	6200	500	1700	500	1800
Nitrate as N	µg/L	10000	50	<50	162	<50	<50	1250	<1250	250	<250
pH	pH Units	(6.5-8.5)	NA	7.89	7.40	11.00	8.10	NA	7.76	NA	7.92
Sulphate	µg/L	(500000)	100	824000	201000	84400	291000	2500	2570000	500	2050000
Total Dissolved Solids	µg/L	(500000)	20000	1830000	826000	276000	980000	20000	3960000	20000	2930000
Barium	µg/L	1000	2.0	107	118	183	47.5	2.0	5.9	2.0	17.3
Boron	µg/L	5000	10.0	372	34.6	38.9	43.3	10.0	433	10.0	10200
Iron	µg/L		10.0	<10.0	408	58.2	513	10.0	2230	10.0	207
Magnesium	µg/L		50	111000	21200	60	91000	50	370000	50	186000
Sodium	µg/L		50	73800	19400	56300	60100	50	121000	50	47400

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Certificate of Analysis

AGAT WORK ORDER: 11T497547
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters - Revised Final Report

DATE SAMPLED: May 30, 2011 | DATE RECEIVED: Jun 01, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW5a-09 2443211	MW5b-09 2443215
Alkalinity (as CaCO3)	µg/L		5000	394000	604000
Ammonia as N	µg/L		20	295	279
Calcium	µg/L		50	536000	186000
Chemical Oxygen Demand	µg/L		5000	<5000	18200
Chloride	µg/L	(250000)	500	50400	13500
Electrical Conductivity	uS/cm		2	3710	4270
Dissolved Organic Carbon	µg/L	(5000)	500	1700	13800
Nitrate as N	µg/L	10000	250	<250	<250
pH	pH Units	(6.5-8.5)	NA	7.91	7.84
Sulphate	µg/L	(500000)	500	2880000	3140000
Total Dissolved Solids	µg/L	(500000)	20000	4480000	5060000
Barium	µg/L	1000	2.0	7.3	9.3
Boron	µg/L	5000	10.0	518	160
Iron	µg/L		10.0	3360	<10.0
Magnesium	µg/L		50	417000	725000
Sodium	µg/L		50	150000	244000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

2442843-2443215 Revised: Dec.01, 2011
Revision: See Quality Assurance Certificate.
Revised: Dec 14, 2011
2nd Revision: See Quality Assurance Certificate.

Certified By:

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Guideline Violation

AGAT WORK ORDER: 11T497547

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2443176	MW1a-07	O.Reg.169/03	Brooks Landfill - GW Parameters - Revised Final Report	pH	(6.5-8.5)	11.00
2443192	MW1d-07	O.Reg.169/03	Brooks Landfill - GW Parameters - Revised Final Report	Boron	5000	10200

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T497547

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - GW Parameters - Revised Final Report															
Alkalinity (as CaCO3)	1	2442843	391000	408000	4.3%	< 5000	98%	80%	120%						
Ammonia as N	1		113	117	3.5%	< 20	100%	90%	110%	101%	90%	110%	82%	80%	120%
Calcium	1	2442892	63700	62000	2.7%	< 50	101%	90%	110%	105%	90%	110%	109%	70%	130%
Chemical Oxygen Demand	1		<5000	< 5000	0.0%	< 5000	102%	90%	110%	98%	90%	110%	95%	70%	130%
Chloride	1	2442892	30000	29900	0.3%	< 100	94%	90%	110%	94%	90%	110%	102%	80%	120%
Electrical Conductivity	1	2443181	1220	1220	0.0%	< 2	102%	80%	120%						
Dissolved Organic Carbon	1	2443215	13800	13300	3.7%	< 500	98%	90%	110%	102%	80%	120%	96%	70%	130%
Nitrate as N	1	2442892	< 50	< 50	0.0%	< 50	98%	90%	110%	97%	90%	110%	102%	80%	120%
pH	1	2443181	8.10	8.06	0.5%		100%	80%	120%						
Sulphate	1	2442892	353000	352000	0.3%	< 100	101%	90%	110%	97%	90%	110%	112%	80%	120%
Total Dissolved Solids	1	2442887	4050000	4240000	4.6%	< 20000	102%	80%	120%						
Barium	1	2442843	4.6	4.4	4.4%	< 2.0	98%	90%	110%	93%	90%	110%	100%	70%	130%
Boron	1	2442843	446	440	1.4%	< 10.0	104%	90%	110%	105%	90%	110%	126%	70%	130%
Iron	1	2442843	506	521	2.9%	< 10.0	107%	90%	110%	100%	90%	110%	107%	70%	130%
Magnesium	1	2442892	153000	150000	2.0%	< 50	102%	90%	110%	103%	90%	110%	108%	70%	130%
Sodium	1	2442892	103000	98400	4.6%	< 50	104%	90%	110%	109%	90%	110%	106%	70%	130%

Comments: Alkalinity - Sample ID and values for Dup #1 & Dup#2 were changed.
DOC - Values for duplicates were corrected.

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T497547

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	TITRATION
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES

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2 Lg Black cooler
4.0

5835 Coopers Avenue
Mississauga, Ontario; L4Z 1Y2
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Toll free: 800-856-6261
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http://webearth.agatlabs.com

CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 2.0 AGAT WO #: 11T497547
Notes:

Client Information
Company: Genivar
Contact: Matt Welsh
Address: 110 Colborne St
Brantford, ON
Phone: 519-756-9422 Fax:
Project: 111-53338-00 PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☑ Other (indicate) ODWS
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)?
☐ Yes ☑ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	GW Indicator Parameters	Dec Grade.				LABORATORY USE ONLY LAB SAMPLE ID
MW2S-07	May31/11		GW	5												✓					
MW2D-07																✓					
MW2A-01																✓					
MW2B-07																✓					
MW2C-01																✓					
OW9A-06																✓					
OW9B-06																✓					
OW3A-07																✓					
OW3B-07																✓					
MW1A-07																✓					
MW1B-07																✓					
MW1S-07																✓					
MW1D-07																✓					
MW5A-09	May30/11															✓					

Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time
Matt Welsh	2011/06/01		~~May 31~~ June 1. 11 9:15
Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time
			June 1. 11 11:15

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of 2
NO: 153487

2 LS Black cooler

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CHAIN OF CUSTODY RECORD

4.0

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 2.0 AGAT WO #: 11T497547
Notes:

Client Information
Company: Genivar
Contact: Matt Welsh
Address: 110 Colborne St.
Brantford, On
Phone: 519-756-9426 Fax:
Project: 111-53338-00 PO:
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name:
Email:
2. Name:
Email:

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☑ Other (indicate) OWS
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☑ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☐ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	Chlorinator	Per Route				LABORATORY USE ONLY LAB SAMPLE ID
MW5B-09	May31/11		GW	5												✓					

Samples Relinquished By (print name & sign): Matt Welsh
Date/Time: 2011/06/01
Samples Received By (print name & sign):
Date/Time: June. 1.11 9.15

Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign):
Date/Time: June 11 11:15

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 2 of 2
NO: 153485

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T507657

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 18, 2011

PAGES (INCLUDING COVER): 18

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

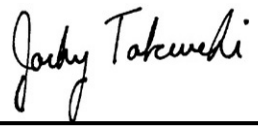
ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW6A - 07 2523649	MW6B - 07 2523693	MW1 - 03 2523706	MW2 - 03 2523718	MW3 - 03 2523730	MW4A - 09 2523750	MW5A - 09 2523762	OW8A - 06 2523774
Naphthalene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L		0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b/j)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
2-and 1-methyl Napthalene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Chrysene-d12	%	60-130		73	79	68	67	68	83	79	72

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW8B - 06 2523786	OW8S - 07 2523798	OW8D - 07 2523810	MWFD2 2523822
Naphthalene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L		0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b/j)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06
2-and 1-methyl Napthalene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits					
Chrysene-d12	%	60-130		71	70	70	65

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW6A - 07 2523649	MW6B - 07 2523693	MW1 - 03 2523706	MW2 - 03 2523718	MW3 - 03 2523730	MW4A - 09 2523750	MW5A - 09 2523762	OW8A - 06 2523774
Dichlorodifluoromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L		0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethylene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW6A - 07 2523649	MW6B - 07 2523693	MW1 - 03 2523706	MW2 - 03 2523718	MW3 - 03 2523730	MW4A - 09 2523750	MW5A - 09 2523762	OW8A - 06 2523774
Ethylbenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylene Mixture (Total)	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
n-Hexane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Toluene-d8	% Recovery	60-130		91	95	92	100	101	96	99	102
4-Bromofluorobenzene	% Recovery	70-130		78	76	77	79	74	78	85	81

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW8B - 06 2523786	OW8S - 07 2523798	OW8D - 07 2523810	MWFD2 2523822
Dichlorodifluoromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Chloromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L		0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethylene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW8B - 06 2523786	OW8S - 07 2523798	OW8D - 07 2523810	MWFD2 2523822
Ethylbenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
Xylene Mixture (Total)	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
n-Hexane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**					
Toluene-d8	% Recovery	60-130		97	93	101	95
4-Bromofluorobenzene	% Recovery	70-130		78	80	83	84

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW6A - 07 2523649	MW6B - 07 2523693	RDL	MW1 - 03 2523706	MW2 - 03 2523718	MW3 - 03 2523730	RDL	MW4A - 09 2523750
Alkalinity (as CaCO3)	µg/L		5000	428000	465000	5000	419000	381000	490000	5000	390000
Ammonia as N	µg/L		20	307	<20	20	<20	<20	<20	20	<20
BOD (5)	µg/L		5000	<5000	<5000	5000	<5000	<5000	<5000	5000	<5000
Calcium	µg/L		50	526000	209000	50	173000	180000	130000	50	528000
Chemical Oxygen Demand	µg/L		5000	5670	10400	5000	9800	13300	15500	5000	5040
Chloride	µg/L		400	11700	49600	100	101000	105000	43700	400	13300
Electrical Conductivity	uS/cm		2	3740	2770	2	1330	1270	1260	2	3590
Dissolved Organic Carbon	µg/L		500	3300	8100	500	4800	6900	21800	500	6100
Total Hardness (as CaCO3)	µg/L		500	2640000	1860000	500	640000	619000	620000	500	2470000
Nitrate as N	µg/L		200	<200	<200	50	<50	<50	<50	200	<200
Nitrite as N	µg/L		200	<200	<200	50	<50	<50	<50	200	<200
pH	pH Units		NA	7.77	8.03	NA	8.03	7.87	7.91	NA	7.96
Phenols	µg/L		1	<1	<1	1	<1	<1	<1	1	<1
Potassium	µg/L		50	4760	3220	50	2530	2050	1820	50	8130
Sulphate	µg/L		400	2580000	1530000	100	232000	207000	212000	400	<400
Total Dissolved Solids	µg/L		20000	3110000	2390000	20000	920000	840000	822000	20000	3460000
Total Kjeldahl Nitrogen	µg/L		100	460	160	100	180	160	250	100	180
Total Phosphorus	µg/L		20	1910	420	20	102	104	128	20	474
Total Suspended Solids	µg/L		10000	4290000	930000	10000	154000	158000	250000	10000	555000
Arsenic	µg/L		3.0	<3.0	<3.0	3.0	<3.0	<3.0	<3.0	3.0	<3.0
Barium	µg/L		2.0	8.3	15.1	2.0	89.7	44.7	41.2	2.0	10.5
Beryllium	µg/L		1.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	1.0	<1.0
Boron	µg/L		10.0	443	56.7	10.0	39.5	29.7	42.6	10.0	342
Cadmium	µg/L		0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	0.10	<0.10
Chromium	µg/L		3.0	<3.0	<3.0	3.0	<3.0	3.1	<3.0	3.0	<3.0
Cobalt	µg/L		0.50	0.63	<0.50	0.50	<0.50	<0.50	<0.50	0.50	1.30
Copper	µg/L		0.80	1.60	1.85	0.80	2.16	2.99	2.47	0.80	2.26
Iron	µg/L		10.0	4820	<10.0	10.0	<10.0	<10.0	254	10.0	40.8
Lead	µg/L		1.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	1.0	<1.0
Magnesium	µg/L		50	322000	324000	50	50500	41100	71800	50	280000
Manganese	µg/L		2.0	114	15.9	2.0	3.6	4.1	35.7	2.0	151
Mercury	µg/L		0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	0.05	<0.05
Molybdenum	µg/L		2.0	2.9	<2.0	2.0	<2.0	<2.0	<2.0	2.0	10.2

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PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW6A - 07 2523649	MW6B - 07 2523693	RDL	MW1 - 03 2523706	MW2 - 03 2523718	MW3 - 03 2523730	RDL	MW4A - 09 2523750
Nickel	µg/L		3.0	<3.0	<3.0	3.0	<3.0	<3.0	<3.0	3.0	4.6
Silver	µg/L		0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	0.10	<0.10
Sodium	µg/L		50	116000	85300	50	45400	32000	43300	50	117000
Thallium	µg/L		0.3	<0.3	<0.3	0.3	<0.3	<0.3	<0.3	0.3	<0.3
Vanadium	µg/L		2.0	<2.0	<2.0	2.0	<2.0	<2.0	<2.0	2.0	<2.0
Zinc	µg/L		5.0	24.9	11.7	5.0	42.4	26.9	5.8	5.0	14.9

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Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW5A - 09 2523762	OW8A - 06 2523774	RDL	OW8B - 06 2523786	RDL	OW8S - 07 2523798	OW8D - 07 2523810	MWFD2 2523822
Alkalinity (as CaCO3)	µg/L		5000	390000	422000	5000	658000	5000	410000	154000	434000
Ammonia as N	µg/L		20	454	242	20	<20	20	196	4150	359
BOD (5)	µg/L		5000	<5000	<5000	5000	<5000	5000	<5000	90000	<5000
Calcium	µg/L		50	503000	532000	50	72000	50	510000	527000	518000
Chemical Oxygen Demand	µg/L		5000	7580	7260	5000	6310	5000	7580	141000	11400
Chloride	µg/L		400	15500	14400	100	61100	400	14000	34400	13700
Electrical Conductivity	uS/cm		2	4040	3800	2	1680	2	3880	3210	3760
Dissolved Organic Carbon	µg/L		500	3900	2400	500	6900	500	10500	15600	3500
Total Hardness (as CaCO3)	µg/L		500	2890000	2720000	500	810000	500	2830000	2050000	2600000
Nitrate as N	µg/L		200	<200	<200	50	<50	200	<200	<200	<200
Nitrite as N	µg/L		200	<200	<200	50	<50	200	<200	<200	<200
pH	pH Units		NA	7.79	7.79	NA	8.09	NA	7.78	8.28	7.83
Phenols	µg/L		1	<1	<1	1	<1	1	<1	83	<1
Potassium	µg/L		50	5510	5400	50	3490	50	5730	34500	4760
Sulphate	µg/L		400	2890000	2640000	100	324000	400	2720000	2390000	2580000
Total Dissolved Solids	µg/L		20000	4280000	3760000	20000	1100000	20000	3290000	3240000	3190000
Total Kjeldahl Nitrogen	µg/L		100	590	530	100	110	100	380	3940	500
Total Phosphorus	µg/L		20	366	501	20	44	20	57	1470	1820
Total Suspended Solids	µg/L		10000	463000	1210000	10000	41000	10000	69000	18100000	3690000
Arsenic	µg/L		3.0	15.1	3.3	3.0	<3.0	3.0	5.2	4.9	<3.0
Barium	µg/L		2.0	8.2	6.2	2.0	18.7	2.0	6.9	12.3	7.8
Beryllium	µg/L		1.0	<1.0	<1.0	1.0	<1.0	1.0	<1.0	<1.0	<1.0
Boron	µg/L		10.0	523	457	10.0	839	10.0	504	10000	448
Cadmium	µg/L		0.10	<0.10	<0.10	0.10	<0.10	0.10	<0.10	<0.10	<0.10
Chromium	µg/L		3.0	<3.0	<3.0	3.0	3.2	3.0	7.7	<3.0	<3.0
Cobalt	µg/L		0.50	0.89	1.47	0.50	<0.50	0.50	2.97	0.79	0.84
Copper	µg/L		0.80	1.72	1.36	0.80	2.20	0.80	1.54	4.17	1.47
Iron	µg/L		10.0	3690	4250	10.0	<10.0	10.0	2030	<10.0	5390
Lead	µg/L		1.0	<1.0	<1.0	1.0	<1.0	1.0	<1.0	<1.0	<1.0
Magnesium	µg/L		50	396000	339000	50	153000	50	378000	178000	317000
Manganese	µg/L		2.0	45.8	104	2.0	4.2	2.0	230	85.8	122
Mercury	µg/L		0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05
Molybdenum	µg/L		2.0	6.2	5.0	2.0	6.3	2.0	5.9	<2.0	2.7

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T507657
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 05, 2011 | DATE RECEIVED: Jul 06, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW5A - 09 2523762	OW8A - 06 2523774	RDL	OW8B - 06 2523786	RDL	OW8S - 07 2523798	OW8D - 07 2523810	MWFD2 2523822
Nickel	µg/L		3.0	<3.0	<3.0	3.0	<3.0	3.0	<3.0	<3.0	<3.0
Silver	µg/L		0.10	<0.10	<0.10	0.10	<0.10	0.10	<0.10	<0.10	<0.10
Sodium	µg/L		50	139000	116000	50	95100	50	122000	117000	110000
Thallium	µg/L		0.3	<0.3	<0.3	0.3	<0.3	0.3	<0.3	<0.3	<0.3
Vanadium	µg/L		2.0	<2.0	<2.0	2.0	<2.0	2.0	<2.0	<2.0	<2.0
Zinc	µg/L		5.0	17.8	<5.0	5.0	21.3	5.0	17.1	13.5	11.6

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507657

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
PAHs in Water															
Naphthalene	1					< 0.12	107%	60%	140%	88%	60%	140%		60%	140%
Acenaphthylene	1					< 0.11	103%	60%	140%	91%	60%	140%		60%	140%
Acenaphthene	1					< 0.10	108%	60%	140%	92%	60%	140%		60%	140%
Fluorene	1					< 0.09	106%	60%	140%	101%	60%	140%		60%	140%
Phenanthrene	1					< 0.10	92%	60%	140%	92%	60%	140%		60%	140%
Anthracene	1					< 0.05	106%	60%	140%	99%	60%	140%		60%	140%
Fluoranthene	1					< 0.12	98%	60%	140%	94%	60%	140%		60%	140%
Pyrene	1					< 0.05	97%	60%	140%	91%	60%	140%		60%	140%
Benzo(a)anthracene	1					< 0.08	90%	60%	140%	65%	60%	140%		60%	140%
Chrysene	1					< 0.05	82%	60%	140%	72%	60%	140%		60%	140%
Benzo(b/j)fluoranthene	1					< 0.05	111%	60%	140%	93%	60%	140%		60%	140%
Benzo(k)fluoranthene	1					< 0.05	116%	60%	140%	112%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	124%	60%	140%	91%	60%	140%		60%	140%
Indeno(1,2,3-cd)pyrene	1					< 0.06	95%	60%	140%	70%	60%	140%		60%	140%
Dibenzo(a,h)anthracene	1					< 0.09	100%	60%	140%	69%	60%	140%		60%	140%
Benzo(g,h,i)perylene	1					< 0.06	93%	60%	140%	69%	60%	140%		60%	140%
2-and 1-methyl Napthalene	1					< 0.20	111%	60%	140%	86%	80%	120%		60%	140%
Volatile Organic Compounds in Water															
Dichlorodifluoromethane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	99%	60%	130%	80%	60%	130%	126%	60%	130%
Chloromethane	1	2523693	< 0.40	< 0.40	0.0%	< 0.40	74%	60%	130%	87%	60%	130%	120%	60%	130%
Vinyl Chloride	1	2523693	< 0.17	< 0.17	0.0%	< 0.17	78%	60%	130%	86%	60%	130%	121%	60%	130%
Bromomethane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	81%	60%	130%	94%	60%	130%
Chloroethane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	96%	60%	130%	119%	60%	130%
Trichlorofluoromethane	1	2523693	< 0.40	< 0.40	0.0%	< 0.40	85%	60%	130%	92%	60%	130%	121%	60%	130%
Acetone	1	2523693	< 1.0	< 1.0	0.0%	< 1.0	112%	60%	130%	113%	60%	130%	111%	60%	130%
1,1 Dichloroethylene	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	77%	60%	130%	71%	60%	130%	109%	60%	130%
Methylene Chloride	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	93%	60%	130%	94%	60%	130%	119%	60%	130%
trans- 1,2-dichloroethylene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	71%	60%	130%	72%	60%	130%	88%	60%	130%
Methyl tert-butyl ether	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	84%	60%	130%	78%	60%	130%
1,1-Dichloroethane	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	81%	60%	130%	81%	60%	130%	109%	60%	130%
Methyl Ethyl Ketone	1	2523693	< 1.0	< 1.0	0.0%	< 1.0	95%	60%	130%	99%	60%	130%	88%	60%	130%
cis- 1,2-Dichloroethylene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	71%	60%	130%	73%	60%	130%	90%	60%	130%
Chloroform	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	88%	60%	130%	89%	60%	130%	119%	60%	130%
1,2 - Dichloroethane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	88%	60%	130%	87%	60%	130%	112%	60%	130%
1,1,1-Trichloroethane	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	87%	60%	130%	89%	60%	130%	111%	60%	130%
Carbon Tetrachloride	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	95%	60%	130%	92%	60%	130%	111%	60%	130%
Benzene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	70%	60%	130%	97%	60%	130%
1,2-Dichloropropane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	79%	60%	130%	96%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507657

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis (Continued)

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Trichloroethylene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	72%	60%	130%	73%	60%	130%	103%	60%	130%
Bromodichloromethane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	84%	60%	130%	86%	60%	130%	111%	60%	130%
cis-1,3-Dichloropropene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	98%	60%	130%	80%	60%	130%	106%	60%	130%
Methyl Isobutyl Ketone	1	2523693	< 1.0	< 1.0	0.0%	< 1.0	74%	60%	130%	99%	60%	130%	98%	60%	130%
trans-1,3-Dichloropropene	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	77%	60%	130%	81%	60%	130%	83%	60%	130%
1,1,2-Trichloroethane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	100%	60%	130%	100%	60%	130%	100%	60%	130%
Toluene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	89%	60%	130%	104%	60%	130%
2-Hexanone	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	79%	60%	130%		60%	130%		60%	130%
Dibromochloromethane	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	93%	60%	130%	107%	60%	130%	110%	60%	130%
Ethylene Dibromide	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	99%	60%	130%	105%	60%	130%	107%	60%	130%
Tetrachloroethylene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	89%	60%	130%	99%	60%	130%
1,1,1,2-Tetrachloroethane	1	2523693	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	102%	60%	130%	108%	60%	130%
Chlorobenzene	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	81%	60%	130%	86%	60%	130%	95%	60%	130%
Ethylbenzene	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	71%	60%	130%	74%	60%	130%	87%	60%	130%
m & p-Xylene	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	93%	60%	130%	92%	60%	130%	104%	60%	130%
Bromoform	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	107%	60%	130%	110%	60%	130%	103%	60%	130%
Styrene	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	81%	60%	130%	78%	60%	130%	84%	60%	130%
1,1,2,2-Tetrachloroethane	1	2523693	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	97%	60%	130%	111%	60%	130%
o-Xylene	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	82%	60%	130%	86%	60%	130%	96%	60%	130%
1,3-Dichlorobenzene	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	77%	60%	130%	73%	60%	130%	74%	60%	130%
1,4-Dichlorobenzene	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	78%	60%	130%	79%	60%	130%	82%	60%	130%
1,2-Dichlorobenzene	1	2523693	< 0.10	< 0.10	0.0%	< 0.10	77%	60%	130%	77%	60%	130%	72%	60%	130%
1,2,4-Trichlorobenzene	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	76%	60%	130%	78%	60%	130%	73%	60%	130%
1,3-Dichloropropene (Cis + Trans)	1	2523693	< 0.30	< 0.30	0.0%	< 0.30	77%	60%	130%	81%	60%	130%	83%	60%	130%
Xylene Mixture (Total)	1	2523693	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	86%	60%	130%	96%	60%	130%
n-Hexane	1	2523693	< 0.20	< 0.20	0.0%	< 0.20		60%	130%	71%	60%	130%	93%	60%	130%

Certified By: Jacky Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507657

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - GW Parameters															
Alkalinity (as CaCO3)	1		184000	184000	0.0%	< 5000	102%	80%	120%						
Ammonia as N	1	2523649	307	328	6.6%	< 20	101%	90%	110%	97%	90%	110%	94%	80%	120%
BOD (5)	1	2523750	< 5000	< 5000	0.0%	< 5000	96%	75%	125%						
Calcium	1	2523706	173000	161000	7.2%	< 50	102%	90%	110%	103%	90%	110%	119%	70%	130%
Chemical Oxygen Demand	1	2523649	5670	6310	10.7%	< 5000	107%	90%	110%	106%	90%	110%	116%	70%	130%
Chloride	1	2523786	61100	60400	1.2%	< 100	97%	90%	110%	97%	90%	110%	103%	80%	120%
Electrical Conductivity	1		356	356	0.0%	< 2	102%	80%	120%						
Dissolved Organic Carbon	1		17.6	18.4	4.4%	< 500	100%	90%	110%	111%	80%	120%	95%	80%	120%
Nitrate as N	1	2523786	< 50	< 50	0.0%	< 50	90%	90%	110%	96%	90%	110%	103%	80%	120%
Nitrite as N	1	2523786	< 50	< 50	0.0%	< 50	NA	90%	110%	93%	90%	110%	114%	80%	120%
pH	1		8.19	8.19	0.0%		100%	80%	120%						
Phenols	1	2523649	< 1	< 1	0.0%	< 1	102%	90%	110%	94%	90%	110%	97%	80%	120%
Potassium	1	2523706	2530	2470	2.4%	< 50	102%	90%	110%	102%	90%	110%	103%	70%	130%
Sulphate	1	2523786	324000	320000	1.2%	< 100	94%	90%	110%	95%	90%	110%	96%	80%	120%
Total Dissolved Solids	1	2523786	1100000	1160000	5.3%	< 20000	98%	80%	120%						
Total Kjeldahl Nitrogen	1	2523706	180	200	10.5%	< 100	92%	80%	120%	90%	80%	120%	88%	70%	130%
Total Phosphorus	1	2523649	1910	1860	2.7%	< 20	107%	90%	110%	106%	90%	110%	92%	80%	120%
Total Suspended Solids	1	2523730	250000	264000	5.4%	< 10000	92%	80%	120%						
Arsenic	1	2523649	< 3.0	< 3.0	0.0%	< 3.0	106%	90%	110%	109%	90%	110%	106%	70%	130%
Barium	1	2523649	8.35	8.52	2.0%	< 2.0	99%	90%	110%	99%	90%	110%	112%	70%	130%
Beryllium	1	2523649	< 1.0	< 1.0	0.0%	< 1.0	97%	90%	110%	101%	90%	110%	96%	70%	130%
Boron	1	2523649	443	441	0.5%	< 10.0	102%	90%	110%	108%	90%	110%	106%	70%	130%
Cadmium	1	2523649	< 0.10	< 0.10	0.0%	< 0.10	101%	90%	110%	105%	90%	110%	108%	70%	130%
Chromium	1	2523649	< 3.0	< 3.0	0.0%	< 3.0	104%	90%	110%	109%	90%	110%	107%	70%	130%
Cobalt	1	2523649	0.63	0.70	10.5%	< 0.50	96%	90%	110%	109%	90%	110%	110%	70%	130%
Copper	1	2523649	1.60	1.56	2.5%	< 0.80	107%	90%	110%	107%	90%	110%	108%	70%	130%
Iron	1	2523649	4820	4920	2.1%	< 10.0	105%	90%	110%	108%	90%	110%	111%	70%	130%
Lead	1	2523649	< 1.0	< 1.0	0.0%	< 1.0	98%	90%	110%	99%	90%	110%	109%	70%	130%
Magnesium	1	2523706	50500	48500	4.0%	< 50	104%	90%	110%	104%	90%	110%	108%	70%	130%
Manganese	1	2523649	114	113	0.9%	< 2.0	96%	90%	110%	112%	80%	120%	115%	70%	130%
Mercury	1	2523649	< 0.05	< 0.05	0.0%	< 0.05	102%	90%	110%	94%	90%	110%	95%	80%	120%
Molybdenum	1	2523649	2.90	2.82	2.8%	< 2.0	100%	90%	110%	108%	90%	110%	108%	70%	130%
Nickel	1	2523649	< 3.0	< 3.0	0.0%	< 3.0	97%	90%	110%	108%	90%	110%	108%	70%	130%
Silver	1	2523649	< 0.10	< 0.10	0.0%	< 0.10	97%	90%	110%	107%	90%	110%	116%	70%	130%
Sodium	1	2523706	45400	39900	12.9%	< 50	106%	90%	110%	107%	90%	110%	107%	70%	130%
Thallium	1	2523649	< 0.3	< 0.3	0.0%	< 0.3	91%	90%	110%	94%	90%	110%	101%	70%	130%
Vanadium	1	2523649	< 2.0	< 2.0	0.0%	< 2.0	98%	90%	110%	106%	90%	110%	107%	70%	130%
Zinc	1	2523649	24.9	24.5	1.6%	< 5.0	101%	90%	110%	111%	80%	120%	109%	70%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507657

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis (Continued)

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507657

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b/j)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Napthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507657

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507657

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	TITRATION
Ammonia as N		QuikChem 10-107-06-1-J & SM 4500 NH3-H	LACHAT FIA
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

4 Large coolers 5.8

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CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 4.2 AGAT WO #: 11T507657
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Collborne St.
Brantford, ON
Phone: 519-756-9422 Fax: 5
Project: 111-53338-00 PO: 111-53338-00
AGAT Quotation #: 111-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: MattHenriwelsh@genivar.com
2. Name: Bailey Walters
Email: Bailey.Walters@genivar.com

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☑ Other (indicate) OWS.
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (except Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	GW Inorganics	GW Metals	GW PAHs	GW VOCs			LABORATORY USE ONLY LAB SAMPLE ID
MW6A-07	July 5/11		GW	11	Filter Hg from Various Inorganics											✓	✓	✓				
MW6B-07																✓	✓	✓				
MW1-03																✓	✓	✓				
MW2-03																✓	✓	✓				
MW3-03																✓	✓	✓				
MW4A-09																✓	✓	✓				
MW5A-09																✓	✓	✓				
OW8A-06																✓	✓	✓				
OW8B-06																✓	✓	✓				
OW8S-07				12												✓	✓	✓				
OW80-07																✓	✓	✓				
MWF02				11	Filter Hg From Various Inorganics											✓	✓	✓				

Samples Relinquished By (print name & sign): Matt Welsh — Date/Time: June 6/11
Samples Relinquished By (print name & sign): — Date/Time:
Samples Received By (print name & sign): Joe — Date/Time: 7/6/11 11:40
Samples Received By (print name & sign): — Date/Time: 3:15 7/6/11

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of 1
NO: 155049

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO:

AGAT WORK ORDER: 11T508150

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 18, 2011

PAGES (INCLUDING COVER): 19

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

VERSION 2:Report revised on December 1st, 2011 to include the Groundwater General Chemistry parameters for sample MW2D-07 (2527286).

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T508150

PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW1A-06 2527206	OW1B-06 2527210	MW2A-01 2527222	MW2B-07 2527261	MW2C-01 2527272	MW2D-07 2527286	MW2S-07 2527311	OW3B-07 2527323
Naphthalene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L		0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
2-and 1-methyl Napthalene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Chrysene-d12	%	60-130		106	112	112	74	110	99	114	119

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T508150
PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW3A-07 2527335	MW1A-07 2527347	MW1B-07 2527351	MW1D-07 2527365	MW1S-07 2527382	MWFD4 2527394
Naphthalene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L		0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
2-and 1-methyl Napthalene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits							
Chrysene-d12	%	60-130		104	108	109	112	110	116

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T508150
PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW1A-06 2527206	OW1B-06 2527210	MW2A-01 2527222	MW2B-07 2527261	MW2C-01 2527272	MW2D-07 2527286	MW2S-07 2527311	OW3B-07 2527323
Dichlorodifluoromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	2	0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane (FREON 11)	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethylene	µg/L	14	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dichloromethane (Methylene Chloride)	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl t-butyl ether (MTBE)	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl-ethyl ketone, MEK (2-Butanone)	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	(24)	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dibromoethane (EDB)	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethylene	µg/L	30	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T508150

PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW1A-06 2527206	OW1B-06 2527210	MW2A-01 2527222	MW2B-07 2527261	MW2C-01 2527272	MW2D-07 2527286	MW2S-07 2527311	OW3B-07 2527323
Chlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	200	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylene Mixture (Total)	µg/L	(300)	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
n-Hexane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Toluene-d8	% Recovery	60-130		91	86	87	88	86	90	89	84
4-Bromofluorobenzene	% Recovery	70-130		77	76	78	76	78	81	78	77

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Volatile Organic Compounds in Water

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW3A-07 2527335	MW1A-07 2527347	MW1B-07 2527351	MW1D-07 2527365	MW1S-07 2527382	MWFD4 2527394
Dichlorodifluoromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	2	0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane (FREON 11)	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethylene	µg/L	14	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dichloromethane (Methylene Chloride)	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl t-butyl ether (MTBE)	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl-ethyl ketone, MEK (2-Butanone)	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	(24)	0.20	<0.20	0.55	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dibromoethane (EDB)	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethylene	µg/L	30	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

Certified By: Jordy Takewaki

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PROJECT NO:

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ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW3A-07 2527335	MW1A-07 2527347	MW1B-07 2527351	MW1D-07 2527365	MW1S-07 2527382	MWFD4 2527394
Chlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	200	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylene Mixture (Total)	µg/L	(300)	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
n-Hexane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits							
Toluene-d8	% Recovery	60-130		86	86	87	83	84	88
4-Bromofluorobenzene	% Recovery	70-130		77	80	75	79	83	81

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T508150
PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW1A-06 2527206	OW1B-06 2527210	MW2A-01 2527222	MW2D-07 2527286	MW2S-07 2527311	RDL	OW3B-07 2527323
Alkalinity (as CaCO3)	µg/L		5000	411000	792000	388000	413000	405000	5000	431000
Ammonia as N	µg/L		20	368	<20	26	228	133	20	<20
BOD (5)	µg/L		5000	<5000	<5000	<5000	<5000	<5000	5000	<5000
Calcium	µg/L		50	462000	68100	472000	486000	480000	50	215000
Chemical Oxygen Demand	µg/L		5000	<5000	10000	5000	<5000	7000	5000	23000
Chloride	µg/L	(250000)	200	11700	18100	14500	13200	12200	100	14100
Electrical Conductivity	uS/cm		2	3850	2050	4040	3800	3830	2	1080
Dissolved Organic Carbon	µg/L	(5000)	500	4700	4300	2400	9400	4800	500	11500
Total Hardness (as CaCO3)	µg/L		500	2710000	1200000	2860000	2680000	2680000	500	623000
Nitrate as N	µg/L	10000	100	<100	<100	<100	<100	<100	50	265
Nitrite as N	µg/L	1000	100	<100	<100	<100	<100	<100	50	<50
pH	pH Units	(6.5-8.5)	NA	7.84	8.23	7.84	7.84	7.84	NA	8.07
Phenols	µg/L		1	<1	<1	<1	<1	<1	1	<1
Potassium	µg/L		50	4650	5350	6820	6230	5450	50	2120
Sulphate	µg/L	(500000)	200	2520000	605000	2700000	2560000	2520000	100	200000
Total Dissolved Solids	µg/L	(500000)	20000	2390000	1680000	4500000	2390000	4130000	20000	842000
Total Kjeldahl Nitrogen	µg/L		100	570	180	220	440	290	100	440
Total Phosphorus	µg/L		20	213	88	<20	71	26	20	306
Total Suspended Solids	µg/L		10000	1460000	140000	64500	312000	133000	10000	460000
Arsenic	µg/L	25	3.0	6.8	<3.0	<3.0	<3.0	<3.0	3.0	<3.0
Barium	µg/L	1000	2.0	6.9	16.3	5.4	7.6	5.4	2.0	139
Beryllium	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0
Boron	µg/L	5000	10.0	480	82.8	387	640	433	10.0	32.4
Cadmium	µg/L	5	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10
Chromium	µg/L	50	3.0	4.1	<3.0	<3.0	<3.0	<3.0	3.0	<3.0
Cobalt	µg/L		0.50	0.98	0.54	2.85	3.14	2.44	0.50	0.89
Copper	µg/L		0.80	2.49	2.44	2.61	2.30	2.50	0.80	5.41
Iron	µg/L		10.0	2750	23.1	<10.0	675	579	10.0	<10.0
Lead	µg/L	10	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0
Magnesium	µg/L		50	379000	250000	408000	356000	360000	50	21000
Manganese	µg/L		2.0	118	17.9	146	203	174	2.0	165
Mercury	µg/L	1	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05
Molybdenum	µg/L		2.0	5.5	6.4	6.4	5.7	5.7	2.0	2.8

Certified By:

AGAT Laboratories

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AGAT WORK ORDER: 11T508150
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ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW1A-06 2527206	OW1B-06 2527210	MW2A-01 2527222	MW2D-07 2527286	MW2S-07 2527311	RDL	OW3B-07 2527323
Nickel	µg/L		3.0	<3.0	<3.0	12.0	5.8	5.7	3.0	6.0
Silver	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10
Sodium	µg/L		50	136000	88200	133000	112000	113000	50	18500
Thallium	µg/L		0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3
Vanadium	µg/L		2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0
Zinc	µg/L		5.0	18.3	42.5	21.5	79.3	18.7	5.0	128

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T508150
PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW3A-07 2527335	MW1B-07 2527351	MW1D-07 2527365	MW1S-07 2527382	MWFD4 2527394
Alkalinity (as CaCO3)	µg/L		5000	396000	655000	124000	419000	396000
Ammonia as N	µg/L		20	<20	<20	3600	285	<20
BOD (5)	µg/L		5000	<5000	<5000	44000	<5000	<5000
Calcium	µg/L		50	340000	141000	508000	495000	450000
Chemical Oxygen Demand	µg/L		5000	<5000	21000	67000	7000	7000
Chloride	µg/L	(250000)	200	4850	12800	15900	8640	13900
Electrical Conductivity	uS/cm		2	2320	1460	2920	3750	4050
Dissolved Organic Carbon	µg/L	(5000)	500	7300	1500	7700	2300	2800
Total Hardness (as CaCO3)	µg/L		500	1350000	805000	2010000	2670000	2740000
Nitrate as N	µg/L	10000	100	<100	<100	<100	<100	<100
Nitrite as N	µg/L	1000	100	<100	<100	<100	<100	<100
pH	pH Units	(6.5-8.5)	NA	7.95	8.07	8.28	7.84	7.88
Phenols	µg/L		1	<1	<1	91	<1	<1
Potassium	µg/L		50	3580	2720	30300	4830	7100
Sulphate	µg/L	(500000)	200	1190000	264000	1900000	2450000	2690000
Total Dissolved Solids	µg/L	(500000)	20000	1190000	536000	1610000	4240000	4220000
Total Kjeldahl Nitrogen	µg/L		100	240	280	3750	410	150
Total Phosphorus	µg/L		20	485	207	184	40	48
Total Suspended Solids	µg/L		10000	764000	1450000	3300000	45000	72000
Arsenic	µg/L	25	3.0	<3.0	<3.0	<3.0	8.4	<3.0
Barium	µg/L	1000	2.0	63.7	56.9	13.2	4.6	5.5
Beryllium	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	5000	10.0	381	55.4	10600	478	411
Cadmium	µg/L	5	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	µg/L	50	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Cobalt	µg/L		0.50	2.86	2.29	0.78	0.74	3.00
Copper	µg/L		0.80	2.32	1.45	<0.80	2.07	2.93
Iron	µg/L		10.0	15.7	687	41.6	2260	<10.0
Lead	µg/L	10	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Magnesium	µg/L		50	122000	110000	179000	349000	393000
Manganese	µg/L		2.0	879	531	47.9	49.6	151
Mercury	µg/L	1	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum	µg/L		2.0	4.6	2.2	<2.0	4.9	6.6

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Certificate of Analysis

AGAT WORK ORDER: 11T508150
PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 06, 2011 | DATE RECEIVED: Jul 07, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW3A-07 2527335	MW1B-07 2527351	MW1D-07 2527365	MW1S-07 2527382	MWFD4 2527394
Nickel	µg/L		3.0	4.7	3.3	<3.0	<3.0	13.2
Silver	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	µg/L		50	66200	57000	39500	111000	117000
Thallium	µg/L		0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Vanadium	µg/L		2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/L		5.0	55.8	26.2	19.8	6.4	38.4

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

2527206-2527394 Revised Dec.01/2011
Revision: This report replaces the Certificate of Analysis issued on Jul.13, 2011. Values for Sample 2527286 are included in this report.

Certified By:

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Guideline Violation

AGAT WORK ORDER: 11T508150

PROJECT NO:

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2527365	MW1D-07	O.Reg.169/03	Brooks Landfill - GW Parameters	Boron	5000	10600

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Quality Assurance

CLIENT NAME: GENIVAR INC
AGAT WORK ORDER: 11T508150
PROJECT NO:
ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date: Jul 18, 2011

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
PAHs in Water															
Naphthalene	1					< 0.12	99%	60%	140%	89%	60%	140%		60%	140%
Acenaphthylene	1					< 0.11	105%	60%	140%	94%	60%	140%		60%	140%
Acenaphthene	1					< 0.10	105%	60%	140%	93%	60%	140%		60%	140%
Fluorene	1					< 0.09	106%	60%	140%	98%	60%	140%		60%	140%
Phenanthrene	1					< 0.10	106%	60%	140%	108%	60%	140%		60%	140%
Anthracene	1					< 0.05	107%	60%	140%	110%	60%	140%		60%	140%
Fluoranthene	1					< 0.12	107%	60%	140%	119%	60%	140%		60%	140%
Pyrene	1					< 0.05	107%	60%	140%	117%	60%	140%		60%	140%
Benzo(a)anthracene	1					< 0.08	92%	60%	140%	80%	60%	140%		60%	140%
Chrysene	1					< 0.05	111%	60%	140%	103%	60%	140%		60%	140%
Benzo(b)fluoranthene	1					< 0.05	98%	60%	140%	94%	60%	140%		60%	140%
Benzo(k)fluoranthene	1					< 0.05	107%	60%	140%	114%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	95%	60%	140%	90%	60%	140%		60%	140%
Indeno(1,2,3-cd)pyrene	1					< 0.06	93%	60%	140%	79%	60%	140%		60%	140%
Dibenzo(a,h)anthracene	1					< 0.09	90%	60%	140%	90%	60%	140%		60%	140%
Benzo(g,h,i)perylene	1					< 0.06	100%	60%	140%	90%	60%	140%		60%	140%
2-and 1-methyl Napthalene	1					< 0.20	103%	60%	140%	87%	80%	120%		60%	140%
Volatile Organic Compounds in Water															
Dichlorodifluoromethane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	97%	60%	130%	119%	60%	130%	120%	60%	130%
Chloromethane	1	2527210	< 0.40	< 0.40	0.0%	< 0.40	96%	60%	130%	107%	60%	130%	121%	60%	130%
Vinyl Chloride	1	2527210	< 0.17	< 0.17	0.0%	< 0.17	95%	60%	130%	102%	60%	130%	119%	60%	130%
Bromomethane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	90%	60%	130%	109%	60%	130%	116%	60%	130%
Chloroethane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	98%	60%	130%	104%	60%	130%	118%	60%	130%
Trichlorofluoromethane (FREON 11)	1	2527210	< 0.40	< 0.40	0.0%	< 0.40	98%	60%	130%	102%	60%	130%	110%	60%	130%
Acetone	1	2527210	< 1.0	< 1.0	0.0%	< 1.0	106%	60%	130%	113%	60%	130%	91%	60%	130%
1,1 Dichloroethylene	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	71%	60%	130%	76%	60%	130%	78%	60%	130%
Dichloromethane (Methylene Chloride)	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	107%	60%	130%	114%	60%	130%	112%	60%	130%
trans- 1,2-dichloroethylene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	76%	60%	130%	78%	60%	130%	74%	60%	130%
Methyl t-butyl ether (MTBE)	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	80%	60%	130%	93%	60%	130%	73%	60%	130%
1,1-Dichloroethane	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	97%	60%	130%	95%	60%	130%	88%	60%	130%
Methyl-ethyl ketone, MEK (2-Butanone)	1	2527210	< 1.0	< 1.0	0.0%	< 1.0	79%	60%	130%	105%	60%	130%	98%	60%	130%
cis- 1,2-Dichloroethylene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	73%	60%	130%	91%	60%	130%	85%	60%	130%
Chloroform	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	94%	60%	130%	94%	60%	130%	88%	60%	130%
1,2 - Dichloroethane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	88%	60%	130%	76%	60%	130%
1,1,1-Trichloroethane	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	84%	60%	130%	86%	60%	130%	79%	60%	130%
Carbon Tetrachloride	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	87%	60%	130%	86%	60%	130%
Benzene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	93%	60%	130%	84%	60%	130%	85%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC
AGAT WORK ORDER: 11T508150
PROJECT NO:
ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis (Continued)

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,2-Dichloropropane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	81%	60%	130%	86%	60%	130%	75%	60%	130%
Trichloroethylene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	85%	60%	130%	83%	60%	130%
Bromodichloromethane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	78%	60%	130%	86%	60%	130%	77%	60%	130%
cis-1,3-Dichloropropene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	110%	60%	130%	90%	60%	130%	86%	60%	130%
Methyl Isobutyl Ketone	1	2527210	< 1.0	< 1.0	0.0%	< 1.0	96%	60%	130%	80%	60%	130%	80%	60%	130%
trans-1,3-Dichloropropene	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	71%	60%	130%	72%	60%	130%	71%	60%	130%
1,1,2-Trichloroethane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	88%	60%	130%	91%	60%	130%	93%	60%	130%
Toluene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	89%	60%	130%	95%	60%	130%	110%	60%	130%
2-Hexanone	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	98%	60%	130%	84%	60%	130%	80%	60%	130%
Dibromochloromethane	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	73%	60%	130%	80%	60%	130%	80%	60%	130%
1,2-Dibromoethane (EDB)	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	71%	60%	130%	83%	60%	130%	84%	60%	130%
Tetrachloroethylene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	92%	60%	130%	108%	60%	130%
1,1,1,2-Tetrachloroethane	1	2527210	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	83%	60%	130%	89%	60%	130%
Chlorobenzene	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	78%	60%	130%	92%	60%	130%	103%	60%	130%
Ethylbenzene	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	74%	60%	130%	84%	60%	130%	98%	60%	130%
m & p-Xylene	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	88%	60%	130%	94%	60%	130%	106%	60%	130%
Bromoform	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	73%	60%	130%	84%	60%	130%	87%	60%	130%
Styrene	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	85%	60%	130%	91%	60%	130%	100%	60%	130%
1,1,2,2-Tetrachloroethane	1	2527210	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	98%	60%	130%	98%	60%	130%
o-Xylene	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	84%	60%	130%	93%	60%	130%	103%	60%	130%
1,3-Dichlorobenzene	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	81%	60%	130%	87%	60%	130%	90%	60%	130%
1,4-Dichlorobenzene	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	79%	60%	130%	90%	60%	130%	91%	60%	130%
1,2-Dichlorobenzene	1	2527210	< 0.10	< 0.10	0.0%	< 0.10	77%	60%	130%	84%	60%	130%	90%	60%	130%
1,2,4-Trichlorobenzene	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	112%	60%	130%	114%	60%	130%	110%	60%	130%
1,3-Dichloropropene (Cis + Trans)	1	2527210	< 0.30	< 0.30	0.0%	< 0.30	71%	60%	130%	72%	60%	130%	71%	60%	130%
Xylene Mixture (Total)	1	2527210	< 0.20	< 0.20	0.0%	< 0.20	84%	60%	130%	93%	60%	130%	103%	60%	130%
n-Hexane	1	2527210	< 0.20	< 0.20	0.0%	< 0.20		60%	130%	97%	60%	130%	119%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508150

PROJECT NO:

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 18, 2011

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - GW Parameters															
Alkalinity (as CaCO3)	1	2527210	792000	792000	0.0%	< 5000	100%	80%	120%						
Ammonia as N	1		21	21	0.0%	< 20	101%	90%	110%	97%	90%	110%	95%	80%	120%
BOD (5)	1	2527206	< 5000	< 5000	0.0%	< 5000	96%	75%	125%						
Calcium	1	2527351	141000	144000	2.1%	< 50	102%	90%	110%	103%	90%	110%	95%	70%	130%
Chloride	1	2527323	14100	13900	1.4%	< 100	96%	90%	110%	96%	90%	110%	98%	80%	120%
Electrical Conductivity	1	2527210	2050	2050	0.0%	< 2	100%	80%	120%						
Dissolved Organic Carbon	1	2527206	< 500	< 500	0.0%	< 500	98%	90%	110%	109%	90%	110%	91%	80%	120%
Nitrate as N	1	2527323	265	261	1.5%	< 50	91%	90%	110%	98%	90%	110%	97%	80%	120%
Nitrite as N	1	2527323	< 50	< 50	0.0%	< 50	NA	90%	110%	90%	90%	110%	93%	80%	120%
pH	1	2527210	8.23	8.23	0.0%		100%	80%	120%						
Phenols	1	2527206	< 1	< 1	0.0%	< 1	104%	90%	110%	102%	90%	110%	99%	80%	120%
Potassium	1	2527351	2720	2810	3.3%	< 50	102%	90%	110%	102%	90%	110%	98%	70%	130%
Sulphate	1	2527323	200000	200000	0.0%	< 100	96%	90%	110%	98%	90%	110%	89%	80%	120%
Total Dissolved Solids	1	2527382	4240000	4110000	3.1%	< 20000	96%	80%	120%						
Total Kjeldahl Nitrogen	1	2527365	3750	3660	2.4%	< 100	100%	80%	120%	95%	80%	120%	96%	70%	130%
Total Phosphorus	1		< 20	< 20	0.0%	< 20	102%	90%	110%	96%	90%	110%	94%	80%	120%
Total Suspended Solids	1	2527382	45000	44000	2.2%	< 10000	98%	80%	120%						
Arsenic	1	2527206	6.8	7.0	2.9%	< 3.0	101%	90%	110%	106%	90%	110%	115%	70%	130%
Barium	1	2527206	6.92	6.95	0.4%	< 2.0	99%	90%	110%	111%	80%	120%	103%	70%	130%
Beryllium	1	2527206	< 1.0	< 1.0	0.0%	< 1.0	102%	90%	110%	107%	90%	110%	102%	70%	130%
Boron	1	2527206	480	495	3.1%	< 10.0	102%	90%	110%	103%	90%	110%	102%	70%	130%
Cadmium	1	2527206	< 0.10	< 0.10	0.0%	< 0.10	94%	90%	110%	102%	90%	110%	107%	70%	130%
Chromium	1	2527206	4.1	4.1	0.0%	< 3.0	101%	90%	110%	113%	80%	120%	106%	70%	130%
Cobalt	1	2527206	0.98	0.98	0.0%	< 0.50	95%	90%	110%	106%	90%	110%	108%	70%	130%
Copper	1	2527206	2.49	2.56	2.8%	< 0.80	107%	90%	110%	109%	80%	120%	106%	70%	130%
Iron	1	2527206	2750	2770	0.7%	< 10.0	112%	80%	120%	112%	80%	120%	109%	70%	130%
Lead	1	2527206	< 1.0	< 1.0	0.0%	< 1.0	99%	90%	110%	106%	80%	120%	107%	70%	130%
Magnesium	1	2527351	110000	112000	1.8%	< 50	104%	90%	110%	104%	90%	110%	98%	70%	130%
Manganese	1	2527206	118	121	2.5%	< 2.0	98%	90%	110%	108%	90%	110%	109%	70%	130%
Mercury	1	2527206	< 0.05	< 0.05	0.0%	< 0.05	94%	90%	110%	99%	90%	110%	99%	80%	120%
Molybdenum	1	2527206	5.5	5.5	0.0%	< 2.0	100%	90%	110%	110%	90%	110%	105%	70%	130%
Nickel	1	2527206	< 3.0	< 3.0	0.0%	< 3.0	96%	90%	110%	102%	90%	110%	102%	70%	130%
Silver	1	2527206	< 0.10	< 0.10	0.0%	< 0.10	92%	90%	110%	108%	90%	110%	115%	70%	130%
Sodium	1	2527351	57000	58100	1.9%	< 50	106%	90%	110%	107%	90%	110%	99%	70%	130%
Thallium	1	2527206	< 0.3	< 0.3	0.0%	< 0.3	93%	90%	110%	95%	90%	110%	94%	70%	130%
Vanadium	1	2527206	< 2.0	< 2.0	0.0%	< 2.0	92%	90%	110%	100%	90%	110%	102%	70%	130%
Zinc	1	2527206	18.3	18.3	0.0%	< 5.0	102%	90%	110%	111%	80%	120%	102%	70%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508150

PROJECT NO:

ATTENTION TO: MATTHEW WELSH

Water Analysis (Continued)

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508150

PROJECT NO:

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Napthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane (FREON 11)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichloromethane (Methylene Chloride)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl t-butyl ether (MTBE)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl-ethyl ketone, MEK (2-Butanone)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dibromoethane (EDB)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508150

PROJECT NO:

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508150

PROJECT NO:

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

4 large coolers 6-7 1 med cooler

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CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 5.0 8. AGAT WO #: 11T508150
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St
Brantford, ON
Phone: 519-756-9422 Fax:
Project: 11-53338-00 PO: 111-53338-00
AGAT Quotation #: 111-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☑ Other (indicate) ONWS
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	GW Inorganic	GW Metals	GW PAHs	GW VOCs	LABORATORY USE ONLY LAB SAMPLE ID
OW1A-06	July 6/11		GW	~~12~~ 11												✓	✓	✓	✓	
OW1B-06				~~12~~ 12												✓	✓	✓	✓	
MW2A-01				12												✓	✓	✓	✓	
MW2B-07				4														✓	✓	
MW2C-01				4														✓	✓	
MW2D-07				12												✓	✓	✓	✓	
MW2S-07				12												✓	✓	✓	✓	
OW3B-07				12												✓	✓	✓	✓	
OW3A-07				12												✓	✓	✓	✓	
MW1A-07				4														✓	✓	
MW1B-07				12												✓	✓	✓	✓	
MW1D-07				12												✓	✓	✓	✓	
MW1S-07				12												✓	✓	✓	✓	
MWFD4				12												✓	✓	✓	✓	

Samples Relinquished By (print name & sign): Matt Welsh — Date/Time: June 7/11
Samples Relinquished By (print name & sign): — Date/Time:
Samples Received By (print name & sign): Joe 7/7/11 — Date/Time: 10:40 A.
Samples Received By (print name & sign): Joe 7/7/11 — Date/Time: 2:45 P

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE ____ of ____
NO: 155050

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T508736

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 18, 2011

PAGES (INCLUDING COVER): 13

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T508736
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Jul 07, 2011 | DATE RECEIVED: Jul 08, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW9A-06 2529980	OW9B-06 2529994	OW5A-06 2530008	OW5B-06 2530021	MWFD3 2530033
Naphthalene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L		0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06
2-and 1-methyl Napthalene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits						
Chrysene-d12	%	60-130		86	91	103	95	84

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T508736
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 07, 2011 | DATE RECEIVED: Jul 08, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW9A-06 2529980	OW9B-06 2529994	OW5A-06 2530008	OW5B-06 2530021	MWFD3 2530033	Trip Blank 2530045
Dichlorodifluoromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	2	0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethylene	µg/L	14	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	(24)	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethylene	µg/L	30	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T508736
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Volatile Organic Compounds in Water

DATE SAMPLED: Jul 07, 2011 | DATE RECEIVED: Jul 08, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW9A-06 2529980	OW9B-06 2529994	OW5A-06 2530008	OW5B-06 2530021	MWFD3 2530033	Trip Blank 2530045
Ethylbenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	200	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylene Mixture (Total)	µg/L	(300)	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
n-Hexane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits							
Toluene-d8	% Recovery	60-130		101	94	102	93	94	103
4-Bromofluorobenzene	% Recovery	70-130		88	82	87	84	85	90

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

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AGAT WORK ORDER: 11T508736
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 07, 2011 | DATE RECEIVED: Jul 08, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW9A-06 2529980	OW9B-06 2529994	OW5A-06 2530008	OW5B-06 2530021	MWFD3 2530033
Alkalinity (as CaCO3)	µg/L		5000	401000	617000	407000	551000	399000
Ammonia as N	µg/L		20	137	<20	404	<20	383
BOD (5)	µg/L		5000	<5000	<5000	<5000	<5000	<5000
Calcium	µg/L		50	517000	67900	561000	64400	556000
Chemical Oxygen Demand	µg/L		5000	<5000	6300	5980	15400	9130
Chloride	µg/L	(250000)	100	11700	28700	7720	11600	7500
Electrical Conductivity	uS/cm		2	3700	1560	3240	1160	3230
Dissolved Organic Carbon	µg/L	(5000)	500	2100	3800	5300	7200	4400
Total Hardness (as CaCO3)	µg/L		500	2810000	812000	2410000	618000	2380000
Nitrate as N	µg/L	10000	50	<50	<50	<50	152	<50
Nitrite as N	µg/L	1000	50	<50	<50	<50	<50	<50
pH	pH Units	(6.5-8.5)	NA	7.80	8.11	7.68	8.26	7.76
Phenols	µg/L		1	2	<1	<1	<1	<1
Potassium	µg/L		50	5730	5290	4230	2960	4200
Sulphate	µg/L	(500000)	100	2610000	361000	2240000	173000	2230000
Total Dissolved Solids	µg/L	(500000)	20000	4160000	1120000	3490000	770000	3590000
Total Kjeldahl Nitrogen	µg/L		100	270	170	580	150	610
Total Phosphorus	µg/L		20	116	136	333	290	173
Total Suspended Solids	µg/L		10000	230000	100000	1030000	408000	1230000
Arsenic	µg/L	25	3.0	<3.0	<3.0	14.6	<3.0	15.4
Barium	µg/L	1000	2.0	6.8	22.5	7.6	38.4	8.0
Beryllium	µg/L		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	5000	10.0	441	106	380	35.8	389
Cadmium	µg/L	5	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	µg/L	50	3.0	<3.0	<3.0	<3.0	6.6	<3.0
Cobalt	µg/L		0.50	3.56	<0.50	0.93	<0.50	0.89
Copper	µg/L		0.80	2.34	2.15	1.72	2.40	1.67
Iron	µg/L		10.0	534	<10.0	5000	<10.0	5110
Lead	µg/L	10	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Magnesium	µg/L		50	368000	156000	244000	111000	242000
Manganese	µg/L		2.0	189	<2.0	74.8	5.3	75.1
Mercury	µg/L	1	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum	µg/L		2.0	5.9	5.1	5.0	4.9	5.2

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AGAT WORK ORDER: 11T508736
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - GW Parameters

DATE SAMPLED: Jul 07, 2011 | DATE RECEIVED: Jul 08, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW9A-06 2529980	OW9B-06 2529994	OW5A-06 2530008	OW5B-06 2530021	MWFD3 2530033
Nickel	µg/L		3.0	4.2	<3.0	<3.0	<3.0	<3.0
Silver	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	µg/L		50	120000	103000	100000	61800	99600
Thallium	µg/L		0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Vanadium	µg/L		2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	µg/L		5.0	111	8.1	14.3	13.5	7.6

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508736

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date: Jul 18, 2011

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Volatile Organic Compounds in Water															
Dichlorodifluoromethane	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	109%	60%	130%	127%	60%	130%
Chloromethane	1		< 0.40	< 0.40	0.0%	< 0.40	70%	60%	130%	106%	60%	130%	78%	60%	130%
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	70%	60%	130%	101%	60%	130%	70%	60%	130%
Bromomethane	1		< 0.20	< 0.20	0.0%	< 0.20	107%	60%	130%	102%	60%	130%	105%	60%	130%
Chloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	101%	60%	130%	95%	60%	130%
Trichlorofluoromethane	1		< 0.40	< 0.40	0.0%	< 0.40	120%	60%	130%	101%	60%	130%	108%	60%	130%
Acetone	1		< 1.0	< 1.0	0.0%	< 1.0	70%	60%	130%	104%	60%	130%	89%	60%	130%
1,1 Dichloroethylene	1		< 0.30	< 0.30	0.0%	< 0.30	106%	60%	130%	91%	60%	130%	91%	60%	130%
Methylene Chloride	1		< 0.30	< 0.30	0.0%	< 0.30	83%	60%	130%	92%	60%	130%	120%	60%	130%
trans- 1,2-dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	121%	60%	130%	118%	60%	130%
Methyl tert-butyl ether	1		< 0.20	< 0.20	0.0%	< 0.20	103%	60%	130%	93%	60%	130%	112%	60%	130%
1,1-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	111%	60%	130%	98%	60%	130%	95%	60%	130%
Methyl Ethyl Ketone	1		< 1.0	< 1.0	0.0%	< 1.0	70%	60%	130%	89%	60%	130%	113%	60%	130%
cis- 1,2-Dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	97%	60%	130%	109%	60%	130%	91%	60%	130%
Chloroform	1		< 0.20	< 0.20	0.0%	< 0.20	120%	60%	130%	105%	60%	130%	109%	60%	130%
1,2 - Dichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	113%	60%	130%	113%	60%	130%	108%	60%	130%
1,1,1-Trichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	120%	60%	130%	108%	60%	130%	104%	60%	130%
Carbon Tetrachloride	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	100%	60%	130%	97%	60%	130%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	101%	60%	130%	90%	60%	130%
1,2-Dichloropropane	1		< 0.20	< 0.20	0.0%	< 0.20	98%	60%	130%	77%	60%	130%	94%	60%	130%
Trichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	91%	60%	130%	99%	60%	130%	76%	60%	130%
Bromodichloromethane	1		< 0.20	< 0.20	0.0%	< 0.20	104%	60%	130%	114%	60%	130%	100%	60%	130%
cis-1,3-Dichloropropene	1		< 0.20	< 0.20	0.0%	< 0.20	116%	60%	130%	86%	60%	130%	92%	60%	130%
Methyl Isobutyl Ketone	1		< 1.0	< 1.0	0.0%	< 1.0	70%	60%	130%	116%	60%	130%	105%	60%	130%
trans-1,3-Dichloropropene	1		< 0.30	< 0.30	0.0%	< 0.30	80%	60%	130%	98%	60%	130%	89%	60%	130%
1,1,2-Trichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	98%	60%	130%	98%	60%	130%	81%	60%	130%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	92%	60%	130%	114%	60%	130%	98%	60%	130%
2-Hexanone	1		< 0.30	< 0.30	0.0%	< 0.30	70%	60%	130%	108%	60%	130%	119%	60%	130%
Dibromochloromethane	1		< 0.10	< 0.10	0.0%	< 0.10	84%	60%	130%	114%	60%	130%	99%	60%	130%
Ethylene Dibromide	1		< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	99%	60%	130%	103%	60%	130%
Tetrachloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	90%	60%	130%	107%	60%	130%	97%	60%	130%
1,1,1,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10		60%	130%	115%	60%	130%	103%	60%	130%
Chlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	99%	60%	130%	111%	60%	130%	93%	60%	130%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	93%	60%	130%	104%	60%	130%	96%	60%	130%
m & p-Xylene	1		< 0.20	< 0.20	0.0%	< 0.20	94%	60%	130%	106%	60%	130%	94%	60%	130%
Bromoform	1		< 0.10	< 0.10	0.0%	< 0.10	81%	60%	130%	83%	60%	130%	80%	60%	130%
Styrene	1		< 0.10	< 0.10	0.0%	< 0.10	80%	60%	130%	104%	60%	130%	86%	60%	130%
1,1,2,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10		60%	130%	116%	60%	130%	106%	60%	130%
o-Xylene	1		< 0.10	< 0.10	0.0%	< 0.10	89%	60%	130%	106%	60%	130%	89%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508736

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis (Continued)

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,3-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	104%	60%	130%	106%	60%	130%	99%	60%	130%
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	104%	60%	130%	111%	60%	130%	105%	60%	130%
1,2-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	97%	60%	130%	96%	60%	130%	93%	60%	130%
1,2,4-Trichlorobenzene	1		< 0.30	< 0.30	0.0%	< 0.30	111%	60%	130%	96%	60%	130%	88%	60%	130%
1,3-Dichloropropene (Cis + Trans)	1		< 0.30	< 0.30	0.0%	< 0.30	80%	60%	130%	98%	60%	130%	89%	60%	130%
Xylene Mixture (Total)	1		< 0.20	< 0.20	0.0%	< 0.20	89%	60%	130%	106%	60%	130%	89%	60%	130%
n-Hexane	1		< 0.20	< 0.20	0.0%	< 0.20		60%	130%	96%	60%	130%	108%	60%	130%
PAHs in Water															
Naphthalene	1					< 0.12	102%	60%	140%	94%	60%	140%		60%	140%
Acenaphthylene	1					< 0.11	102%	60%	140%	95%	60%	140%		60%	140%
Acenaphthene	1					< 0.10	99%	60%	140%	92%	60%	140%		60%	140%
Fluorene	1					< 0.09	101%	60%	140%	93%	60%	140%		60%	140%
Phenanthrene	1					< 0.10	101%	60%	140%	95%	60%	140%		60%	140%
Anthracene	1					< 0.05	107%	60%	140%	95%	60%	140%		60%	140%
Fluoranthene	1					< 0.12	106%	60%	140%	94%	60%	140%		60%	140%
Pyrene	1					< 0.05	107%	60%	140%	92%	60%	140%		60%	140%
Benzo(a)anthracene	1					< 0.08	116%	60%	140%	86%	60%	140%		60%	140%
Chrysene	1					< 0.05	119%	60%	140%	90%	60%	140%		60%	140%
Benzo(b)fluoranthene	1					< 0.05	90%	60%	140%	92%	60%	140%		60%	140%
Benzo(k)fluoranthene	1					< 0.05	100%	60%	140%	99%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	102%	60%	140%	82%	60%	140%		60%	140%
Indeno(1,2,3-cd)pyrene	1					< 0.06	107%	60%	140%	86%	60%	140%		60%	140%
Dibenzo(a,h)anthracene	1					< 0.09	106%	60%	140%	88%	60%	140%		60%	140%
Benzo(g,h,i)perylene	1					< 0.06	100%	60%	140%	82%	60%	140%		60%	140%
2-and 1-methyl Napthalene	1					< 0.20	102%	60%	140%	86%	80%	120%		60%	140%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508736

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - GW Parameters															
Alkalinity (as CaCO3)	1		66	66	0.0%	< 5000	99%	80%	120%						
Ammonia as N	1		3.34	3.34	0.0%	< 20	100%	90%	110%	97%	90%	110%	90%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	95%	75%	125%						
Calcium	1		83800	84600	1.0%	< 50	104%	90%	110%	104%	90%	110%	102%	70%	130%
Chemical Oxygen Demand	1		< 5000	< 5000	0.0%	< 5000	96%	80%	120%	98%	90%	110%	110%	80%	120%
Chloride	1	2530021	11600	11600	0.0%	< 100	97%	90%	110%	97%	90%	110%	100%	80%	120%
Electrical Conductivity	1		324	324	0.0%	< 2	100%	80%	120%						
Dissolved Organic Carbon	1		60700	60300	0.7%	< 500	98%	90%	110%	113%	80%	120%	94%	80%	120%
Nitrate as N	1	2530021	152	158	3.9%	< 50	90%	90%	110%	97%	90%	110%	95%	80%	120%
Nitrite as N	1	2530021	< 50	< 50	0.0%	< 50	NA	90%	110%	90%	90%	110%	90%	80%	120%
pH	1		8.09	8.10	0.1%	NA	100%	80%	120%						
Phenols	1	2529994	< 1	< 1	0.0%	< 1	103%	90%	110%	101%	90%	110%	91%	80%	120%
Potassium	1		3760	3680	2.2%	< 50	103%	90%	110%	102%	90%	110%	104%	70%	130%
Sulphate	1	2530021	173000	173000	0.0%	< 100	95%	90%	110%	98%	90%	110%	97%	80%	120%
Total Dissolved Solids	1		290000	294000	1.4%	< 20000	94%	80%	120%						
Total Kjeldahl Nitrogen	1	2530008	580	640	9.8%	< 100	98%	80%	120%	100%	80%	120%	93%	70%	130%
Total Phosphorus	1		< 20	< 20	0.0%	< 20	104%	90%	110%	103%	90%	110%	102%	80%	120%
Total Suspended Solids	1		< 10000	< 10000	0.0%	< 10000	102%	80%	120%						
Arsenic	1		6.8	7.0	2.9%	< 3.0	100%	90%	110%	106%	90%	110%	115%	70%	130%
Barium	1		6.92	6.95	0.4%	< 2.0	97%	90%	110%	111%	80%	120%	103%	70%	130%
Beryllium	1		< 1.0	< 1.0	0.0%	< 1.0	95%	90%	110%	107%	90%	110%	102%	70%	130%
Boron	1		480	495	3.1%	< 10.0	101%	90%	110%	103%	90%	110%	102%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	93%	90%	110%	102%	90%	110%	107%	70%	130%
Chromium	1		4.1	4.1	0.0%	< 3.0	101%	90%	110%	103%	90%	110%	106%	70%	130%
Cobalt	1		0.98	0.98	0.0%	< 0.50	95%	90%	110%	106%	90%	110%	108%	70%	130%
Copper	1		2.49	2.56	2.8%	< 0.80	106%	90%	110%	109%	90%	110%	106%	70%	130%
Iron	1		2750	2770	0.7%	< 10.0	107%	90%	110%	102%	90%	110%	109%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	98%	90%	110%	106%	90%	110%	107%	70%	130%
Magnesium	1		68700	69400	1.0%	< 50	105%	90%	110%	105%	90%	110%	103%	70%	130%
Manganese	1		118	121	2.5%	< 2.0	100%	90%	110%	108%	90%	110%	109%	70%	130%
Mercury	1	2530008	< 0.05	< 0.05	0.0%	< 0.05	102%	90%	110%	109%	90%	110%	96%	80%	120%
Molybdenum	1		5.5	5.5	0.0%	< 2.0	100%	90%	110%	110%	90%	110%	105%	70%	130%
Nickel	1		< 3.0	< 3.0	0.0%	< 3.0	96%	90%	110%	102%	90%	110%	102%	70%	130%
Silver	1		< 0.10	< 0.10	0.0%	< 0.10	91%	90%	110%	108%	90%	110%	105%	70%	130%
Sodium	1		104000	103000	1.0%	< 50	107%	90%	110%	107%	90%	110%	100%	70%	130%
Thallium	1		< 0.3	< 0.3	0.0%	< 0.3	93%	90%	110%	95%	90%	110%	94%	70%	130%
Vanadium	1		< 2.0	< 2.0	0.0%	< 2.0	93%	90%	110%	100%	90%	110%	102%	70%	130%
Zinc	1		18.3	18.3	0.0%	< 5.0	100%	90%	110%	111%	80%	120%	102%	70%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508736

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis (Continued)

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508736

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Napthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508736

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508736

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

9.4.

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CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 6.7 AGAT WO #: 11T508766
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St. Brantford, On
Phone: 519-756-9422 Fax:
Project: 11-5333-00 PO:
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? (Yes)/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: Matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☑ Other (indicate) ODWQS
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	GW Inorganics	GW Metals	GW PAHs	GW VOCs			LABORATORY USE ONLY LAB SAMPLE ID
OW9A-06	July 7/11		GW	12												✓	✓	✓	✓			
OW9B-06				12												✓	✓	✓	✓			
OW5A-06				12												✓	✓	✓	✓			
OW5B-06				12												✓	✓	✓	✓			
MWFD3				12												✓	✓	✓	✓			
Trip Blank				3															✓			

Samples Relinquished By (print name & sign): Matt Welsh
Date/Time: July 8/11
Samples Received By (print name & sign): Jue 7/8/11
Date/Time: 2:30P
Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign): Jue 7/8/11
Date/Time: 6:03

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of 1
NO: 155046

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CLIENT NAME: GENIVAR
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: Rachel Bryan

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T550217

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Nov 25, 2011

PAGES (INCLUDING COVER): 8

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T550217
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Rachel Bryan

Brooks Landfill - GW Indicator Parameters

DATE SAMPLED: Nov 14, 2011 | DATE RECEIVED: Nov 16, 2011 | DATE REPORTED: Nov 25, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MWFD1 2917632	MWFD2 2917633	MWFD3 2917638	MW6A-07 2917644	MW6B-07 2917651	MW2-03 2917656	MW3-03 2917662	MW1-03 2917671
Alkalinity (as CaCO3)	µg/L		5000	367000	412000	388000	414000	477000	335000	392000	416000
Ammonia as N	µg/L		20	72	537	381	563	26	<20	<20	33
Calcium	µg/L		50	475000	507000	525000	490000	204000	169000	127000	171000
Chemical Oxygen Demand	µg/L		5000	<5000	<5000	<5000	<5000	<5000	5600	16200	<5000
Chloride	µg/L	(250000)	500	13900	10900	8060	10600	44900	107000	56900	66200
Electrical Conductivity	uS/cm		2	4290	3950	3510	3940	2930	1260	1210	1310
Dissolved Organic Carbon	µg/L	(5000)	500	1500	27600	2800	3100	4700	7300	33900	7600
Nitrate as N	µg/L	10000	250	<250	<250	<250	<250	<250	<250	<250	<250
pH	pH Units	(6.5-8.5)	NA	7.83	7.89	7.88	7.84	8.00	8.03	8.04	8.02
Sulphate	µg/L	(500000)	500	2880000	2560000	2190000	2570000	1500000	187000	192000	229000
Total Dissolved Solids	µg/L	(500000)	20000	4410000	4000000	3460000	3890000	2620000	828000	748000	852000
Barium	µg/L	1000	2.0	4.8	5.5	6.3	5.6	14.0	49.2	35.7	85.1
Boron	µg/L	5000	10.0	362	459	439	501	78.4	34.5	52.9	59.8
Iron	µg/L		10.0	<10.0	3800	4560	3960	29.9	219	275	238
Magnesium	µg/L		50	424000	326000	232000	330000	310000	38100	52000	49300
Sodium	µg/L		50	130000	115000	92900	117000	82900	39500	51500	39300
Potassium	µg/L		50	7100	4930	4160	4840	3160	2290	1490	2970

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T550217

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Rachel Bryan

Brooks Landfill - GW Indicator Parameters

DATE SAMPLED: Nov 14, 2011 | DATE RECEIVED: Nov 16, 2011 | DATE REPORTED: Nov 25, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	MW4-09 2917676	MW5A-09 2917681	OW8A-06 2917686	OW8B-06 2917691	OW8D-07 2917696	OW8S-07 2917701	OW1B-06 2917706	OW1A-06 2917711
Alkalinity (as CaCO3)	µg/L		5000	346000	393000	401000	554000	155000	410000	872000	407000
Ammonia as N	µg/L		20	42	478	737	<20	2030	237	28	366
Calcium	µg/L		50	509000	472000	499000	105000	489000	472000	80000	456000
Chemical Oxygen Demand	µg/L		5000	<5000	<5000	<5000	<5000	91200	<5000	<5000	<5000
Chloride	µg/L	(250000)	500	12000	14300	11300	90500	24800	11900	16300	11600
Electrical Conductivity	uS/cm		2	3700	4210	3950	1770	3230	4050	2540	4110
Dissolved Organic Carbon	µg/L	(5000)	500	30200	29600	6200	18300	13400	25900	7600	2700
Nitrate as N	µg/L	10000	250	<250	<250	<250	<250	<250	<250	<250	<250
pH	pH Units	(6.5-8.5)	NA	7.92	7.84	7.91	8.19	8.36	7.90	8.16	7.95
Sulphate	µg/L	(500000)	500	2390000	2780000	2590000	341000	2030000	2650000	812000	2620000
Total Dissolved Solids	µg/L	(500000)	20000	3580000	4350000	3880000	1090000	3040000	3980000	1890000	4020000
Barium	µg/L	1000	2.0	6.6	6.2	5.7	19.0	6.2	5.5	15.7	5.9
Boron	µg/L	5000	10.0	402	677	544	1610	10600	592	158	558
Iron	µg/L		10.0	10.2	3370	6790	<10.0	<10.0	1680	69.0	2520
Magnesium	µg/L		50	282000	385000	332000	102000	192000	355000	316000	383000
Sodium	µg/L		50	108000	138000	114000	133000	52800	115000	109000	136000
Potassium	µg/L		50	7000	5310	5520	2420	27800	5620	7100	4790

Certified By:

AGAT Laboratories

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CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 11T550217
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Rachel Bryan

Brooks Landfill - GW Indicator Parameters

DATE SAMPLED: Nov 14, 2011 | DATE RECEIVED: Nov 16, 2011 | DATE REPORTED: Nov 25, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW5A-06 2917717	OW5B-06 2917723	MW2S-07 2917748	MW2D-07 2917756	MW2A-01 2917763	MW2B-07 2917769	MW2C-01 2917775	OW9A-06 2917780
Alkalinity (as CaCO3)	µg/L		5000	397000	420000	389000	398000	357000	509000	816000	404000
Ammonia as N	µg/L		20	403	93	184	262	85	820	41	178
Calcium	µg/L		50	556000	159000	498000	517000	502000	79700	197000	500000
Chemical Oxygen Demand	µg/L		5000	<5000	16500	<5000	<5000	<5000	<5000	9780	6890
Chloride	µg/L	(250000)	500	7870	23500	13300	12200	13800	13800	14300	11400
Electrical Conductivity	uS/cm		2	3510	1580	3990	4040	4290	2080	4730	4030
Dissolved Organic Carbon	µg/L	(5000)	500	2600	8700	3000	3000	1400	5200	28800	1600
Nitrate as N	µg/L	10000	250	<250	653	<250	<250	<250	<250	<250	<250
pH	pH Units	(6.5-8.5)	NA	8.00	8.04	7.93	8.06	7.98	8.26	8.16	8.01
Sulphate	µg/L	(500000)	500	2160000	474000	2570000	2640000	2940000	796000	2680000	2110000
Total Dissolved Solids	µg/L	(500000)	20000	3410000	1140000	3870000	3930000	4360000	1500000	4490000	3980000
Barium	µg/L	1000	2.0	7.1	60.3	7.9	7.3	4.1	39.1	9.5	5.5
Boron	µg/L	5000	10.0	468	49.5	489	992	354	63.5	296	423
Iron	µg/L		10.0	4470	<10.0	513	713	<10.0	<10.0	<10.0	262
Magnesium	µg/L		50	242000	102000	367000	373000	445000	221000	630000	360000
Sodium	µg/L		50	95600	64100	117000	118000	134000	121000	305000	112000
Potassium	µg/L		50	4000	3000	6860	8150	7120	6890	13900	5620

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Certificate of Analysis

AGAT WORK ORDER: 11T550217
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Rachel Bryan

Brooks Landfill - GW Indicator Parameters

DATE SAMPLED: Nov 14, 2011 | DATE RECEIVED: Nov 16, 2011 | DATE REPORTED: Nov 25, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	OW9B-06 2917785	OW3A-07 2917790	OW3B-07 2917795	MW1A-07 2917800	MW1B-07 2917806	MW1S-07 2917811	MW1D-07 2917822
Alkalinity (as CaCO3)	µg/L		5000	607000	402000	438000	90900	662000	403000	142000
Ammonia as N	µg/L		20	<20	287	98	365	210	287	3040
Calcium	µg/L		50	70500	361000	216000	45700	143000	498000	534000
Chemical Oxygen Demand	µg/L		5000	<5000	<5000	12000	<5000	13000	<5000	74100
Chloride	µg/L	(250000)	500	30400	5280	13600	19200	10900	10500	15400
Electrical Conductivity	uS/cm		2	1750	2360	1170	659	1520	3940	3110
Dissolved Organic Carbon	µg/L	(5000)	500	2700	4100	10000	3000	7900	2500	1300
Nitrate as N	µg/L	10000	250	<250	<250	<250	<250	<250	<250	<250
pH	pH Units	(6.5-8.5)	NA	8.28	8.07	7.95	10.9	8.07	7.94	8.36
Sulphate	µg/L	(500000)	500	406000	1160000	204000	94800	245000	2440000	1950000
Total Dissolved Solids	µg/L	(500000)	20000	1100000	2020000	772000	274000	884000	3740000	2870000
Barium	µg/L	1000	2.0	21.0	68.4	121	126	42.7	4.8	4.6
Boron	µg/L	5000	10.0	119	381	34.1	32.8	53.1	511	10700
Iron	µg/L		10.0	<10.0	<10.0	28.5	39.6	854	1640	<10.0
Magnesium	µg/L		50	161000	130000	21300	<50	99000	344000	186000
Sodium	µg/L		50	114000	76800	19500	53400	53900	108000	35900
Potassium	µg/L		50	5670	3870	2180	5730	2240	5200	30500

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

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Guideline Violation

AGAT WORK ORDER: 11T550217

PROJECT NO: 111-53338-00

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CLIENT NAME: GENIVAR

ATTENTION TO: Rachel Bryan

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2917696	OW8D-07	O.Reg.169/03	Brooks Landfill - GW Indicator Parameters	Boron	5000	10600
2917800	MW1A-07	O.Reg.169/03	Brooks Landfill - GW Indicator Parameters	pH	(6.5-8.5)	10.9
2917822	MW1D-07	O.Reg.169/03	Brooks Landfill - GW Indicator Parameters	Boron	5000	10700

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T550217

PROJECT NO: 111-53338-00

ATTENTION TO: Rachel Bryan

Water Analysis

RPT Date: Nov 25, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - GW Indicator Parameters															
Alkalinity (as CaCO3)	1	2917638	388000	396000	2.0%	< 5000	99%	80%	120%						
Ammonia as N	1	2917632	72	74	2.7%	< 20	101%	90%	110%	98%	90%	110%	84%	80%	120%
Calcium	1	2917662	127000	125000	1.6%	< 50	98%	90%	110%	100%	90%	110%	99%	70%	130%
Chemical Oxygen Demand	1	2917632	< 5000	< 5000	0.0%	< 5000	110%	90%	110%	106%	90%	110%	106%	70%	130%
Chloride	1	2917656	107000	106000	0.9%	< 500	94%	90%	110%	95%	90%	110%	103%	80%	120%
Electrical Conductivity	1	2917638	3510	3490	0.6%	< 2	105%	80%	120%						
Dissolved Organic Carbon	1	2917691	18300	18000	1.7%	< 500	95%	90%	110%	95%	80%	120%	96%	70%	130%
Nitrate as N	1	2917656	< 250	< 250	0.0%	< 250	101%	90%	110%	103%	90%	110%	105%	80%	120%
pH	1	2917638	7.88	7.89	0.1%		100%	80%	120%						
Sulphate	1	2917656	187000	185000	1.1%	< 500	96%	90%	110%	98%	90%	110%	89%	80%	120%
Total Dissolved Solids	1	2917681	4350000	4350000	0.0%	< 20000	106%	80%	120%						
Barium	1	2917632	4.8	4.5	6.5%	< 2.0	100%	90%	110%	97%	90%	110%	101%	70%	130%
Boron	1	2917632	362	346	4.5%	< 10.0	99%	90%	110%	96%	90%	110%	107%	70%	130%
Iron	1	2917632	< 10.0	< 10.0	0.0%	< 10.0	105%	90%	110%	101%	90%	110%	116%	70%	130%
Magnesium	1	2917662	52000	52900	1.7%	< 50	100%	90%	110%	101%	90%	110%	100%	70%	130%
Sodium	1	2917662	51500	50600	1.8%	< 50	100%	90%	110%	100%	90%	110%	98%	70%	130%
Brooks Landfill - GW Indicator Parameters															
Alkalinity (as CaCO3)	1	2917696	155000	156000	0.6%	< 5000	98%	80%	120%						
Ammonia as N	1	2917763	85	75	12.5%	< 20	102%	90%	110%	98%	90%	110%	103%	80%	120%
Calcium	1	2917711	456000	450000	1.3%	< 50	105%	90%	110%	103%	90%	110%	97%	70%	130%
Chemical Oxygen Demand	1	2917763	< 5000	< 5000	0.0%	< 5000	105%	90%	110%	109%	90%	110%	107%	70%	130%
Chloride	1	2917800	19200	19000	1.0%	< 500	93%	90%	110%	94%	90%	110%	99%	80%	120%
Electrical Conductivity	1	2917696	3230	3230	0.0%	< 2	105%	80%	120%						
Dissolved Organic Carbon	1	2917822	1300	1400	7.4%	< 500	90%	90%	110%	95%	80%	120%	99%	70%	130%
Nitrate as N	1	2917800	< 250	< 250	0.0%	< 250	100%	90%	110%	103%	90%	110%	101%	80%	120%
pH	1	2917696	8.36	8.39	0.4%		100%	80%	120%						
Sulphate	1	2917800	94800	94700	0.1%	< 500	98%	90%	110%	99%	90%	110%	98%	80%	120%
Total Dissolved Solids	1	2917748	3870000	4010000	3.6%	< 20000	106%	80%	120%						
Barium	1	2917686	5.7	5.6	1.8%	< 2.0	99%	90%	110%	97%	90%	110%	97%	70%	130%
Boron	1	2917686	544	552	1.5%	< 10.0	107%	90%	110%	101%	90%	110%	98%	70%	130%
Iron	1	2917686	6790	6790	0.0%	< 10.0	108%	90%	110%	99%	90%	110%	101%	70%	130%
Magnesium	1	2917711	383000	376000	1.8%	< 50	105%	90%	110%	103%	90%	110%	99%	70%	130%
Sodium	1	2917711	136000	133000	2.2%	< 50	103%	90%	110%	100%	90%	110%	96%	70%	130%

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T550217

PROJECT NO: 111-53338-00

ATTENTION TO: Rachel Bryan

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	TITRATION
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES

3 x coolers

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Mississauga, Ontario
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Chain of Custody Record

Ph.: 905.712.5100 - Fax: 905.712.5122 - Toll Free: 800.856.6261

Laboratory Use Only
Arrival Temperature: 3.1
AGAT WO #: 11T550217
Lab Temperature:
Notes:

Client Information:
Company: Genivar
Contact: Rachel Bryan
Address: 1425 Cormorant Rd. Ancaster L9G4V5
Phone: 2892390100 Fax: 2892390109
Project: 111-53338-00 PO: Brooks Rd Lndfl.
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ____ (Indicate one)
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region ____ (Indicate one)
☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☑ Other (specify) ODWS ☐ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☑ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
*TAT is exclusive of weekends and statutory holidays

Invoice To: Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☑ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: Bailey Walters
Email: Bailey.Walters@genivar.com
2. Name:
Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ OH- ☐ SAR ☐ NO2/NO3 ☐ N-Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH3 ☐ TKN ☐ NO3 ☐ NO2 ☐ NO3/NO2	VOC: ☑ VOC ☐ THM ☐ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	GW indicators
MWFD1	Nov 14/11	AM GW	GW	5																	✓
MWFD2	Nov 15/11																				✓
MWFD3	Nov 15/11																				✓
MW6A-07	Nov 15																				✓
MW6B-07	Nov 15																				✓
MW2-03	Nov 16																				✓
MW3-03	Nov 16																				✓
MW1-03	Nov 16																				✓
MW4-09	Nov 16																				✓
MW5A-09	Nov 16																				✓
OW8A-06	Nov 15																				✓
OW8B-06	Nov 15																				✓

Samples Relinquished by (print name & sign): Rachel Bryan
Date/Time: Nov 16 2pm
Samples Received by (Print name & sign): Nov 16/11
Date/Time: 4:04
Samples Relinquished by (print name & sign):
Date/Time:
Samples Received by (Print name & sign):
Date/Time:

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

NO: 165615

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

3 of 3 pg 1 of 1

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 3.4
AGAT WO #:
Lab Temperature: 1.6
Notes:

Client Information:
Company: Genivar
Contact: Rachel Bryan
Address: 1425 Cormorant Rd
Ancaster L9G 4V5
Phone: 2892390100 Fax: 2892390109
Project: Brooks Ladf. PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ____ Indicate one
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region ____ Indicate one
☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☑ Other (specify) ODWS
☐ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☑ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day
OR
Date Required (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Invoice To: Same: Yes ☑ No ☐
Company:
Contact:
Address:

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If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☑ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: Bailey Walters
Email: bailey.walters@genivar.com
2. Name:
Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information
OW8D-07	Nov 15	PM	GW	5	
OW8S-07	Nov 15				
OW1B-06	Nov 15				
OW1A-06	Nov 15				
OW5A-06	Nov 15				
OW5B-06	Nov 15				
MW2S-07	Nov 14	AM			
MW2D-07	Nov 14				
MW2A-01	Nov 14				
MW2B-07	Nov 14			5*	*well went dry, 1 bottle only partially full.
MW2C-01	Nov 14			5	
OW9A-06	Nov 14			5	

Metals and Inorganics; Metal Scan; Hydride Forming Metals; Client Custom Metals; ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ CrVI6 ☐ SAR ☐ NO_3/NO_2 ☐ N-Total ☐ Hg ☐ pH; Nutients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_3; VOC: ☐ VOC ☐ THM ☐ BTEX; CCME Fractions 1 to 4; ABNs; PAHs; Chlorophenols; PCBs; Organochlorine Pesticides; TCLP Metals/Inorganics; TCLP:; Sewer Use; GW indicators

Samples Relinquished by (print name & sign):	Date/Time	Samples Received by (Print name & sign):	Date/Time
Rachel Bryan	Nov 16 2pm	Nov 16/11	4:04
Samples Relinquished by (print name & sign):	Date/Time	Samples Received by (Print name & sign):	Date/Time
			6:07

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page 2 of 3
NO: 165617

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

AGAT Laboratories

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 3.4
AGAT WO #:
Lab Temperature: 1.6
Notes:

Client Information:
Company: Genivar
Contact: Rachel Bryan
Address: 1425 Cormorant Rd Ancaster L9G 4V5
Phone: 2892390100 Fax: 2892390109
Project: Brooks Rd. PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ____ (Indicate one)
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region ____ (Indicate one)
☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☑ Other (specify) ODWS
☐ Prov. Water Quality Objectives (PWQO)
☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☑ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
*TAT is exclusive of weekends and statutory holidays

Invoice To: Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the *Drinking Water Chain of Custody Form*

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: Bailey Walters
Email: bailey.walters@genivar.com
2. Name:
Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ NO3/NO2 ☐ N-Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH3 ☐ TKN ☐ NO3 ☐ NO2 ☐ NO3/NO3	VOC: ☐ VOC ☐ THM ☑ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	GW indicators
OW9B-06	Nov 14	PM	GW	5																	✓
OW 3A-07	Nov 14	↓	↓	↓																	✓
OW 3B-07	Nov 14																				✓
MW 1A-07	Nov 14																				✓
MW 1B-07	Nov 14																				✓
MW 1S-07	Nov 14																				✓
MW 1D-07	Nov 16	AM																			✓

Samples Relinquished by (print name & sign): Rachel Bryan
Date/Time: Nov 16 2pm
Samples Received by (Print name & sign): Nov 16/11
Date/Time: 4:04 6:07

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page 3 of 3
NO: 165616

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

Table F-1 C of A Leachate Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Parameter	Parameter Suite	Units	ODWQSOG Standard	ODWQSOG Type	Sample Location / Sampling Date / Sample Type	LCS 2011/05/31 Leachate	LCS 2011/07/04 Leachate	LCS 2011/07/04 Lab Replicate	LCS 2011/07/04 QA/QC Check	LCS 2011/11/11 Leachate
Standard					Leachate Characteristic Peak Ranges (after Rowe 1995)	Leachate Indicator	Leachate Inorg; Metals, PAH, VOC			Leachate Indicator
Field Parameters										
Conductivity		µS/cm				6770	>4000			11230
pH			6.5-8.5	OG	6.3 - 7.7	7.03	7.2			7.48
Temperature		°C				31.8	27.7			8.8
General										
Alkalinity (Total as $CaCO_3$)		mg/L	30-500	OG		**2610**				**3700**
Ammonia (as N)		mg/L				125	189			384
Ammonia, un-ionised (as N)		mg/L				1.53				25
Biological Oxygen Demand (BOD_5)		mg/L			3361 - 12367	239	350			484
Calcium (Ca)		mg/L				338	306			203
Chemical Oxygen Demand (COD)		mg/L			5238 - 17116	1480	3550	3480	1.99	1680
Chloride (Cl)		mg/L	250	AO	851 - 3572	**1060**	**1190**			**1440**
Conductivity		µS/cm				6.2	7520			
Dissolved Organic Carbon (DOC)		mg/L	5	AO	1640 - 25598	**211**	**304**			**555**
Hardness (Total as $CaCO_3$)		mg/L	80-100	OG			**1860**			
Nitrate (N)		mg/L	10	MAC		<50	<0.50			<0.5
Nitrite (N)		mg/L	1	MAC			<0.50			
pH			6.5-8.5	OG	6.3 - 7.7	7.5	7.9			
Phenol-4AAP		mg/L					0.35			
Potassium (K)		mg/L					223			
Sulphate (SO_4)		mg/L	500	AO		26.3	57.5			75.1
Total Dissolved Solids (TDS)		mg/L	500	AO		**4210**	**4560**			**5800**
Total Kjeldahl Nitrogen (TKN)		mg/L					218			
Total Phosphorus (P)		mg/L					51.3			
Total Suspended Solids (TSS)		mg/L				9890	5380			
Metals										
Arsenic		µg/L	25	IMAC			0.05			
Barium		µg/L	1000	MAC		359	633			329
Beryllium		µg/L					<1			
Boron		µg/L	5000	IMAC		**6730**	**9820**			**16100**
Cadmium		µg/L	5	MAC	15 - 50		<0.1			
Chromium		µg/L	50	MAC	110 - 390		**58**			
Cobalt		µg/L					7			
Copper		µg/L	1000	AO			5			
Iron		µg/L	300	AO	86000 - 966000	**1200**	**7510**			**2210**
Lead		µg/L	10	MAC	100 - 570		3			
Magnesium		µg/L				255000	267000			410000
Manganese		µg/L					3040			
Mercury		µg/L	1	MAC	0.26 - 5		<0.1			
Molybdenum		µg/L					2			
Nickel		µg/L					62			
Silver		µg/L					<2			
Sodium		µg/L				720000	832000			1090000
Thallium		µg/L					<3			
Vanadium		µg/L					25			
Zinc		µg/L	5000	AO	1320 - 11000		34			
VOCs										
1,1,1,2-Tetrachloroethane		µg/L					<0.40			
1,1,1-Trichloroethane		µg/L					<1.20			
1,1,2,2-Tetrachloroethane		µg/L					<0.40			
1,1,2-Trichloroethane		µg/L					<0.80			
1,1-Dichloroethane		µg/L					<1.20			
1,1-Dichloroethylene		µg/L					<1.20			
1,2-Dibromoethane (EDB)		µg/L								
1,2-Dichlorobenzene		µg/L					<0.40			
1,2-Dichloroethane		µg/L					<0.80			
1,2-Dichloropropane		µg/L					<0.80			
1,3-Dichlorobenzene		µg/L					<0.40			
1,4-Dichlorobenzene		µg/L	5	MAC	<16		<0.40			
2-Hexanone		µg/L					<1.20			
Acetone		µg/L					<4.0			
Benzene		µg/L	5	MAC	<3 - 22.3		<0.80			
Bromodichloromethane		µg/L					<0.80			
Bromoform		µg/L					<0.40			
Bromomethane		µg/L					<0.80			
Carbon Tetrachloride		µg/L					<0.80			
Chlorobenzene		µg/L					<0.40			
Chloroethane		µg/L					<0.80			
Chloroform		µg/L					<0.80			
Chloromethane		µg/L					<1.60			
cis-1,2-Dichloroethylene		µg/L								
cis-1,3-Dichloropropene		µg/L					<0.80			
Dibromochloromethane		µg/L					<0.40			
Dichloromethane(Methylene Chloride)		µg/L	50	MAC						
Ethylbenzene		µg/L	2.4	AO	70.6 - 170		1.5			
Methyl isobutyl ketone		µg/L								
Methyl t-butyl ether (MTBE)		µg/L								
Methyl-ethyl ketone, MEK (2-Butanone)		µg/L								
Styrene		µg/L					<0.40			
Tetrachloroethylene		µg/L					<0.80			
Toluene		µg/L	24	AO	156 - 1226		**41**			
trans-1,2-Dichloroethylene		µg/L					<0.80			
trans-1,3-Dichloropropene		µg/L					<1.20			
Trichloroethylene		µg/L					<0.80			
Trichlorofluoromethane (FREON 11)		µg/L								
Vinyl Chloride		µg/L	2	MAC	<13 - 65		<0.68			
Xylene, *o-*		µg/L					**1.5**			
Xylene, *p-* + *m-*		µg/L					**4**			
PAHs										
Acenaphthene		µg/L					**0.22**			
Acenaphthylene		µg/L					<0.11			
Anthracene		µg/L					<0.05			
Benzo(a)anthracene		µg/L					<0.08			
Benzo(a)pyrene		µg/L	0.01	MAC			<0.01			
Benzo(b)fluoranthene		µg/L								
Benzo(b,j)fluoranthene		µg/L								
Benzo(g,h,i)perylene		µg/L					<0.06			
Benzo(j)fluoranthene (indirect, as co-elutes)		µg/L								
Benzo(k)fluoranthene		µg/L					<0.05			
Chrysene		µg/L					<0.05			
Dibenzo(a,h)anthracene		µg/L					<0.09			
Fluoranthene		µg/L					**0.17**			
Fluorene		µg/L					**0.25**			
Indeno(1,2,3-cd)pyrene		µg/L					<0.06			
Naphthalene		µg/L					**2.1**			
Phenanthrene		µg/L					<0.10			
Pyrene		µg/L					**0.16**			

Notes:

ODWQSOG	Ontario Drinking Water Quality Standards, Objectives, and Guidelines (Ministry of the Environment, June 2003 and updates)
AO	Aesthetic Objective
IMAC	Interim Maximum Acceptable Concentration
MAC	Maximum Acceptable Concentration
OG	Operational Guideline
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard

Table F-2 s53 C of A Leachate Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Parameter Suite	Units	Standard PWQO Value	Standard PWQO *Type*	Leachate Characteristic Peak Ranges (after Rowe 1995)	Sample Location	LCS	LCS	LCS	LCS	LCS	LCS	LCS
						Sampling Date	2010/12/23	2011/03/31	2011/03/31	2011/03/31	2011/06/10	2011/09/26	2011/12/12
						Sample Type	Leachate	Leachate	Lab Replicate	QA/QC Check	Leachate	Leachate	Leachate
							s53 Leachate	s53 Leachate, VOC			s53 Leachate	s53 Leachate	s53 Leachate
Field Parameters													
Conductivity		µS/cm					3931	4680			7190	6450	6930
Dissolved Oxygen (DO)		mg/L	see table					0.35			0.6	0.47	0.95
pH					6.3 - 7.7		7.03	7.55			6.98	5.46	7.64
Temperature		°C	qualitative				2.9	4.6			25.1	25.3	4
General													
Alkalinity (Total as $CaCO_3$)		µg/L	Note				1810000	1200000			2600000	2550000	2270000
Ammonia (as N)		µg/L					61900	51400			139000	165000	166000
Ammonia, un-ionised (as N)		µg/L	20					**1570**			**3650**		**8880**
Biological Oxygen Demand (BOD_5)		µg/L			3361000 - 12367000		97000	160000			313000	540000	163000
Chemical Oxygen Demand (COD)		µg/L			5238000 - 17116000		612000	430000			1110000	1350000	807000
Chloride (Cl)		µg/L			851000 - 3572000		757000	553000			1060000	1150000	1000000
Conductivity		µS/cm					4430	4370			6330	6200	6600
Dissolved Organic Carbon (DOC)		µg/L			1640000 - 25598000		182000	172000			446000	412000	288000
Hardness (Total as $CaCO_3$)		µg/L					1490000	1460000				2040000	1960000
Nitrate (N)		µg/L					<50	<50			<500	<50	<500
Nitrite (N)		µg/L					<50	<50			<500	<50	<500
pH			6.5-8.5		6.3 - 7.7		7.7	7.7			7.9	7.9	8.0
Phenol-4AAP		µg/L	1				**760**	**130**			**354**	**766**	**344**
Sulphate (SO_4)		µg/L					127000	506000			113000	220000	408000
Total Dissolved Solids (TDS)		µg/L					2720000	3090000			4280000	4580000	4960000
Total Kjeldahl Nitrogen (TKN)		µg/L					78000	81800	83400	1.94	186000	229000	196000
Total Phosphorus (P)		µg/L	30	interim			**1030**	**1350**			**4060**	**4880**	**1705**
Total Suspended Solids (TSS)		µg/L					30000	29000			1010000	6510000	154000
Metals													
Arsenic		µg/L	5	interim			**19**	**15**			**29**	**56.1**	**55.5**
Barium		µg/L					216	207			400	234	265
Boron		µg/L	200	interim			**5050**	**2510**			**7710**	**10500**	**14100**
Cadmium		µg/L	0.5	interim	15 - 50		<1	<0.1			<0.10	<0.10	<0.10
Chromium		µg/L			110 - 390		41	10			63.8	76.6	51.8
Copper		µg/L	5				4	**6**			**7.1**	**17.4**	**11.3**
Iron		µg/L	300		86000 - 966000		**3990**	**7550**			**6400**	**6950**	**5360**
Lead		µg/L	5	interim	100 - 570		<2	2			**8.8**	4.1	6
Mercury		µg/L	0.2		0.26 - 5		<0.1	<0.1			<0.05	<0.1	<0.1
Zinc		µg/L	20	interim	1320 - 11000			**87**			**172**	**101**	**94.9**
VOCs													
1,4-Dichlorobenzene		µg/L	4		<16		<1.00	<1.00			<1.00	<1.00	<0.40
Benzene		µg/L			<3 - 22.3		<2.00	<2.00			<2.00	<2.00	0.97
Dichloromethane(Methylene Chloride)		µg/L	100	interim			<3.00						
Ethylbenzene		µg/L	8	interim	70.6 - 170		1.7	<1.00			2.1	<1.00	<0.40
Toluene		µg/L	0.8	interim	156 - 1226		**25**	**4.4**			**37**	**13**	<0.80
Vinyl Chloride		µg/L	600	interim	<13 - 65		<1.70	<1.70			<1.70	<1.70	<0.68
PAHs													
Benzo(a)pyrene		µg/L					<0.03	<0.01			0.02	<0.01	<0.01
Naphthalene		µg/L	7	interim			2.2	<0.12			2.4	1.8	0.49

Notes:

PWQO	Ontario Provincial Water Quality Objectives (1999)
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
<10	less than RDL

AGAT Laboratories

5835 COOPERS AVENUE
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CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATHEW WELSH

PROJECT NO: 05100178.01

AGAT WORK ORDER: 11T483117

TRACE ORGANICS REVIEWED BY: Inga Kuzmina, Analytical Chemist

WATER ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Apr 11, 2011

PAGES (INCLUDING COVER): 11

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T483117

PROJECT NO: 05100178.01

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CLIENT NAME: GENIVAR INC

ATTENTION TO: MATHEW WELSH

O. Reg. 153 - Benzo(a)pyrene and Naphthalene in Water

DATE SAMPLED: Mar 31, 2011 | DATE RECEIVED: Apr 01, 2011 | DATE REPORTED: Apr 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2334532
Naphthalene	µg/L	7	0.12	<0.12
Benzo(a)pyrene	µg/L		0.01	<0.01
Surrogate	**Unit**	**Acceptable Limits**		
Chrysene-d12	%	60-130		88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By:

AGAT Laboratories

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AGAT WORK ORDER: 11T483117
PROJECT NO: 05100178.01

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATHEW WELSH

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Mar 31, 2011 | DATE RECEIVED: Apr 01, 2011 | DATE REPORTED: Apr 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2334532
Dichlorodifluoromethane	µg/L		2.00	<2.00
Chloromethane	µg/L	700	4.00	<4.00
Vinyl Chloride	µg/L	600	1.70	<1.70
Bromomethane	µg/L	0.9	2.00	<2.00
Chloroethane	µg/L		2.00	<2.00
Trichlorofluoromethane	µg/L		4.00	<4.00
Acetone	µg/L		10.0	930
1,1 Dichloroethylene	µg/L	40	3.00	<3.00
Methylene Chloride	µg/L	100	3.00	<3.00
trans- 1,2-dichloroethylene	µg/L	200	2.00	<2.00
Methyl tert-butyl ether	µg/L	200	2.00	<2.00
1,1-Dichloroethane	µg/L	200	3.00	<3.00
Methyl Ethyl Ketone	µg/L	400	10.0	100
cis- 1,2-Dichloroethylene	µg/L	200	2.00	9.5
Chloroform	µg/L		2.00	<2.00
1,2 - Dichloroethane	µg/L	100	2.00	<2.00
1,1,1-Trichloroethane	µg/L	10	3.00	<3.00
Carbon Tetrachloride	µg/L		2.00	<2.00
Benzene	µg/L	100	2.00	<2.00
1,2-Dichloropropane	µg/L	0.7	2.00	<2.00
Trichloroethylene	µg/L	20	2.00	<2.00
Bromodichloromethane	µg/L	200	2.00	<2.00
cis-1,3-Dichloropropene	ug/L		2.00	<2.00
Methyl Isobutyl Ketone	µg/L		10.0	<10.0
trans-1,3-Dichloropropene	µg/L	7	3.00	<3.00
1,1,2-Trichloroethane	µg/L	800	2.00	<2.00
Toluene	µg/L	0.8	2.00	4.4
2-Hexanone	µg/L		3.00	<3.00
Dibromochloromethane	µg/L	40	1.00	<1.00
Ethylene Dibromide	µg/L	5	2.00	<2.00
Tetrachloroethylene	µg/L	50	2.00	2.7
1,1,1,2-Tetrachloroethane	µg/L	20	1.00	<1.00
Chlorobenzene	µg/L	15	1.00	<1.00

Certified By:

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AGAT WORK ORDER: 11T483117
PROJECT NO: 05100178.01

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATHEW WELSH

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Mar 31, 2011 | DATE RECEIVED: Apr 01, 2011 | DATE REPORTED: Apr 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2334532
Ethylbenzene	µg/L	8	1.00	<1.00
m & p-Xylene	µg/L	32	2.00	<2.00
Bromoform	µg/L	60	1.00	<1.00
Styrene	µg/L	4	1.00	<1.00
1,1,2,2-Tetrachloroethane	µg/L	70	1.00	<1.00
o-Xylene	µg/L	40	1.00	<1.00
1,3-Dichlorobenzene	µg/L	2.5	1.00	<1.00
1,4-Dichlorobenzene	µg/L	4	1.00	<1.00
1,2-Dichlorobenzene	µg/L	2.5	1.00	<1.00
1,2,4-Trichlorobenzene	µg/L	0.5	3.00	<3.00
1,3-Dichloropropene (Cis + Trans)	µg/L		3.00	<3.00
Xylene Mixture (Total)	µg/L		2.00	<2.00
n-Hexane	µg/L		2.00	<2.00
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		88
4-Bromofluorobenzene	% Recovery	70-130		88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

2334532 Dilution factor= 10
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T483117
PROJECT NO: 05100178.01

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATHEW WELSH

Brooks Landfill - S53 Leachate Parameters

DATE SAMPLED: Mar 31, 2011 | DATE RECEIVED: Apr 01, 2011 | DATE REPORTED: Apr 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2334532
BOD (5)	mg/L		50	160
pH	pH Units	6.5-8.5	NA	7.72
Electrical Conductivity	uS/cm		2	4370
Total Dissolved Solids	mg/L		20	3090
Total Suspended Solids	mg/L		10	29
Total Hardness (as CaCO3)	mg/L		10	1460
Alkalinity (as CaCO3)	mg/L		5	1200
Chloride	mg/L		0.10	553
Nitrate as N	mg/L		0.05	<0.05
Nitrite as N	mg/L		0.05	<0.05
Sulphate	mg/L		0.10	506
Ammonia as N	mg/L		0.02	51.4
Ammonia-Un-ionized	mg/L		0.02	1.57
Chemical Oxygen Demand	mg/L		5	430
Dissolved Organic Carbon	mg/L		0.5	172
Phenols	mg/L	0.001	0.001	0.130
Total Kjeldahl Nitrogen	mg/L		0.10	81.8
Total Phosphorus	mg/L	0.03	0.02	1.35
Arsenic	mg/L	0.1	0.003	0.015
Barium	mg/L		0.002	0.207
Boron	mg/L	0.20	0.010	2.51
Cadmium	mg/L	0.0002	0.0001	<0.0001
Chromium	mg/L		0.003	0.010
Copper	mg/L	0.005	0.002	0.006
Iron	mg/L	0.3	0.010	7.55
Lead	mg/L	0.005	0.001	0.002
Mercury	mg/L		0.0001	<0.0001
Zinc	mg/L	0.03	0.005	0.087

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO (mg/L)

Certified By: Tony Nash

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 11T483117

PROJECT NO: 05100178.01

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2334532	Leachate	PWQO (mg/L)	Brooks Landfill - S53 Leachate Parameters	Boron	0.20	2.51
2334532	Leachate	PWQO (mg/L)	Brooks Landfill - S53 Leachate Parameters	Copper	0.005	0.006
2334532	Leachate	PWQO (mg/L)	Brooks Landfill - S53 Leachate Parameters	Iron	0.3	7.55
2334532	Leachate	PWQO (mg/L)	Brooks Landfill - S53 Leachate Parameters	Phenols	0.001	0.130
2334532	Leachate	PWQO (mg/L)	Brooks Landfill - S53 Leachate Parameters	Total Phosphorus	0.03	1.35
2334532	Leachate	PWQO (mg/L)	Brooks Landfill - S53 Leachate Parameters	Zinc	0.03	0.087
2334532	Leachate	PWQO.	O. Regulation 153 - Volatile Organic Compounds in Water	Toluene	0.8	4.4

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T483117

PROJECT NO: 05100178.01

ATTENTION TO: MATHEW WELSH

Trace Organics Analysis

RPT Date: Apr 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153 - Benzo(a)pyrene and Naphthalene in Water															
Naphthalene	1					< 0.12	113%	60%	140%	94%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	116%	60%	140%	74%	60%	140%		60%	140%
O. Regulation 153 - Volatile Organic Compounds in Water															
Dichlorodifluoromethane	1		< 0.20	< 0.20	0.0%	< 0.20	95%	60%	130%	114%	60%	130%	97%	60%	130%
Chloromethane	1		< 0.40	< 0.40	0.0%	< 0.40	113%	60%	130%	116%	60%	130%	117%	60%	130%
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	115%	60%	130%	121%	60%	130%	120%	60%	130%
Bromomethane	1		< 0.20	< 0.20	0.0%	< 0.20	115%	60%	130%	111%	60%	130%	107%	60%	130%
Chloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	116%	60%	130%	117%	60%	130%
Trichlorofluoromethane	1		< 0.40	< 0.40	0.0%	< 0.40	113%	60%	130%	115%	60%	130%	101%	60%	130%
Acetone	1		< 1.0	< 1.0	0.0%	< 1.0	98%	60%	130%	90%	60%	130%	107%	60%	130%
1,1 Dichloroethylene	1		< 0.30	< 0.30	0.0%	< 0.30	78%	60%	130%	74%	60%	130%	113%	60%	130%
Methylene Chloride	1		< 0.30	< 0.30	0.0%	< 0.30	117%	60%	130%	105%	60%	130%	114%	60%	130%
trans- 1,2-dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	75%	60%	130%	96%	60%	130%
Methyl tert-butyl ether	1		< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	73%	60%	130%	88%	60%	130%
1,1-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	105%	60%	130%	82%	60%	130%	86%	60%	130%
Methyl Ethyl Ketone	1		< 1.0	< 1.0	0.0%	< 1.0	81%	60%	130%	74%	60%	130%	84%	60%	130%
cis- 1,2-Dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	74%	60%	130%	76%	60%	130%	82%	60%	130%
Chloroform	1		< 0.20	< 0.20	0.0%	< 0.20	104%	60%	130%	94%	60%	130%	93%	60%	130%
1,2 - Dichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	91%	60%	130%	86%	60%	130%	89%	60%	130%
1,1,1-Trichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	103%	60%	130%	89%	60%	130%	86%	60%	130%
Carbon Tetrachloride	1		< 0.20	< 0.20	0.0%	< 0.20	108%	60%	130%	73%	60%	130%	91%	60%	130%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	105%	60%	130%	79%	60%	130%	78%	60%	130%
1,2-Dichloropropane	1		< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	73%	60%	130%	78%	60%	130%
Trichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	92%	60%	130%	78%	60%	130%	80%	60%	130%
Bromodichloromethane	1		< 0.20	< 0.20	0.0%	< 0.20	88%	60%	130%	90%	60%	130%	82%	60%	130%
cis-1,3-Dichloropropene	1		< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	86%	60%	130%	76%	60%	130%
Methyl Isobutyl Ketone	1		< 1.0	< 1.0	0.0%	< 1.0	100%	60%	130%	86%	60%	130%	86%	60%	130%
trans-1,3-Dichloropropene	1		< 0.30	< 0.30	0.0%	< 0.30	85%	60%	130%	94%	60%	130%	81%	60%	130%
1,1,2-Trichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	120%	60%	130%	112%	60%	130%	99%	60%	130%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	111%	60%	130%	106%	60%	130%	91%	60%	130%
2-Hexanone	1		< 0.30	< 0.30	0.0%	< 0.30	113%	60%	130%	86%	60%	130%	91%	60%	130%
Dibromochloromethane	1		< 0.10	< 0.10	0.0%	< 0.10	108%	60%	130%	120%	60%	130%	92%	60%	130%
Ethylene Dibromide	1		< 0.20	< 0.20	0.0%	< 0.20	104%	60%	130%	115%	60%	130%	91%	60%	130%
Tetrachloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	118%	60%	130%	115%	60%	130%	87%	60%	130%
1,1,1,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10		60%	130%	118%	60%	130%		60%	130%
Chlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	100%	60%	130%	102%	60%	130%	95%	60%	130%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	90%	60%	130%	74%	60%	130%	74%	60%	130%
m & p-Xylene	1		< 0.20	< 0.20	0.0%	< 0.20	106%	60%	130%	89%	60%	130%	87%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T483117

PROJECT NO: 05100178.01

ATTENTION TO: MATHEW WELSH

Trace Organics Analysis (Continued)

RPT Date: Apr 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Bromoform	1		< 0.10	< 0.10	0.0%	< 0.10	120%	60%	130%	116%	60%	130%	111%	60%	130%
Styrene	1		< 0.10	< 0.10	0.0%	< 0.10	75%	60%	130%	97%	60%	130%	97%	60%	130%
1,1,2,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10		60%	130%	107%	60%	130%	113%	60%	130%
o-Xylene	1		< 0.10	< 0.10	0.0%	< 0.10	98%	60%	130%	82%	60%	130%	86%	60%	130%
1,3-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	91%	60%	130%	84%	60%	130%	88%	60%	130%
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	84%	60%	130%	78%	60%	130%	86%	60%	130%
1,2-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	98%	60%	130%	92%	60%	130%	101%	60%	130%
1,2,4-Trichlorobenzene	1		< 0.30	< 0.30	0.0%	< 0.30	115%	60%	130%	117%	60%	130%	110%	60%	130%
1,3-Dichloropropene (Cis + Trans)	1		< 0.30	< 0.30	0.0%	< 0.30	85%	60%	130%	94%	60%	130%	81%	60%	130%
Xylene Mixture (Total)	1		< 0.20	< 0.20	0.0%	< 0.20	98%	60%	130%	82%	60%	130%	86%	60%	130%
n-Hexane	1		< 0.20	< 0.20	0.0%	< 0.20		60%	130%	79%	60%	130%	99%	60%	130%

Certified By:

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T483117

PROJECT NO: 05100178.01

ATTENTION TO: MATHEW WELSH

Water Analysis

RPT Date: Apr 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - S53 Leachate Parameters															
BOD (5)	1		< 5	< 5	0.0%	< 5	105%	75%	125%						
pH	1		7.88	8.01	1.6%	N/A	100%	90%	110%						
Electrical Conductivity	1		665	669	0.6%	<2	99%	80%	120%						
Total Dissolved Solids	1		130	128	1.6%	< 20	98%	80%	120%						
Total Suspended Solids	1		< 10	< 10	0.0%	< 10	102%	80%	120%						
Alkalinity (as CaCO3)	1		153	163	6.3%	<5	99%	80%	120%						
Chloride	1		74.5	74.3	0.3%	< 0.10	102%	90%	110%	100%	90%	110%	98%	85%	115%
Nitrate as N	1		< 0.05	< 0.05	0.0%	< 0.05	93%	90%	110%	101%	90%	110%	100%	85%	115%
Nitrite as N	1		< 0.05	< 0.05	0.0%	< 0.05	NA	90%	110%	101%	90%	110%	95%	85%	115%
Sulphate	1		40.0	39.0	2.5%	< 0.10	96%	90%	110%	99%	90%	110%	88%	85%	115%
Ammonia as N	1		< 0.02	< 0.02	0.0%	< 0.02	100%	80%	120%	97%	90%	110%	98%	80%	120%
Chemical Oxygen Demand	1		14	13	7.4%	< 5	92%	90%	110%	101%	90%	110%	120%	70%	130%
Dissolved Organic Carbon	1		1.1	1.2	8.7%	< 0.5	100%	90%	110%	103%	90%	110%	87%	80%	120%
Phenols	1		< 0.001	< 0.001	0.0%	< 0.001	101%	90%	110%	103%	90%	110%	105%	70%	130%
Total Kjeldahl Nitrogen	1	2334532	81.8	83.4	1.9%	< 0.10	103%	80%	120%	101%	80%	120%	110%	70%	130%
Total Phosphorus	1		0.06	0.06	0.0%	< 0.02	108%	90%	110%	102%	90%	110%	94%	70%	130%
Arsenic	1		< 0.003	< 0.003	0.0%	< 0.003	102%	90%	110%	108%	90%	110%	103%	70%	130%
Barium	1		0.036	0.036	0.0%	< 0.002	100%	90%	110%	100%	90%	110%	100%	70%	130%
Boron	1		0.0274	0.0306	11.0%	< 0.010	104%	90%	110%	102%	90%	110%	94%	70%	130%
Cadmium	1		< 0.0001	< 0.0001	0.0%	< 0.0001	100%	90%	110%	101%	80%	120%	100%	70%	130%
Chromium	1		< 0.003	< 0.003	0.0%	< 0.003	100%	90%	110%	105%	90%	110%	102%	70%	130%
Copper	1		0.003	0.003	0.0%	< 0.002	102%	90%	110%	103%	80%	120%	106%	70%	130%
Iron	1		0.024	0.024	0.0%	< 0.010	94%	90%	110%	96%	80%	120%	95%	70%	130%
Lead	1		< 0.001	< 0.001	0.0%	< 0.001	97%	90%	110%	101%	90%	110%	110%	70%	130%
Mercury	1		< 0.0001	< 0.0001	0.0%	< 0.0001	99%	90%	110%	101%	70%	130%	93%	70%	130%
Zinc	1		0.767	0.775	1.0%	< 0.005	100%	90%	110%	107%	90%	110%	102%	70%	130%

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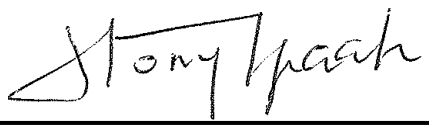

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T483117

PROJECT NO: 05100178.01

ATTENTION TO: MATHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T483117

PROJECT NO: 05100178.01

ATTENTION TO: MATHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene-d8	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5035 & 8260	(P&T)GC/MS
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010 & 200.7 & SM 2340 B	ICP/OES
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

3 coolers

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CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 3.1 AGAT WO #: 11T483117
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St
Brantford, On
Phone: 519-756-9472 Fax: 519-756-6723
Project: 05100128-01 PO: 05100128-01
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? (Yes)/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: Matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ____
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (excluding Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	SSSLeachate (April 11)	Leachate (April 11)			LABORATORY USE ONLY LAB SAMPLE ID
Leachate.	March 31/11		Leachate	12												✓				

Samples Relinquished By (print name & sign): Tamara Hamilton
Date/Time: April 1/11 10:20
Samples Received By (print name & sign): Matt
Date/Time: April 1/11 10:20
Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign):
Date/Time: 1:01

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of 1
NO: 151039

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T497811

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 11, 2011

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T497811
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - Leachate Parameters

DATE SAMPLED: May 31, 2011 | DATE RECEIVED: Jun 01, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2442859
Alkalinity (as CaCO3)	µg/L		5000	2610000
Ammonia as N	µg/L		20	125000
Ammonia-Un-ionized	µg/L		20	1530
BOD (5)	µg/L		5000	239000
Calcium	µg/L		50	338000
Chemical Oxygen Demand	µg/L		5000	1480000
Chloride	µg/L	(250000)	100	1060000
Electrical Conductivity	uS/cm		2	6200
Dissolved Organic Carbon	µg/L	(5000)	500	211000
Nitrate as N	µg/L	10000	50	<50
pH	pH Units	(6.5-8.5)	NA	7.47
Sulphate	µg/L	(500000)	100	26300
Total Dissolved Solids	µg/L	(500000)	20000	4210000
Total Suspended Solids	µg/L		10000	9890000
Barium	µg/L	1000	2.0	359
Boron	µg/L	5000	100	6730
Iron	µg/L		10.0	1200
Magnesium	µg/L		50	255000
Sodium	µg/L		50	720000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

Certified By:

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Guideline Violation

AGAT WORK ORDER: 11T497811

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2442859	Leachate	O.Reg.169/03	Brooks Landfill - Leachate Parameters	Boron	5000	6730

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T497811

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - Leachate Parameters															
Alkalinity (as CaCO3)	1		205000	203000	1.0%	< 5000	100%	80%	120%						
Ammonia as N	1		1110	1090	1.8%	< 20	109%	90%	110%	94%	90%	110%	104%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	103%	75%	125%						
Calcium	1		83800	83500	0.4%	< 50	101%	90%	110%	100%	90%	110%	109%	70%	130%
Chemical Oxygen Demand	1	2442859	< 5000	< 5000	0.0%	< 5000	109%	90%	110%	104%	90%	110%			
Chloride	1		60200	59500	1.2%	< 100	97%	90%	110%	102%	90%	110%	93%	60%	140%
Electrical Conductivity	1		22	22	0.0%	< 2	100%	80%	120%						
Dissolved Organic Carbon	1	2442807	2.1	2.0	4.9%	< 500	100%	80%	120%	108%	80%	120%	113%	70%	130%
Nitrate as N	1		< 50	< 50	0.0%	< 50	95%	90%	110%	102%	90%	110%	106%	85%	115%
pH	1		5.95	5.93	0.3%	NA	98%	80%	120%						
Sulphate	1		< 100	< 100	0.0%	< 100	95%	90%	110%	100%	90%	110%	103%	85%	115%
Total Dissolved Solids	1		104000	102000	1.9%	< 20000	104%	80%	120%						
Total Suspended Solids	1		< 10000	< 10000	0.0%	< 10000	92%	80%	120%						
Barium	1		47.5	48.4	1.9%	< 2.0	98%	90%	110%	93%	90%	110%	100%	70%	130%
Boron	1		43.3	44.8	3.4%	< 10.0	104%	90%	110%	105%	90%	110%	126%	70%	130%
Iron	1		513	495	3.6%	< 10.0	107%	90%	110%	100%	90%	110%	107%	70%	130%
Magnesium	1		23800	23400	1.7%	< 50	102%	90%	110%	101%	90%	110%	108%	70%	130%
Sodium	1		2210	2120	4.2%	< 50	104%	90%	110%	103%	90%	110%	106%	70%	130%

Certified By:

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T497811

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES

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60

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CHAIN OF CUSTODY RECORD

1 sm Blue coolers

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 9.9 AGAT WO #: 11T497811
Notes:

Client Information
Company: Geniva
Contact: Matt Welsh
Address: 110 Colborne St.
Brantford, ON
Phone: 519-756-9422 Fax:
Project: 111-53338-00 PO:
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes (6) / No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: Matthew.welsh@geniva.com
2. Name: Bailey Walters
Email: bailey.walters@geniva.com

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ____
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☐ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	Leachate Indicator				LAB SAMPLE ID
Leachate -	May 31/11		leachate	6												✓				

Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time
[signature]	2011/06/01	[signature]	June. 1. 11 5:15
Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time June 1. 11 11:15

Pink Copy - Client
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PAGE 1 of 1
NO: 153490

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T507452

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 14, 2011

PAGES (INCLUDING COVER): 14

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES
VERSION 2:Parameters added that were missing from report on September 30th, 2011.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T507452
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Leachate VOCs (water)

DATE SAMPLED: Jul 04, 2011 | DATE RECEIVED: Jul 05, 2011 | DATE REPORTED: Jul 14, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2521423
1,1,1,2-Tetrachloroethane	µg/L		0.40	<0.40
1,1,1-Trichloroethane	µg/L		1.20	<1.20
1,1,2,2-Tetrachloroethane	µg/L		0.40	<0.40
1,1,2-Trichloroethane	µg/L		0.80	<0.80
1,1-Dichloroethane	µg/L		1.20	<1.20
1,1 Dichloroethylene	µg/L	14	1.20	<1.20
1,2-Dibromoethane (EDB)	µg/L		0.80	<0.80
1,2-Dichlorobenzene	µg/L	200	0.40	<0.40
1,2 - Dichloroethane	µg/L	5	0.80	<0.80
1,2-Dichloropropane	µg/L		0.80	<0.80
1,3-Dichlorobenzene	µg/L		0.40	<0.40
1,4-Dichlorobenzene	µg/L	5	0.40	<0.40
2-Hexanone	µg/L		1.20	<1.20
Acetone	µg/L		4.0	<4.0
Benzene	µg/L	5	0.80	<0.80
Bromodichloromethane	µg/L		0.80	<0.80
Bromoform	µg/L		0.40	<0.40
Bromomethane	µg/L		0.80	<0.80
Carbon Tetrachloride	µg/L	5	0.80	<0.80
Chlorobenzene	µg/L		0.40	<0.40
Chloroethane	µg/L		0.80	<0.80
Chloroform	µg/L		0.80	<0.80
Chloromethane	µg/L		1.60	<1.60
cis-1,2-Dichloroethylene	µg/L		0.80	<0.80
cis-1,3-Dichloropropene	ug/L		0.80	<0.80
Dibromochloromethane	µg/L		0.40	<0.40
Dichlorodifluoromethane	µg/L		0.80	<0.80
Ethylbenzene	µg/L		0.40	1.5
Dichloromethane(Methylene Chloride)	µg/L		1.20	<1.20
Methyl Isobutyl Ketone	µg/L		4.0	<4.0
Methyl tert-butyl ether (MTBE)	µg/L		0.80	<0.80
Methyl-ethyl ketone, MEK (2-Butanone)	µg/L		4.0	<4.0

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T507452
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Leachate VOCs (water)

DATE SAMPLED: Jul 04, 2011 | DATE RECEIVED: Jul 05, 2011 | DATE REPORTED: Jul 14, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2521423
Styrene	µg/L		0.40	<0.40
Tetrachloroethylene	µg/L	30	0.80	<0.80
Toluene	µg/L	(24)	0.80	41
trans- 1,2-dichloroethylene	µg/L		0.80	<0.80
trans-1,3-Dichloropropene	µg/L		1.20	<1.20
Trichloroethylene	µg/L	5	0.80	<0.80
Trichlorofluoromethane (FREON 11)	µg/L		1.60	<1.60
Trihalomethanes (Total)	µg/L	100	2.0	<2.0
Vinyl Chloride	µg/L	2	0.68	<0.68
o-Xylene	µg/L		0.40	1.5
m & p-Xylene	µg/L		0.80	4.0
Xylene Mixture (Total)	µg/L	(300)	0.80	5.5
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		84
4-Bromofluorobenzene	% Recovery	70-130		96

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

2521423 Dilution factor= 4
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T507452
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Jul 04, 2011 | DATE RECEIVED: Jul 05, 2011 | DATE REPORTED: Jul 14, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2521423
Naphthalene	µg/L		0.12	2.1
Acenaphthylene	µg/L		0.11	<0.11
Acenaphthene	µg/L		0.10	0.22
Fluorene	µg/L		0.09	0.25
Phenanthrene	µg/L		0.10	<0.10
Anthracene	µg/L		0.05	<0.05
Fluoranthene	µg/L		0.12	0.17
Pyrene	µg/L		0.05	0.16
Benzo(a)anthracene	µg/L		0.08	<0.08
Chrysene	µg/L		0.05	<0.05
Benzo(b,j)fluoranthene	µg/L		0.05	0.08
Benzo(k)fluoranthene	µg/L		0.05	<0.05
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06
Dibenzo(a,h)anthracene	µg/L		0.09	<0.09
Benzo(g,h,i)perylene	µg/L		0.06	<0.06
Surrogate	**Unit**	**Acceptable Limits**		
Chrysene-d12	%	60-130		115

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T507452
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - Leachate Parameters

DATE SAMPLED: Jul 04, 2011 | DATE RECEIVED: Jul 05, 2011 | DATE REPORTED: Jul 14, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2521423
BOD (5)	mg/L		5	350
pH	pH Units	(6.5-8.5)	NA	7.88
Electrical Conductivity	uS/cm		2	7520
Total Dissolved Solids	mg/L	(500)	20	4560
Total Suspended Solids	mg/L		10	5380
Total Hardness (as CaCO3)	mg/L	(80-100)	10	1860
Chloride	mg/L	(250)	1.00	1190
Nitrate as N	mg/L	10.0	0.50	<0.50
Nitrite as N	mg/L	1.0	0.50	<0.50
Sulphate	mg/L	(500)	1.00	57.5
Ammonia as N	mg/L		0.02	189
Chemical Oxygen Demand	mg/L		5	3550
Dissolved Organic Carbon	mg/L	(5)	0.5	304
Phenols	mg/L		0.001	0.350
Total Kjeldahl Nitrogen	mg/L		0.10	218
Total Phosphorus	mg/L		0.02	51.3
Calcium	mg/L		0.05	306
Magnesium	mg/L		0.05	267
Sodium	mg/L	20 (200)	0.05	832
Potassium	mg/L		0.05	223
Arsenic	mg/L	0.025	0.003	0.050
Barium	mg/L	1	0.002	0.633
Beryllium	mg/L		0.001	<0.001
Boron	mg/L	5	0.100	9.82
Cadmium	mg/L	0.005	0.0001	<0.0001
Chromium	mg/L	0.05	0.003	0.058
Cobalt	mg/L		0.001	0.007
Copper	mg/L	(1)	0.002	0.005
Iron	mg/L	(0.3)	0.010	7.51
Lead	mg/L	0.01	0.001	0.003
Manganese	mg/L	(0.05)	0.002	3.04
Mercury	mg/L	0.001	0.0001	<0.0001
Molybdenum	mg/L		0.001	0.002

Certified By:

AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
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http://www.agatlabs.com

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - Leachate Parameters

DATE SAMPLED: Jul 04, 2011 | DATE RECEIVED: Jul 05, 2011 | DATE REPORTED: Jul 14, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2521423
Nickel	mg/L		0.003	0.062
Silver	mg/L		0.002	<0.002
Thallium	mg/L		0.003	<0.003
Vanadium	mg/L		0.002	0.025
Zinc	mg/L	(5)	0.005	0.034

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03

Certified By:

AGAT Laboratories

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Guideline Violation

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2521423	Leachate	O.Reg.169/03	Brooks Landfill - Leachate Parameters	Arsenic	0.025	0.050
2521423	Leachate	O.Reg.169/03	Brooks Landfill - Leachate Parameters	Boron	5	9.82
2521423	Leachate	O.Reg.169/03	Brooks Landfill - Leachate Parameters	Chromium	0.05	0.058
2521423	Leachate	O.Reg.169/03	Brooks Landfill - Leachate Parameters	Sodium	20 (200)	832
2521423	Leachate	O.Reg.169/03	Brooks Landfill - Leachate Parameters	Total Hardness (as CaCO3)	(80-100)	1860

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date: Jul 14, 2011

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Leachate VOCs (water)															
1,1,1,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10		60%	130%	111%	60%	130%	87%	60%	130%
1,1,1-Trichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	110%	60%	130%	120%	60%	130%	90%	60%	130%
1,1,2,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10		60%	130%	116%	60%	130%	85%	60%	130%
1,1,2-Trichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	107%	60%	130%	110%	60%	130%	87%	60%	130%
1,1-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	97%	60%	130%	102%	60%	130%	82%	60%	130%
1,1 Dichloroethylene	1		< 0.30	< 0.30	0.0%	< 0.30	84%	60%	130%	84%	60%	130%	90%	60%	130%
1,2-Dibromoethane (EDB)	1		< 0.20	< 0.20	0.0%	< 0.20	109%	60%	130%	110%	60%	130%	87%	60%	130%
1,2-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	107%	60%	130%	92%	60%	130%	109%	60%	130%
1,2 - Dichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	101%	60%	130%	101%	60%	130%	84%	60%	130%
1,2-Dichloropropane	1		< 0.20	< 0.20	0.0%	< 0.20	98%	60%	130%	92%	60%	130%	77%	60%	130%
1,3-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	99%	60%	130%	90%	60%	130%	95%	60%	130%
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	103%	60%	130%	92%	60%	130%	84%	60%	130%
2-Hexanone	1		< 0.30	< 0.30	0.0%	< 0.30	82%	60%	130%	88%	60%	130%	87%	60%	130%
Acetone	1		< 1.0	< 1.0	0.0%	< 1.0	101%	60%	130%	92%	60%	130%	110%	60%	130%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	106%	60%	130%	97%	60%	130%	88%	60%	130%
Bromodichloromethane	1		< 0.20	< 0.20	0.0%	< 0.20	100%	60%	130%	110%	60%	130%	84%	60%	130%
Bromoform	1		< 0.10	< 0.10	0.0%	< 0.10	117%	60%	130%	117%	60%	130%	88%	60%	130%
Bromomethane	1		< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	109%	60%	130%	74%	60%	130%
Carbon Tetrachloride	1		< 0.20	< 0.20	0.0%	< 0.20	111%	60%	130%	120%	60%	130%	89%	60%	130%
Chlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	95%	60%	130%	100%	60%	130%	84%	60%	130%
Chloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	92%	60%	130%	118%	60%	130%	87%	60%	130%
Chloroform	1		< 0.20	< 0.20	0.0%	< 0.20	102%	60%	130%	110%	60%	130%	88%	60%	130%
Chloromethane	1		< 0.40	< 0.40	0.0%	< 0.40	89%	60%	130%	113%	60%	130%	85%	60%	130%
cis-1,2-Dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	75%	60%	130%	93%	60%	130%		60%	130%
cis-1,3-Dichloropropene	1		< 0.20	< 0.20	0.0%	< 0.20	109%	60%	130%	110%	60%	130%	96%	60%	130%
Dibromochloromethane	1		< 0.10	< 0.10	0.0%	< 0.10	107%	60%	130%	118%	60%	130%	86%	60%	130%
Dichlorodifluoromethane	1		< 0.20	< 0.20	0.0%	< 0.20	81%	60%	130%	86%	60%	130%	70%	60%	130%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	86%	60%	130%	89%	60%	130%	81%	60%	130%
Dichloromethane(Methylene Chloride)	1		< 0.30	< 0.30	0.0%	< 0.30	108%	60%	130%	105%	60%	130%	81%	60%	130%
Methyl Isobutyl Ketone	1		< 1.0	< 1.0	0.0%	< 1.0	85%	60%	130%	96%	60%	130%	96%	60%	130%
Methyl tert-butyl ether (MTBE)	1		< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	77%	60%	130%	84%	60%	130%
Methyl-ethyl ketone, MEK (2-Butanone)	1		< 1.0	< 1.0	0.0%	< 1.0	72%	60%	130%	78%	60%	130%	83%	60%	130%
Styrene	1		< 0.10	< 0.10	0.0%	< 0.10	79%	60%	130%	92%	60%	130%	87%	60%	130%
Tetrachloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	93%	60%	130%	104%	60%	130%	85%	60%	130%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	91%	60%	130%	102%	60%	130%	84%	60%	130%
trans- 1,2-dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	84%	60%	130%	95%	60%	130%	86%	60%	130%
trans-1,3-Dichloropropene	1		< 0.30	< 0.30	0.0%	< 0.30	74%	60%	130%	83%	60%	130%	74%	60%	130%
Trichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	105%	60%	130%	99%	60%	130%	80%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis (Continued)

RPT Date: Jul 14, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Trichlorofluoromethane (FREON 11)	1		< 0.40	< 0.40	0.0%	< 0.40	89%	60%	130%	96%	60%	130%	82%	60%	130%
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	89%	60%	130%	111%	60%	130%	88%	60%	130%
o-Xylene	1		< 0.10	< 0.10	0.0%	< 0.10	97%	60%	130%	99%	60%	130%	80%	60%	130%
m & p-Xylene	1		< 0.20	< 0.20	0.0%	< 0.20	105%	60%	130%	107%	60%	130%	85%	60%	130%
Xylene Mixture (Total)	1		< 0.20	< 0.20	0.0%	< 0.20	97%	60%	130%	99%	60%	130%	80%	60%	130%
PAHs in Water															
Naphthalene	1					< 0.12	107%	60%	140%	88%	60%	140%		60%	140%
Acenaphthylene	1					< 0.11	103%	60%	140%	91%	60%	140%		60%	140%
Acenaphthene	1					< 0.10	108%	60%	140%	92%	60%	140%		60%	140%
Fluorene	1					< 0.09	106%	60%	140%	101%	60%	140%		60%	140%
Phenanthrene	1					< 0.10	92%	60%	140%	92%	60%	140%		60%	140%
Anthracene	1					< 0.05	106%	60%	140%	99%	60%	140%		60%	140%
Fluoranthene	1					< 0.12	98%	60%	140%	94%	60%	140%		60%	140%
Pyrene	1					< 0.05	97%	60%	140%	91%	60%	140%		60%	140%
Benzo(a)anthracene	1					< 0.08	90%	60%	140%	65%	60%	140%		60%	140%
Chrysene	1					< 0.05	82%	60%	140%	72%	60%	140%		60%	140%
Benzo(b,j)fluoranthene	1					< 0.05	111%	60%	140%	93%	60%	140%		60%	140%
Benzo(k)fluoranthene	1					< 0.05	116%	60%	140%	112%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	124%	60%	140%	91%	60%	140%		60%	140%
Indeno(1,2,3-cd)pyrene	1					< 0.06	95%	60%	140%	70%	60%	140%		60%	140%
Dibenzo(a,h)anthracene	1					< 0.09	100%	60%	140%	69%	60%	140%		60%	140%
Benzo(g,h,i)perylene	1					< 0.06	93%	60%	140%	69%	60%	140%		60%	140%

Certified By: Jacky Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 14, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - Leachate Parameters															
BOD (5)	1		13	13	0.0%	< 5	105%	75%	125%						
pH	1		7.71	7.73	0.3%	NA	105%	90%	110%						
Electrical Conductivity	1		4230	4240	0.2%	< 2	102%	80%	120%						
Total Dissolved Solids	1		564	558	1.1%	< 20	94%	80%	120%						
Total Suspended Solids	1		< 10	< 10	0.0%	< 10	108%	80%	120%						
Chloride	1		7.43	7.53	1.3%	< 0.10	97%	90%	110%	96%	90%	110%	95%	80%	120%
Nitrate as N	1		< 0.05	< 0.05	0.0%	< 0.05	92%	90%	110%	97%	90%	110%	97%	80%	120%
Nitrite as N	1		< 0.05	< 0.05	0.0%	< 0.05	NA	90%	110%	107%	90%	110%	108%	80%	120%
Sulphate	1		70.3	70.6	0.4%	< 0.10	93%	90%	110%	94%	90%	110%	97%	80%	120%
Ammonia as N	1		0.31	0.33	6.3%	< 0.02	101%	90%	110%	97%	90%	110%	94%	80%	120%
Chemical Oxygen Demand	1	2521423	3550	3480	2.0%	< 5	101%	90%	110%	95%	90%	110%			
Dissolved Organic Carbon	1		2.7	2.7	0.0%	< 0.5	95%	90%	110%	105%	90%	110%	94%	80%	120%
Phenols	1		0.045	0.046	2.2%	< 0.001	102%	90%	110%	97%	90%	110%	100%	80%	120%
Total Kjeldahl Nitrogen	1		0.82	0.83	1.2%	< 0.10	101%	80%	120%	92%	80%	120%	98%	70%	130%
Total Phosphorus	1		0.04	0.04	0.0%	< 0.02	99%	90%	110%	105%	90%	110%	98%	70%	130%
Calcium	1		140	139	0.7%	< 0.05	102%	90%	110%	103%	90%	110%	98%	70%	130%
Magnesium	1		11.1	11.1	0.0%	< 0.05	104%	90%	110%	104%	90%	110%	100%	70%	130%
Sodium	1		35.4	35.2	0.6%	< 0.05	106%	90%	110%	107%	90%	110%	98%	70%	130%
Potassium	1		0.60	0.52	14.3%	< 0.05	102%	90%	110%	102%	90%	110%	100%	70%	130%
Arsenic	1		< 0.003	< 0.003	0.0%	< 0.003	101%	90%	110%	107%	90%	110%	107%	70%	130%
Barium	1		0.212	0.214	0.9%	< 0.002	105%	90%	110%	102%	90%	110%	105%	70%	130%
Beryllium	1		< 0.001	< 0.001	0.0%	< 0.001	98%	90%	110%	100%	90%	110%	104%	70%	130%
Boron	1		0.480	0.486	1.2%	< 0.010	98%	90%	110%	99%	90%	110%	85%	70%	130%
Cadmium	1		< 0.0001	< 0.0001	0.0%	< 0.0001	97%	90%	110%	104%	90%	110%	101%	70%	130%
Chromium	1		< 0.003	< 0.003	0.0%	< 0.003	99%	90%	110%	100%	90%	110%	107%	70%	130%
Cobalt	1		< 0.001	< 0.001	0.0%	< 0.001	93%	90%	110%	104%	90%	110%	98%	70%	130%
Copper	1		< 0.002	< 0.002	0.0%	< 0.002	96%	90%	110%	104%	90%	110%	96%	70%	130%
Iron	1		1.59	1.56	1.9%	< 0.010	101%	90%	110%	106%	90%	110%	105%	70%	130%
Lead	1		< 0.001	< 0.001	0.0%	< 0.001	107%	90%	110%	101%	90%	110%	107%	70%	130%
Manganese	1		1.39	1.44	3.5%	< 0.002	103%	90%	110%	104%	70%	130%	82%	70%	130%
Mercury	1		< 0.0001	< 0.0001	0.0%	< 0.0001	95%	90%	110%	96%	90%	110%	96%	70%	130%
Molybdenum	1		< 0.001	< 0.001	0.0%	< 0.001	94%	90%	110%	100%	90%	110%	99%	70%	130%
Nickel	1		< 0.003	< 0.003	0.0%	< 0.003	95%	90%	110%	101%	90%	110%	92%	70%	130%
Silver	1		< 0.002	< 0.002	0.0%	< 0.002	91%	90%	110%	114%	80%	120%	82%	70%	130%
Thallium	1		< 0.003	< 0.003	0.0%	< 0.003	94%	90%	110%	100%	90%	110%	95%	70%	130%
Vanadium	1		< 0.002	< 0.002	0.0%	< 0.002	94%	90%	110%	99%	90%	110%	100%	70%	130%
Zinc	1		0.398	0.401	0.8%	< 0.005	95%	90%	110%	101%	90%	110%	100%	70%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis (Continued)

RPT Date: Jul 14, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dibromoethane (EDB)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichloromethane(Methylene Chloride)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether (MTBE)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl-ethyl ketone, MEK (2-Butanone)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane (FREON 11)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trihalomethanes (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b,j)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507452

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010 & 200.7 & SM 2340 B	ICP/OES
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020 & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020 & 200.8	ICP-MS
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

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5.6

1 medium cooler

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CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 4.6 AGAT WO #: 11T507452
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St. Brantford. ON
Phone: 519-756-9422 Fax:
Project: 111-53338-00 PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To
Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: Matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☑ Other (indicate) ODWQS.
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☑ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☐ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs Full MilVan	PAHs Full MilVan	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	Leachate Inorganic	Chemistry	Leachate Metals	Leachate VOCs	Leachate PAHs	LABORATORY USE ONLY LAB SAMPLE ID
Leachate.	July 4/11		Leachate	12					✓	✓						✓		✓	✓	✓	

Samples Relinquished By (print name & sign): Matt Welsh — Date/Time: July 5/11
Samples Relinquished By (print name & sign): — Date/Time:
Samples Received By (print name & sign): Joe — Date/Time: 7/5/11 2:30.
Samples Received By (print name & sign): Joe 7/5/11 — Date/Time: 7:14P.

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of 1
NO: 155048

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CLIENT NAME: GENIVAR
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: Bailey Walters

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T533039

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Oct 04, 2011

PAGES (INCLUDING COVER): 13

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

s53 Leachate - Benzo(a)pyrene and Naphthalene

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Sep 30, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2743178
Naphthalene	µg/L	7	0.12	1.8
Benzo(a)pyrene	µg/L		0.01	<0.01
Surrogate	**Unit**	**Acceptable Limits**		
Chrysene-d12	%	60-130		98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

s53 Stormwater (PWQO) - Organics

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Sep 30, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 2743094
Ethylbenzene	µg/L	8	0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01
Naphthalene	µg/L	7	0.12	<0.12
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		83
4-Bromofluorobenzene	% Recovery	70-130		116
Chrysene-d12	% Recovery	50-130		93

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

s53- Leachate Volatile Organic Compounds in Water

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Sep 30, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2743178
Vinyl Chloride	µg/L	600	1.70	<1.70
Methylene Chloride	µg/L	100	3.00	<3.00
Benzene	µg/L	100	2.00	<2.00
Toluene	µg/L	0.8	2.00	13
Ethylbenzene	µg/L	8	1.00	<1.00
1,4-Dichlorobenzene	µg/L	4	1.00	<1.00
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		75
4-Bromofluorobenzene	% Recovery	70-130		87

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

2743178 Dilution factor= 10
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

Brooks Landfill - s53 Storm Water Parameters

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Oct 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 2743094
Alkalinity (as CaCO3)	µg/L		5000	206000
Ammonia as N	µg/L		20	180
BOD (5)	µg/L		5000	<5000
Chemical Oxygen Demand	µg/L		5000	33000
Chloride	µg/L		100	13900
Electrical Conductivity	uS/cm		2	692
Nitrate as N	µg/L		50	<50
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	8.34
Phenols	µg/L	1.0	1	<1
Sulphate	µg/L		100	233000
Total Dissolved Solids	µg/L		20000	532000
Total Hardness (as CaCO3)	µg/L		500	390000
Total Kjeldahl Nitrogen	µg/L		100	700
Total Phosphorus	µg/L	20	20	80
Total Suspended Solids	µg/L		10000	27500
Arsenic	µg/L	100	3.0	<3.0
Barium	µg/L		2.0	75.5
Boron	µg/L	200	10.0	346
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0
Copper	µg/L	5	0.80	1.23
Iron	µg/L	300	10.0	239
Lead	µg/L	5	1.0	<1.0
Dissolved Mercury	µg/L		0.1	<0.1
Zinc	µg/L	30	5.0	18.9

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

Brooks Landfill - Leachate Parameters - (PWQO)

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Oct 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2743178
Alkalinity (as CaCO3)	µg/L		5000	2550000
Ammonia as N	µg/L		20	165000
BOD (5)	µg/L		5000	540000
Calcium	µg/L		50	238000
Chemical Oxygen Demand	µg/L		5000	1350000
Chloride	µg/L		100	1150000
Electrical Conductivity	uS/cm		2	6200
Dissolved Organic Carbon	µg/L		500	412000
Total Hardness (as CaCO3)	µg/L		500	2040000
Nitrate as N	µg/L		50	<50
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	7.90
Phenols	µg/L	1.0	1	766
Potassium	µg/L		50	246000
Sulphate	µg/L		100	220000
Total Dissolved Solids	µg/L		20000	4580000
Total Kjeldahl Nitrogen	µg/L		100	229000
Total Phosphorus	µg/L	20	20	4880
Total Suspended Solids	µg/L		10000	6510000
Arsenic	µg/L	100	3.0	56.1
Barium	µg/L		2.0	234
Boron	µg/L	200	10.0	10500
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	76.6
Copper	µg/L	5	0.80	17.4
Iron	µg/L	300	10.0	6950
Lead	µg/L	5	1.0	4.1
Magnesium	µg/L		50	351000
Dissolved Mercury	µg/L		0.1	<0.1
Sodium	µg/L		50	821000
Zinc	µg/L	30	5.0	101
% Difference/ Ion Balance	%		NA	Error

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

Brooks Landfill - Leachate Parameters - (PWQO)

DATE SAMPLED: Sep 26, 2011	DATE RECEIVED: Sep 27, 2011	DATE REPORTED: Oct 03, 2011	SAMPLE TYPE: Water

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By:

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Guideline Violation

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

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CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2743094	TDS Pond	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Boron	200	346
2743094	TDS Pond	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Total Phosphorus	20	80
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Boron	200	10500
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Chromium	8.9	76.6
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Copper	5	17.4
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Iron	300	6950
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Phenols	1.0	766
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Total Phosphorus	20	4880
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Zinc	30	101
2743178	Leachate	PWQO.	s53- Leachate Volatile Organic Compounds in Water	Toluene	0.8	13

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53 Stormwater (PWQO) - Organics															
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	71%	60%	130%	114%	60%	130%	95%	60%	130%
Benzo(a)pyrene	1					< 0.01	100%	60%	140%	100%	60%	140%		60%	140%
Naphthalene	1					< 0.12	103%	60%	140%	100%	60%	140%		60%	140%
s53 Leachate - Benzo(a)pyrene and Naphthalene															
Naphthalene	1					< 0.12	100%	60%	140%	100%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	103%	60%	140%	100%	90%	110%		60%	140%
s53- Leachate Volatile Organic Compounds in Water															
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	102%	50%	140%	115%	50%	140%	123%	50%	140%
Methylene Chloride	1		< 0.30	< 0.30	0.0%	< 0.30	105%	50%	140%	107%	60%	130%	108%	50%	140%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	88%	50%	140%	114%	60%	130%	101%	50%	140%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	84%	50%	140%	106%	60%	130%	106%	50%	140%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	71%	50%	140%	95%	60%	130%	95%	50%	140%
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	84%	50%	140%	94%	60%	130%	86%	50%	140%

Certified By: Jordy Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - s53 Storm Water Parameters															
Alkalinity (as CaCO3)	1		25000	25000	0.0%	< 5000	99%	80%	120%						
Ammonia as N	1		80	70	13.3%	< 20	99%	90%	110%	94%	90%	110%	103%	80%	120%
BOD (5)	1	2743094	< 5000	< 5000	0.0%	< 5000	90%	75%	125%						
Chemical Oxygen Demand	1		60900	58400	4.2%	< 5000	91%	90%	110%	100%	90%	110%	90%	70%	130%
Chloride	1		21300	21100	0.9%	< 100	94%	90%	110%	94%	90%	110%	100%	80%	120%
Electrical Conductivity	1		353	352	0.3%	< 2	101%	80%	120%						
Nitrate as N	1		< 50	< 50	0.0%	< 50	91%	90%	110%	103%	90%	110%	103%	80%	120%
Nitrite as N	1		< 50	< 50	0.0%	< 50	NA	90%	110%	94%	90%	110%	108%	80%	120%
pH	1		7.52	7.54	0.3%		100%	90%	110%						
Phenols	1		< 1	< 1	0.0%	< 1	101%	90%	110%	97%	90%	110%	96%	80%	120%
Sulphate	1		332000	328000	1.2%	< 100	104%	90%	110%	97%	90%	110%	97%	80%	120%
Total Dissolved Solids	1		550000	550000	0.0%	< 20000	100%	80%	120%						
Total Kjeldahl Nitrogen	1		1420	1390	2.1%	< 100	103%	80%	120%	102%	80%	120%	106%	70%	130%
Total Phosphorus	1		326	322	1.2%	< 20	100%	90%	110%	96%	90%	110%	104%	80%	120%
Total Suspended Solids	1		86000	89000	3.4%	< 10000	98%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	98%	90%	110%	101%	90%	110%	105%	70%	130%
Barium	1		75.4	74.6	1.1%	< 2.0	99%	90%	110%	102%	90%	110%	105%	70%	130%
Boron	1		138	142	2.9%	< 10.0	105%	90%	110%	102%	90%	110%	107%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	95%	90%	110%	97%	90%	110%	99%	70%	130%
Chromium	1		< 3.0	< 3.0	0.0%	< 3.0	106%	90%	110%	108%	90%	110%	105%	70%	130%
Copper	1		2.57	2.54	1.2%	< 0.80	105%	90%	110%	110%	90%	110%	109%	70%	130%
Iron	1		378	368	2.7%	< 10.0	90%	90%	110%	109%	90%	110%	101%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	103%	90%	110%	107%	90%	110%	105%	70%	130%
Dissolved Mercury	1		< 0.1	< 0.1	0.0%	< 0.1	98%	90%	110%	104%	90%	110%	99%	70%	130%
Zinc	1		14.8	14.5	2.0%	< 5.0	100%	90%	110%	105%	90%	110%	103%	70%	130%
Brooks Landfill - Leachate Parameters - (PWQO)															
Dissolved Organic Carbon	1		1400	1400	0.0%	< 500	99%	90%	110%	100%	90%	110%	94%	80%	120%
Potassium	1	2743094	5560	5640	1.4%	< 50	101%	90%	110%	100%	90%	110%	103%	70%	130%
Sodium	1	2743094	23400	22100	5.7%	< 50	99%	90%	110%	100%	90%	110%	100%	70%	130%

Certified By:

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG 5505	EPA SW-846 3510C & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Naphthalene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chrysene-d12	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
% Difference/ Ion Balance		SM 1030 E	CALCULATION

2 COOLER
Med
1g

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1.9
AGAT WO #: 11T533039
Lab Temperature: 1.0
Notes:

Client Information:
Company: GENIVAR INC.
Contact: Bailey Walters
Address: 1425 Cormorant Road
Ancaster ON
Phone: 289-239-0100 Fax: 289-239-0109
Project: 111-53338-00 PO: 111-53338-00 · 0064012 100
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ____ (Indicate one)
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region ____ (Indicate one)
☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (specify)
☑ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☐ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☑ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
*TAT is exclusive of weekends and statutory holidays

Invoice To:
Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☐ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: Bailey Walters
Email: bailey.walters@genivar.com
2. Name:
Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ NO2/NO3 ☐ N-Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH3 ☐ TKN ☐ NO3 ☐ NO2 ☐ NO2/NO3	VOC: ☐ VOC ☐ THM ☑ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	✓ S53 Leachate	✓ S53 Storm
TDS Pond	Sept 26/11		SW	17																	✓		
Leachate.	Sept 26/11		Leachate	12																		✓	

Samples Relinquished by (print name & sign): Matt Welch — Date/Time
Samples Relinquished by (print name & sign): — Date/Time
Samples Received by (Print name & sign): 09/27/11 — Date/Time 1240
Samples Received by (Print name & sign): — Date/Time 2735

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page ____ of ____
NO: 160970

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

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CLIENT NAME: GENIVAR
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: MATTHEW WELSH

PROJECT NO: Brooks Landfill

AGAT WORK ORDER: 11T549297

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Nov 22, 2011

PAGES (INCLUDING COVER): 17

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	RDL	SW4 2908626	RDL	SW6 2908645	RDL	SW8 2908657	SW3 2908671
1,1,1,2-Tetrachloroethane	µg/L	20	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,1,1-Trichloroethane	µg/L	10	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
1,1,2,2-Tetrachloroethane	µg/L	70	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,1,2-Trichloroethane	µg/L	800	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
1,1 Dichloroethylene	µg/L	40	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
1,2-Dibromoethane (EDB)	µg/L	5	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,2 - Dichloroethane	µg/L	100	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,3-Dichlorobenzene	µg/L	2.5	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
2-Hexanone	µg/L		0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
Acetone	µg/L		2.0	<2.0	1.0	<1.0	2.0	<2.0	1.0	<1.0	<1.0
Benzene	µg/L	100	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Bromoform	µg/L	60	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Bromomethane	µg/L	0.9	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Carbon Tetrachloride	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Chlorobenzene	µg/L	15	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Chloroethane	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Chloroform	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Chloromethane	µg/L	700	0.80	<0.80	0.40	<0.40	0.80	<0.80	0.40	<0.40	<0.40
cis- 1,2-Dichloroethylene	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Dibromochloromethane	µg/L	40	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Dichlorodifluoromethane	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Ethylbenzene	µg/L	8	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Dichloromethane (Methylene Chloride)	µg/L	100	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
Methyl Isobutyl Ketone	µg/L		2.0	<2.0	1.0	<1.0	2.0	<2.0	1.0	<1.0	<1.0
Methyl tert-butyl ether (MTBE)	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Methyl Ethyl Ketone, MEK (2-Butanone)	µg/L	400	2.0	<2.0	1.0	<1.0	2.0	<2.0	1.0	<1.0	<1.0

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	RDL	SW4 2908626	RDL	SW6 2908645	RDL	SW8 2908657	SW3 2908671
Styrene	µg/L	4	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Tetrachloroethylene	µg/L	50	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Toluene	µg/L	0.8	0.40	<0.40	0.20	<0.20	0.40	1.1	0.20	<0.20	<0.20
trans- 1,2-dichloroethylene	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
trans-1,3-Dichloropropene	µg/L	7	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
Trichloroethylene	µg/L	20	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Trichlorofluoromethane (Freon 11)	µg/L		0.80	<0.80	0.40	<0.40	0.80	<0.80	0.40	<0.40	<0.40
Trihalomethanes (Total)	µg/L		1.0	<1.0	0.5	<0.5	1.0	<1.0	0.5	<0.5	<0.5
Vinyl Chloride	µg/L	600	0.34	<0.34	0.17	<0.17	0.34	<0.34	0.17	<0.17	<0.17
o-Xylene	µg/L	40	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
m & p-Xylene	µg/L	32	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Xylene Mixture (Total)	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Toluene-d8	% Recovery	60-130		94		95		93		92	95
4-Bromofluorobenzene	% Recovery	70-130		72		73		77		74	75

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW5 2908683	SW7 2908696	SWD1 2908711
1,1,1,2-Tetrachloroethane	µg/L	20	0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10	0.60	<0.60	<0.60	<0.60
1,1,2,2-Tetrachloroethane	µg/L	70	0.20	<0.20	<0.20	<0.20
1,1,2-Trichloroethane	µg/L	800	0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	µg/L	200	0.60	<0.60	<0.60	<0.60
1,1 Dichloroethylene	µg/L	40	0.60	<0.60	<0.60	<0.60
1,2-Dibromoethane (EDB)	µg/L	5	0.40	<0.40	<0.40	<0.40
1,2-Dichlorobenzene	µg/L	2.5	0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	0.40	<0.40	<0.40	<0.40
1,2-Dichloropropane	µg/L	0.7	0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	µg/L	2.5	0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L		0.60	<0.60	<0.60	<0.60
Acetone	µg/L		2.0	<2.0	<2.0	<2.0
Benzene	µg/L	100	0.40	<0.40	<0.40	<0.40
Bromodichloromethane	µg/L	200	0.40	<0.40	<0.40	<0.40
Bromoform	µg/L	60	0.20	<0.20	<0.20	<0.20
Bromomethane	µg/L	0.9	0.40	<0.40	<0.40	<0.40
Carbon Tetrachloride	µg/L		0.40	<0.40	<0.40	<0.40
Chlorobenzene	µg/L	15	0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L		0.40	<0.40	<0.40	<0.40
Chloroform	µg/L		0.40	<0.40	<0.40	<0.40
Chloromethane	µg/L	700	0.80	<0.80	<0.80	<0.80
cis- 1,2-Dichloroethylene	µg/L	200	0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	ug/L		0.40	<0.40	<0.40	<0.40
Dibromochloromethane	µg/L	40	0.20	<0.20	<0.20	<0.20
Dichlorodifluoromethane	µg/L		0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	8	0.20	<0.20	<0.20	<0.20
Dichloromethane (Methylene Chloride)	µg/L	100	0.60	<0.60	<0.60	<0.60
Methyl Isobutyl Ketone	µg/L		2.0	<2.0	<2.0	<2.0
Methyl tert-butyl ether (MTBE)	µg/L	200	0.40	<0.40	<0.40	<0.40
Methyl Ethyl Ketone, MEK (2-Butanone)	µg/L	400	2.0	<2.0	<2.0	<2.0

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW5 2908683	SW7 2908696	SWD1 2908711
Styrene	µg/L	4	0.20	<0.20	<0.20	<0.20
Tetrachloroethylene	µg/L	50	0.40	<0.40	<0.40	<0.40
Toluene	µg/L	0.8	0.40	<0.40	<0.40	<0.40
trans- 1,2-dichloroethylene	µg/L	200	0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	µg/L	7	0.60	<0.60	<0.60	<0.60
Trichloroethylene	µg/L	20	0.40	<0.40	<0.40	<0.40
Trichlorofluoromethane (Freon 11)	µg/L		0.80	<0.80	<0.80	<0.80
Trihalomethanes (Total)	µg/L		1.0	<1.0	<1.0	<1.0
Vinyl Chloride	µg/L	600	0.34	<0.34	<0.34	<0.34
o-Xylene	µg/L	40	0.20	<0.20	<0.20	<0.20
m & p-Xylene	µg/L	32	0.40	<0.40	<0.40	<0.40
Xylene Mixture (Total)	µg/L		0.40	<0.40	<0.40	<0.40
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	60-130		89	88	112
4-Bromofluorobenzene	% Recovery	70-130		73	73	75

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO(ug/L)

2908589 Dilution factor= 2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

2908645 Dilution factor= 2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

2908683-2908711 Dilution factor= 2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	SW4 2908626	SW6 2908645	SW8 2908657	SW3 2908671	SW5 2908683	SW7 2908696	SWD1 2908711
Naphthalene	µg/L	7	0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L	0.2	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L	0.03	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L	0.0008	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L	0.0008	0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L	0.0004	0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L	0.0001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L	0.0002	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L	0.002	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L	0.00002	0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
2-and 1-methyl Napthalene	µg/L	2.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Chrysene-d12	%	60-130		67	90	78	73	83	81	74	72

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO(ug/L)

2908589-2908711 Note: The result for Benzo(b)Flouranthene is the total of the Benzo(b)&(j)Flouranthene isomers because the isomers co-elute on the GC column.

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 21, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	SW4 2908626	SW6 2908645	SW8 2908657	SW3 2908671	SW5 2908683	SW7 2908696	SWD1 2908711
Alkalinity (as CaCO3)	µg/L		5000	68900	129000	113000	12000	138000	308000	38700	68900
Ammonia as N	µg/L		20	62	44	79	92	65	1420	78	62
Ammonia-Un-ionized	µg/L	20	20	<20	<20	<20	<20	<20	135	<20	<20
BOD (5)	µg/L		5000	<5000	<5000	15000	9000	<5000	<5000	<5000	<5000
Calcium	µg/L		50	45400	83100	45200	15000	84400	139000	17500	45500
Chemical Oxygen Demand	µg/L		5000	146000	25800	254000	142000	22600	58000	125000	116000
Chloride	µg/L		100	48600	16300	11300	1470	13500	24000	4510	48400
Electrical Conductivity	uS/cm		2	415	686	389	129	791	975	166	410
Dissolved Organic Carbon	µg/L		500	27500	13400	56200	22400	9350	25300	45900	25100
Total Hardness (as CaCO3)	µg/L		500	170000	328000	174000	54800	368000	484000	73500	170000
Nitrate as N	µg/L		50	<50	<50	<50	<50	<50	<50	<50	<50
Nitrite as N	µg/L		50	<50	<50	<50	<50	<50	<50	<50	<50
pH	pH Units	6.5-8.5	NA	7.52	8.34	7.43	6.63	8.30	8.26	7.08	7.55
Phenols	µg/L	1.0	1	<1	<1	40	<1	<1	<1	4	<1
Potassium	µg/L		50	5340	5970	5850	3200	3360	9250	5850	5380
Sulphate	µg/L		100	54300	220000	59200	36500	278000	210000	25600	53900
Total Dissolved Solids	µg/L		20000	312000	440000	294000	160000	514000	716000	198000	340000
Total Kjeldahl Nitrogen	µg/L		100	3840	1350	8500	6300	1150	3800	3360	3950
Total Phosphorus	µg/L	30	20	1000	46	833	535	93	174	177	953
Total Suspended Solids	µg/L		10000	296000	<10000	106000	130000	154000	368000	68000	308000
Arsenic	µg/L	100	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3.9	<3.0	<3.0
Barium	µg/L		2.0	54.4	37.1	36.6	37.7	56.5	80.2	30.4	49.6
Beryllium	µg/L	11	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	200	10.0	25.6	150	38.3	25.8	228	66.8	48.0	35.0
Cadmium	µg/L	0.2	0.10	0.17	<0.10	<0.10	0.17	<0.10	<0.10	0.19	0.15
Chromium	µg/L	8.9	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Cobalt	µg/L	0.9	0.50	1.28	<0.50	0.98	1.29	0.62	2.62	2.19	1.27
Copper	µg/L	5	0.80	4.70	1.68	<0.80	5.15	2.70	5.92	3.53	4.21
Iron	µg/L	300	10.0	15600	119	2600	2410	703	4250	5110	14800
Lead	µg/L	5	1.0	1.7	<1.0	2.0	2.5	2.1	6.9	3.9	1.6
Magnesium	µg/L		50	13700	29200	14900	4210	38200	33300	7240	13700
Manganese	µg/L		2.0	245	41.2	403	126	108	638	239	257
Dissolved Mercury	µg/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 21, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	SW4 2908626	SW6 2908645	SW8 2908657	SW3 2908671	SW5 2908683	SW7 2908696	SWD1 2908711
Molybdenum	µg/L	40	2.0	<2.0	<2.0	<2.0	<2.0	2.6	<2.0	<2.0	<2.0
Nickel	µg/L	25	3.0	3.7	<3.0	3.4	3.3	3.4	6.3	4.2	3.5
Silver	µg/L	0.1	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	µg/L		50	10300	17900	8510	1570	19400	17700	3420	10300
Thallium	µg/L	0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Vanadium	µg/L	6	2.0	2.5	<2.0	<2.0	4.7	<2.0	4.4	4.0	2.3
Zinc	µg/L	30	5.0	124	5.0	16.1	29.1	25.4	35.9	22.0	109
% Difference Cation/Anion					0.9	2.5	9.2	3.7	1.9	10.6	1.6

Parameter	Unit	G / S	RDL	Leachate 2908723
Alkalinity (as CaCO3)	µg/L		5000	3700000
Ammonia as N	µg/L		20	384000
Ammonia-Un-ionized	µg/L	20	20	25000
BOD (5)	µg/L		5000	484000
Calcium	µg/L		50	203000
Chemical Oxygen Demand	µg/L		5000	1680000
Chloride	µg/L		1000	1440000
Electrical Conductivity	uS/cm		2	10300
Dissolved Organic Carbon	µg/L		500	555000
Nitrate as N	µg/L		500	<500
pH	pH Units	6.5-8.5	NA	8.08
Sulphate	µg/L		1000	75100
Total Dissolved Solids	µg/L		20000	5800000
Barium	µg/L		2.0	329
Boron	µg/L	200	100	16100
Iron	µg/L	300	10.0	2210
Magnesium	µg/L		50	410000
Sodium	µg/L		50	1090000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO(ug/L)

Certified By:

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Guideline Violation

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

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CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.28
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	15600
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	1000
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	124
2908626	SW4	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	46
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	0.98
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2600
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Phenols	1.0	40
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	833
2908645	SW6	PWQO(ug/L)	Brooks Landfill VOCs (water)	Toluene	0.8	1.1
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.29
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Copper	5	5.15
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2410
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	535
2908671	SW3	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Boron	200	228
2908671	SW3	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	703
2908671	SW3	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	93
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Ammonia-Un-ionized	20	135
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	2.62
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Copper	5	5.92
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	4250
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Lead	5	6.9
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	174
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	35.9

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Guideline Violation

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

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CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	2.19
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	5110
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Phenols	1.0	4
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	177
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.27
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	14800
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	953
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	109
2908723	Leachate	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Ammonia-Un-ionized	20	25000
2908723	Leachate	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Boron	200	16100
2908723	Leachate	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2210

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
PAHs in Water															
Naphthalene	1	2908671	< 0.12	< 0.12	0.0%	< 0.12	89%	50%	140%	94%	50%	140%	96%	50%	140%
Acenaphthylene	1	2908671	< 0.11	< 0.11	0.0%	< 0.11	106%	50%	140%	124%	50%	140%	119%	50%	140%
Acenaphthene	1	2908671	< 0.10	< 0.10	0.0%	< 0.10	91%	50%	140%	100%	50%	140%	98%	50%	140%
Fluorene	1	2908671	< 0.09	< 0.09	0.0%	< 0.09	91%	50%	140%	105%	50%	140%	99%	50%	140%
Phenanthrene	1	2908671	< 0.10	< 0.10	0.0%	< 0.10	94%	50%	140%	110%	50%	140%	106%	50%	140%
Anthracene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	110%	50%	140%	105%	50%	140%
Fluoranthene	1	2908671	< 0.12	< 0.12	0.0%	< 0.12	93%	50%	140%	111%	50%	140%	112%	50%	140%
Pyrene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	94%	50%	140%	109%	50%	140%	111%	50%	140%
Benzo(a)anthracene	1	2908671	< 0.08	< 0.08	0.0%	< 0.08	100%	50%	140%	102%	50%	140%	115%	50%	140%
Chrysene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	106%	50%	140%	114%	50%	140%	108%	50%	140%
Benzo(b)fluoranthene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	111%	50%	140%	100%	50%	140%
Benzo(k)fluoranthene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	107%	50%	140%	97%	50%	140%	95%	50%	140%
Benzo(a)pyrene	1	2908671	< 0.01	< 0.01	0.0%	< 0.01	91%	50%	140%	90%	50%	140%	85%	50%	140%
Indeno(1,2,3-cd)pyrene	1	2908671	< 0.06	< 0.06	0.0%	< 0.06	90%	50%	140%	78%	50%	140%	82%	50%	140%
Dibenzo(a,h)anthracene	1	2908671	< 0.09	< 0.09	0.0%	< 0.09	86%	50%	140%	83%	50%	140%	87%	50%	140%
Benzo(g,h,i)perylene	1	2908671	< 0.06	< 0.06	0.0%	< 0.06	97%	50%	140%	83%	50%	140%	87%	50%	140%
2-and 1-methyl Napthalene	1	2908671	< 0.20	< 0.20	0.0%	< 0.20	90%	50%	140%	90%	50%	140%	92%	50%	140%
Brooks Landfill VOCs (water)															
1,1,1,2-Tetrachloroethane	1	2908626	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	110%	60%	130%	85%	60%	130%
1,1,1-Trichloroethane	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	81%	60%	130%	109%	60%	130%	86%	60%	130%
1,1,2,2-Tetrachloroethane	1	2908626	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	123%	60%	130%	100%	60%	130%
1,1,2-Trichloroethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	86%	60%	130%	116%	60%	130%	98%	60%	130%
1,1-Dichloroethane	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	79%	60%	130%	107%	60%	130%	93%	60%	130%
1,1 Dichloroethylene	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	77%	60%	130%	72%	60%	130%	74%	60%	130%
1,2-Dibromoethane (EDB)	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	110%	60%	130%	94%	60%	130%
1,2-Dichlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	72%	60%	130%	84%	60%	130%	126%	60%	130%
1,2 - Dichloroethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	86%	60%	130%	84%	60%	130%
1,2-Dichloropropane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	84%	60%	130%	98%	60%	130%	84%	60%	130%
1,3-Dichlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	74%	60%	130%	80%	60%	130%	129%	60%	130%
1,4-Dichlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	71%	60%	130%	83%	60%	130%	116%	60%	130%
2-Hexanone	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	100%	60%	130%	114%	60%	130%	106%	60%	130%
Acetone	1	2908626	< 1.0	< 1.0	0.0%	< 1.0	123%	60%	130%	96%	60%	130%	91%	60%	130%
Benzene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	100%	60%	130%	126%	60%	130%
Bromodichloromethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	77%	60%	130%	90%	60%	130%	93%	60%	130%
Bromoform	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	83%	60%	130%	84%	60%	130%	130%	60%	130%
Bromomethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	90%	60%	130%	95%	60%	130%	95%	60%	130%
Carbon Tetrachloride	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	71%	60%	130%	79%	60%	130%	83%	60%	130%
Chlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	85%	60%	130%	121%	60%	130%	116%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Chloroethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	86%	60%	130%	93%	60%	130%	91%	60%	130%
Chloroform	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	81%	60%	130%	94%	60%	130%	93%	60%	130%
Chloromethane	1	2908626	< 0.40	< 0.40	0.0%	< 0.40	107%	60%	130%	103%	60%	130%	97%	60%	130%
cis- 1,2-Dichloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	86%	60%	130%	98%	60%	130%	97%	60%	130%
cis-1,3-Dichloropropene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	72%	60%	130%	83%	60%	130%	79%	60%	130%
Dibromochloromethane	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	75%	60%	130%	94%	60%	130%	78%	60%	130%
Dichlorodifluoromethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	96%	60%	130%	121%	60%	130%	123%	60%	130%
Ethylbenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	82%	60%	130%	115%	60%	130%	124%	60%	130%
Dichloromethane (Methylene Chloride)	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	72%	60%	130%	72%	60%	130%	77%	60%	130%
Methyl Isobutyl Ketone	1	2908626	< 1.0	< 1.0	0.0%	< 1.0	94%	60%	130%	115%	60%	130%	108%	60%	130%
Methyl tert-butyl ether (MTBE)	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	107%	60%	130%	76%	60%	130%
Methyl Ethyl Ketone, MEK (2-Butanone)	1	2908626	< 1.0	< 1.0	0.0%	< 1.0	94%	60%	130%	113%	60%	130%	98%	60%	130%
Styrene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	76%	60%	130%	88%	60%	130%	106%	60%	130%
Tetrachloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	120%	60%	130%	108%	60%	130%
Toluene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	93%	60%	130%	122%	60%	130%	125%	60%	130%
trans- 1,2-dichloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	119%	60%	130%	92%	60%	130%
trans-1,3-Dichloropropene	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	75%	60%	130%	86%	60%	130%	74%	60%	130%
Trichloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	101%	60%	130%	106%	60%	130%
Trichlorofluoromethane (Freon 11)	1	2908626	< 0.40	< 0.40	0.0%	< 0.40	86%	60%	130%	76%	60%	130%	90%	60%	130%
Vinyl Chloride	1	2908626	< 0.17	< 0.17	0.0%	< 0.17	85%	60%	130%	100%	60%	130%	100%	60%	130%
o-Xylene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	82%	60%	130%	121%	60%	130%	128%	60%	130%
m & p-Xylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	120%	60%	130%	61%	60%	130%
Xylene Mixture (Total)	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	121%	60%	130%	128%	60%	130%

Certified By: Jacky Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)															
Alkalinity (as CaCO3)	1	2908589	68900	69200	0.4%	< 5000	98%	80%	120%						
Ammonia as N	1	2908589	62	54	13.8%	< 20	102%	90%	110%	99%	90%	110%	110%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	97%	75%	125%						
Calcium	1	2908626	83100	79700	4.2%	< 50	94%	90%	110%	94%	90%	110%	92%	70%	130%
Chemical Oxygen Demand	1		32500	29000	11.4%	< 5000	106%	90%	110%	103%	90%	110%	100%	70%	130%
Chloride	1	2908645	11300	11400	0.9%	< 100	95%	90%	110%	97%	90%	110%	101%	80%	120%
Electrical Conductivity	1	2908589	415	415	0.0%	< 2	103%	80%	120%						
Dissolved Organic Carbon	1		4200	4100	2.4%	< 500	98%	90%	110%	90%	90%	110%	82%	80%	120%
Nitrate as N	1	2908645	< 50	< 50	0.0%	< 50	100%	90%	110%	103%	90%	110%	103%	80%	120%
Nitrite as N	1	2908645	< 50	< 50	0.0%	< 50	NA	90%	110%	93%	90%	110%	104%	80%	120%
pH	1	2908589	7.52	7.56	0.5%	N/A	100%	80%	120%						
Phenols	1	2908589	< 1	< 1	0.0%	< 1	98%	90%	110%	97%	90%	110%	95%	80%	120%
Potassium	1	2908626	5970	5550	7.3%	< 50	93%	90%	110%	93%	90%	110%	92%	70%	130%
Sulphate	1	2908645	59200	58900	0.5%	< 100	101%	90%	110%	99%	90%	110%	93%	80%	120%
Total Dissolved Solids	1	2908671	514000	516000	0.4%	< 20000	96%	80%	120%						
Total Kjeldahl Nitrogen	1	2908589	3840	3930	2.3%	< 100	105%	80%	120%	108%	80%	120%	110%	70%	130%
Total Phosphorus	1		2460	2520	2.4%	< 20	104%	90%	110%	92%	90%	110%	106%	80%	120%
Total Suspended Solids	1	2908671	154000	162000	5.1%	< 10000	98%	80%	120%						
Arsenic	1	2908589	< 3.0	< 3.0	0.0%	< 3.0	105%	90%	110%	107%	80%	120%	115%	70%	130%
Barium	1	2908589	54.4	52.1	4.3%	< 2.0	100%	90%	110%	100%	90%	110%	99%	70%	130%
Beryllium	1	2908589	< 1.0	< 1.0	0.0%	< 1.0	111%	80%	120%	106%	90%	110%	100%	70%	130%
Boron	1	2908589	25.6	26.3	2.7%	< 10.0	109%	90%	110%	108%	90%	110%	104%	70%	130%
Cadmium	1	2908589	0.17	0.17	0.0%	< 0.10	101%	90%	110%	108%	90%	110%	119%	70%	130%
Chromium	1	2908589	< 3.0	< 3.0	0.0%	< 3.0	103%	90%	110%	109%	90%	110%	108%	70%	130%
Cobalt	1	2908589	1.28	1.32	3.1%	< 0.50	104%	90%	110%	105%	90%	110%	106%	70%	130%
Copper	1	2908589	4.70	4.90	4.2%	< 0.80	105%	90%	110%	108%	90%	110%	104%	70%	130%
Iron	1	2908589	15600	15900	1.9%	< 10.0	105%	90%	110%	96%	90%	110%	95%	70%	130%
Lead	1	2908589	1.7	1.7	0.0%	< 1.0	104%	90%	110%	110%	90%	110%	107%	70%	130%
Magnesium	1	2908626	29200	27800	4.9%	< 50	96%	90%	110%	96%	90%	110%	95%	70%	130%
Manganese	1	2908589	245	259	5.6%	< 2.0	102%	90%	110%	101%	90%	110%	99%	70%	130%
Dissolved Mercury	1	2908626	< 0.1	< 0.1	0.0%	< 0.1	105%	90%	110%	101%	90%	110%	104%	70%	130%
Molybdenum	1	2908589	< 2.0	< 2.0	0.0%	< 2.0	100%	90%	110%	110%	90%	110%	99%	70%	130%
Nickel	1	2908589	3.7	3.6	2.7%	< 3.0	107%	90%	110%	106%	90%	110%	103%	70%	130%
Silver	1	2908589	< 0.10	< 0.10	0.0%	< 0.10	103%	90%	110%	110%	90%	110%	95%	70%	130%
Sodium	1	2908626	17900	16900	5.7%	< 50	95%	90%	110%	96%	90%	110%	95%	70%	130%
Thallium	1	2908589	< 0.3	< 0.3	0.0%	< 0.3	98%	90%	110%	100%	90%	110%	98%	70%	130%
Vanadium	1	2908589	2.5	2.4	4.1%	< 2.0	102%	90%	110%	100%	90%	110%	101%	70%	130%
Zinc	1	2908589	124	125	0.8%	< 5.0	104%	90%	110%	111%	80%	120%	113%	70%	130%

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Water Analysis (Continued)

RPT Date:			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dibromoethane (EDB)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichloromethane (Methylene Chloride)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether (MTBE)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone, MEK (2-Butanone)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane (Freon 11)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trihalomethanes (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Napthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

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Method Summary

CLIENT NAME: GENIVAR

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
% Difference Cation/Anion			CALCULATION

4 Cooler 6.6

AGAT Laboratories

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 4.3
AGAT WO #: 11T549297
Lab Temperature:
Notes:

Client Information:
Company: Genivar
Contact: Matt Welsh
Address: 1425 Cormorant Rd.
Ancaster L9G4V5
Phone: 2892390100 Fax: 2892390109
Project: Brooks Landfill PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.) — Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use — Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (specify) ____
☑ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☑ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
*TAT is exclusive of weekends and statutory holidays

Invoice To: Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☑ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: MattWelsh
Email: matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: Bailey.Walters@genivar.com

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride-Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ N-Total ☐ Hg ☐ pH ☐ NO_3/NO_2	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_3	VOC: ☐ VOC ☐ THM ☑ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	✓ SW inorganics + metals	✓ SW PAHs	✓ SW VOCs	Leachate Indicator
SW1	Nov 11/11	AM	SW	12																		✓	✓	✓	
SW4		PM	SW	12																		✓	✓	✓	
SW6		PM	SW	12																		✓	✓	✓	
SW8		PM	SW	12																		✓	✓	✓	
SW3		AM	SW	13	→ because of Lab QC - PAH bottle																	✓	✓	✓	
SW5		AM	SW	12																		✓	✓	✓	
SW7		AM	SW	12																		✓	✓	✓	
SWD1		AM	SW	12																		✓	✓	✓	
Leachate		AM	GW	6																					✓

Samples Relinquished by (print name & sign): Matt Welsh
Date/Time: Nov 14
Samples Received by (Print name & sign): Robert Nov 14/11
Date/Time: 11:30
Samples Relinquished by (print name & sign):
Date/Time:
Samples Received by (Print name & sign):
Date/Time: 4:30

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page ____ of ____
NO: 165583

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline			Sample Location	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1
				Sampling Date	2005/04/27	2005/05/09	2005/10/13	2005/11/16	2005/12/02	2006/01/12	2006/03/30	2006/05/29	2006/10/06	2006/12/12	2006/12/14	2007/03/14	2007/03/26	2007/05/16	2008/04/01
					MOE dataset	Background	MOE dataset	MOE dataset	Background	MOE dataset	Background	Background	MOE dataset	Background	Background	Background	MOE dataset	Background	MOE dataset
			Sample Type		Surface Water	Surface Water	DRY	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Value	*Type*	*Units*		SW Comprehensive	SW Comprehensive		SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive
Field Parameters																			
Conductivity			µS/cm					145		170			100				89		90
Dissolved Oxygen	qualitative - see table	PWQO	mg/L					6.37		9.14			4.18				10.27		13.34
pH								7.06		7.65			6.52				7.39		7.64
Temperature			°C					8.26		3.94			11.18				11.78		4.99
Flow Rate			L/s																
General																			
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L		24600	44600		29700	26000	46400	49000	12000	35200	39000		30000	23800	182000	26200
Ammonia (as N)			µg/L		ND	80		ND	<50	ND	<50	90	ND	120		260	ND	70	ND
Ammonia, un-ionised (as N)	20	PWQO	µg/L		ND			ND		ND							NA		NA
Biological Oxygen Demand (BOD_5)			µg/L		2100	<2000		2400	<2000	ND	<2000	<2000	2400	<2000		3000	NA	2000.00	1100
Calcium			µg/L		10400			17000		21000			13000				10000		10000
Chemical Oxygen Demand (COD)			µg/L		55000	61000		47000	46000	50000	56000	96000	75000	46000		35000	32000	59000	42000
Chloride			µg/L			8100			<1000		12000	24000		7000		11000		33000	
Conductivity			µS/cm		71.2	129		147	101	168	164	307	102	107		94	88.9	478	95
Dissolved Organic Carbon (DOC)			µg/L		19600	19600		17300	12700	12300		29100	20900	12900			9400		7700
Hardness (as $CaCO_3$)			µg/L			57900			43000			140000		45000				220000	
Nitrate (as N)	2930	CCME	µg/L		ND	<1000		ND	<1000	ND	<100	<100	ND	<100		300	ND	<100	ND
Nitrite (as N)	18	CCME	µg/L		**30**	<100		ND	20	ND	<10	<10	ND	<10		<10	ND	<10	13
pH	6.5-8.5	PWQO			6.85	7.29		6.89	7.24	7.41	7.40	7.60	6.86	7.40		7.00	6.99	7.70	7.23
Phenol	1	PWQO	µg/L		ND	**4**		ND	<1	ND	<1	1.00	0	**2**		**3**	ND	**4**	ND
Potassium			µg/L		4700	2000		5000	6000	4000		1000	5200	4300			3200		1850
Sulphates			µg/L			7000			15000		16000	4000		6000		7000		15000	
Total Dissolved Solids (TDS)			µg/L		173000	249000		171000	140000	203000	100000	200000	159000	88000		60000	125000	301000	62000
Total Kjeldahl Nitrogen (TKN)			µg/L		1420	1500		920	1000	810	900	1300	1280	1400		1500	700	1500	570
Total Phosphorus	30	IPWQO	µg/L		**190**	**170**		**140**	**175**	**110**	**120**	**280**	**210**	**180**		**140**	ND	**120**	**71**
Total Suspended Solids (TSS)			µg/L		35600	18000		14100	5000	18500	4000	14000	14800	<5000		11000	6800	<10000	11900
Metals																			
Arsenic	5	IPWQO	µg/L		ND	1		ND	<1	ND		2	ND	1			ND	1	ND
Barium			µg/L		28.5	36		24	36	19		37	13	43			8.4	45	8.67
Beryllium	1100	PWQO	µg/L		0.11	<0.5		ND	<0.5	ND		<0.5	ND	<0.5			ND	<0.5	ND
Boron	200	IPWQO	µg/L		ND	20		ND	31	ND		31	ND	17			ND	20	NA
Cadmium	0.5	IPWQO	µg/L		ND	<0.1		ND	0.1	ND		<0.1	ND	<0.1			ND	<0.1	**1.26**
Chromium			µg/L		1.2	<5		ND	6	ND		<5	ND	8			ND	<5	ND
Cobalt	0.9	PWQO	µg/L		ND	**1**		ND	**1**	ND		**2.2**	ND	**1.2**			ND	**1.6**	ND
Copper	5	PWQO	µg/L		3.3	**14**		ND	**6**	ND		2	ND	3			ND	1	1.6
Iron	300	PWQO	µg/L		**1390**	**4200**		93	**4100**	**560**	**4700**	**7100**	**1200**	**5100**		**2600**	**440**	**3000**	256
Lead	5	IPWQO	µg/L		ND	1.7		ND	2.7	ND		0.70	ND	2.2			ND	<0.5	ND
Magnesium			µg/L		3900	4900		5000	4500	6300		11000	4100	4900			3400	19000	3320
Manganese			µg/L		54.6	100		15	59	24		830	55	81			22	1000	36.8
Mercury	0.2	PWQO	µg/L		0.03	**0.3**		ND	<0.1	ND		<0.1	ND	<0.1			ND	<0.1	ND
Molybdenum	40	IPWQO	µg/L		ND	<1		ND	<1	ND		<1	ND	<1			ND	1	ND
Nickel	25	PWQO	µg/L		1.6	4		ND	4	ND		2.00	ND	3			ND	2	ND
Silver	0.1	PWQO	µg/L			<0.5			<0.5			<0.5		<0.1				<0.1	
Sodium			µg/L		1	1700		1.4	4200	1.9		4400	0.9	1100			1.2	6000	1.38
Thallium	0.3	IPWQO	µg/L			0.05			0.07			<0.05		0.08				<0.05	
Vanadium	6		µg/L		2.1	5		ND	**11**	ND		1	**10**	**13**			ND	<1	ND
Zinc	20	IPWQO	µg/L		11.3	**540**		ND	**24**	13		**700**	20	**160**			ND	**130**	10
VOCs																			
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
1,1,1-Trichloroethane	10	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
1,1,2-Trichloroethane	800	IPWQO	µg/L		<.2	<0.2		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
1,1-Dichloroethane	200	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
1,1-Dichloroethylene	40	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
1,2-Dichlorobenzene	2.5		µg/L		<.2	<0.1		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
1,2-Dichloroethane	100	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
1,2-Dichloropropane			µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
1,3-Dichlorobenzene	2.5	PWQO	µg/L		<.2	<0.1		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
1,4-Dichlorobenzene	4	PWQO	µg/L		<.2	<0.1		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
2-Hexanone			µg/L			<5			<5			<10		<5					
Acetone			µg/L			<10			<10			<20		<10				<10	
Benzene	100	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Bromodichloromethane	200	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Bromoform	60	IPWQO	µg/L		<.2	<0.2		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
Bromomethane	0.9	IPWQO	µg/L		<.5	<0.5		<.5	<0.5	<.5		<1	<.5	<0.5			<.5	<0.5	<2.5
Carbon Tetrachloride	13.3	CCME	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Chlorobenzene	15	PWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Chloroethane			µg/L		<.5	<0.2		<.5	<0.2	<.5		<0.4	<.5	<0.2			<.5		<2.5
Chloroform			µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Chloromethane	700	IPWQO	µg/L		<.5	<0.5		<.5	<0.5	<.5		<1	<.5	<0.5			<.5		<2.5
cis-1,3-Dichloropropene			µg/L		<.2	<0.2		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
Dibromochloromethane	40	IPWQO	µg/L		<.2	<0.2		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
Ethylbenzene	8	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Styrene	4	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Tetrachloroethylene	50	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Toluene	0.8	IPWQO	µg/L		<.2	<0.2		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
trans-1,2-Dichloroethylene	200	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
trans-1,3-Dichloropropene	7	IPWQO	µg/L		<.2	<0.2		<.2	<0.2	<.2		<0.4	<.2	<0.2			<.2	<0.2	<1
Trichloroethylene	20	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Vinyl Chloride	600	IPWQO	µg/L		<.5	<0.2		<.5	<0.2	<.5		<0.4	<.5	<0.2			<.5	<0.2	<2.5
Xylene, *o-*	40	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Xylene, *p-* + *m-*	32	IPWQO	µg/L		<.2	<0.1		<.2	<0.1	<.2		<0.2	<.2	<0.1			<.2	<0.1	<1
Xylenes (total)			µg/L			<0.2			<0.2			<0.2		<0.1				<0.1	
PAHs																			
Acenaphthene	5.8	CCME	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<0.2
Acenaphthylene			µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<0.2
Anthracene	0.0008	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<10
Benzo(a)anthracene	0.0004	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<20
Benzo(a)pyrene	0.015	CCME	µg/L		< 0.2	<0.01		< 0.2	<0.01	< 0.2		<0.01	< 0.2		<0.01		< 0.2	<0.01	<1
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L		< 0.2	<0.1		< 0.2	<0.1	< 0.2		<0.1	< 0.2		<0.1		< 0.2	<0.1	<20
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2				< 0.2	<0.05	<10
Chrysene	0.0001	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<10
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L		< 0.5	<0.1		< 0.5	<0.1	< 0.5		<0.1	< 0.5		<0.1		< 0.5		<20
Fluoranthene	0.0008	IPWQO	µg/L		< 0.2	<0.05		< 0.2	**0.05**	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<10
Fluorene	0.2	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<0.2
Indeno(1,2,3-cd)pyrene			µg/L		< 0.5	<0.1		< 0.5	<0.1	< 0.5		<0.1	< 0.5		<0.1		< 0.5	<0.1	<20
Naphthalene	7	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	0.06	<0.2
Phenanthrene	0.03	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<10
Pyrene	0.025	CCME	µg/L		< 0.2	<0.05		< 0.2	<0.05	< 0.2		<0.05	< 0.2		<0.05		< 0.2	<0.05	<10

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline Value	Standard/ Guideline Type	Sample Type Units	Sample Location / Sampling Date	SW1 2008/09/10 MOE dataset	SW1 2009/07/19 Background	SW1 2009/11/25 Background	SW1 2011/01/06 Background	SW1 2011/03/31 Background	SW1 2011/04/11 Background	SW1 2011/05/16 Background	SW1 2011/11/11 Background	SW3 2004/11/29	SW3 2005/03/30	SW3 2005/04/27 MOE dataset	SW3 2005/05/09	SW3 2005/10/13 MOE dataset	SW3 2005/11/07 MOE dataset	SW3 2005/11/16 MOE dataset
				Sample Type	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
				SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator		SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive
Field Parameters																			
Conductivity			µS/cm		298			80	70	649	110	770							
Dissolved Oxygen	qualitative - see table	PWQO	mg/L		NA			2.57	6.8		4.5	3.63							
pH					7.18			6.93	6.86	7.9	6.95	6.82							
Temperature			°C		12.15			1.2	2	12.4	10.2	4							
Flow Rate			L/s					No Measurable Flow	<0.1	No Measurable Flow	<0.1	No Measurable Flow							
General																			
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L		113000	252000	63000	28000	25000		32260	68900	174000	114000	166000	291000	260000	269000	201000
Ammonia (as N)			µg/L		27	<50	<50	<20	<20		<20	62	50	110	ND	<50	ND	ND	ND
Ammonia, un-ionised (as N)	20	PWQO	µg/L		NA			<1	<20		<1	<20			ND		ND	ND	ND
Biological Oxygen Demand (BOD_5)			µg/L		ND	38000	<2000	<5000	<5000		<5000	<5000	<3000	3000	2200	<2000	ND	ND	1200
Calcium			µg/L		38700		20600	13100			13500	45400			58400		150000	133000	88000
Chemical Oxygen Demand (COD)			µg/L		40000	230000	60000	50000	23000		34700	146000	36000	25000	40000	40000	58000	58300	25000
Chloride			µg/L			178000	21500	6250	12500		8220	48600	25000	11900		8800			
Conductivity			µS/cm		308	1100	216	103	108		105	415	519	314	404	684	960	877	619
Dissolved Organic Carbon (DOC)			µg/L		15000	30900	12900	17300			19300	27500	12000		14800	14000	16900	14100	10000
Hardness (as $CaCO_3$)			µg/L			575000	74000	47000			48500	170000	282000			349000			
Nitrate (as N)	2930	CCME	µg/L		0	<100	<100	90	70		<50	<50	200	<1000	ND	<1000	ND	ND	ND
Nitrite (as N)	18	CCME	µg/L		6	<100	<100	<50	<50		<50	<50	<100		ND	<100	ND	ND	ND
pH	6.5-8.5	PWQO			7.63	7.43	7.30	7.07	6.84		7.38	7.52	8.06	7.80	7.81	8.08	7.94	7.78	7.86
Phenol	1	PWQO	µg/L		ND	<1	<1	<1	<1		<1	<1	1	**4**	ND	**2**	ND	ND	ND
Potassium			µg/L		2150	<10000	2900	2250			1390	5340			3500	4700	4800	4100	3800
Sulphates			µg/L			25500	6400	10700	7530		4850	54300	64600	27400		64000			
Total Dissolved Solids (TDS)			µg/L		200000	758000	142000	124000	132000		108000	312000	319000	229000	276000	564000	769000	626000	435000
Total Kjeldahl Nitrogen (TKN)			µg/L		780	7320	860	1190	880		1560	3840	800	1100	1190	700	510	510	450
Total Phosphorus	30	IPWQO	µg/L		**60**	**2280**	**127**	**200**	**120**		**118**	**1000**	**80**	**70**	**130**	**50**	ND	ND	ND
Total Suspended Solids (TSS)			µg/L		18300	1670000	61500	25000	25000		19000	296000	25000	5000	73000	19000	99000	9000	19800
Metals																			
Arsenic	5	IPWQO	µg/L		ND	<10	<1	<3			<3.0	<3.0	<1.4		ND	<1	ND	ND	ND
Barium			µg/L		17.2	230	18.00	25			16.2	54.4	58		40.6	140	130	84	62
Beryllium	1100	PWQO	µg/L		ND	<10	<1	<1			<1.0	<1.0	<1.4		0.07	<0.5	0.05	ND	ND
Boron	200	IPWQO	µg/L		45	<500	<50	12			12.6	25.6	97		**160000**	**1000**	**6600**	**3900**	**900**
Cadmium	0.5	IPWQO	µg/L		**0.977**	<1	<0.1	<0.1			<0.10	0.17	<1		ND	<0.1	ND	ND	ND
Chromium			µg/L		ND	12	1.20	5			<3.0	<3.0	4.9		ND	<5	ND	ND	ND
Cobalt	0.9	PWQO	µg/L		**1.37**	<8	<0.8	0.6			<0.50	**1.28**	<1		ND	0.9	ND	ND	ND
Copper	5	PWQO	µg/L		0.628	**27**	<1	2			1.38	4.7	<3		2.4	**8**	3.2	2.4	ND
Iron	300	PWQO	µg/L		**383**	**44600**	**1700**	**5900**	**1160**		**1490**	**15600**	**2000**	**1200**	**680**	**710**	**1170**	150	**350**
Lead	5	IPWQO	µg/L		ND	<10	<1	1			<1.0	1.7	<2.2		ND	<0.5	ND	ND	ND
Magnesium			µg/L		11400		5560	3450			3600	13700	21000		14300	29000	40000	0	19000
Manganese			µg/L		74.1	657	41.9	138			28.7	245	33		51.7	37	170	12.5	22
Mercury	0.2	PWQO	µg/L		ND	<0.1	<0.1	<0.1			<0.1	<0.1	<0.1		ND	<0.1	ND	0	ND
Molybdenum	40	IPWQO	µg/L		ND	<10	<1	<2			<2.0	<2.0	<1.4		ND	6	9.8	5.5	ND
Nickel	25	PWQO	µg/L		1.49	<20	<2	<3			<3.0	3.7	2		ND	12	6.7	4	ND
Silver	0.1	PWQO	µg/L			<1	<0.1	<0.1			<0.10	<0.10	<0.6			<0.5			
Sodium			µg/L		3.12	41700	3580	2510			3080	10300	5000		4.5	8700	11	9.6	6.3
Thallium	0.3	IPWQO	µg/L			<3	<0.3	<0.3			<0.3	<0.3	<1			0.09			
Vanadium	6		µg/L		ND	**11**	<1	<2			<2.0	2.5	4		1.6	1	1.3	ND	ND
Zinc	20	IPWQO	µg/L		**21.4**	**1120**	4.30	**34**			7.1	**124**	**23**		5.5	13	5	ND	ND
VOCs																			
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
1,1,1-Trichloroethane	10	IPWQO	µg/L		<1	<0.50	<0.50	<0.60			<0.60	<0.60	<0.5		<.2	<0.1	<.2	<.2	<.2
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<1		<.2	<0.1	<.2	<.2	<.2
1,1,2-Trichloroethane	800	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.2	<.2	<.2	<.2
1,1-Dichloroethane	200	IPWQO	µg/L		<1	<0.50	<0.50	<0.60			<0.60	<0.60	<0.4		<.2	<0.1	<.2	<.2	<.2
1,1-Dichloroethylene	40	IPWQO	µg/L		<1	<0.50	<0.50	<0.60			<0.60	<0.60	<0.5		<.2	<0.1	<.2	<.2	<.2
1,2-Dichlorobenzene	2.5		µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
1,2-Dichloroethane	100	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<.2
1,2-Dichloropropane			µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<.2
1,3-Dichlorobenzene	2.5	PWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
1,4-Dichlorobenzene	4	PWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
2-Hexanone			µg/L			<20	<20	<0.60			<0.60	<0.60	<10			<5			
Acetone			µg/L			<20	<20	<2.0			<2.0	<2.0	<10			<10			
Benzene	100	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<.2
Bromodichloromethane	200	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.2		<.2	<0.1	<.2	<.2	<.2
Bromoform	60	IPWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.2		<.2	<0.2	<.2	<.2	<.2
Bromomethane	0.9	IPWQO	µg/L		<2.5	**2.5**	<1.0	<0.40			<0.40	<0.40	<3		<.5	<0.5	<.5	<.5	<.5
Carbon Tetrachloride	13.3	CCME	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<.2
Chlorobenzene	15	PWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
Chloroethane			µg/L		<2.5	<1.0	<1.0	<0.40			<0.40	<0.40	<1		<.5	<0.2	<.5	<.5	<.5
Chloroform			µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.2		<.2	<0.1	<.2	<.2	<.2
Chloromethane	700	IPWQO	µg/L		<2.5	<1.0	<1.0	<0.80			<0.80	<0.80	<2		<.5	<0.5	<.5	<.5	<.5
cis-1,3-Dichloropropene			µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.14		<.2	<0.2	<.2	<.2	<.2
Dibromochloromethane	40	IPWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.2		<.2	<0.2	<.2	<.2	<.2
Ethylbenzene	8	IPWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
Styrene	4	IPWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
Tetrachloroethylene	50	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<.2
Toluene	0.8	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.2	<.2	0.35	<.2
trans-1,2-Dichloroethylene	200	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<1		<.2	<0.1	<.2	<.2	<.2
trans-1,3-Dichloropropene	7	IPWQO	µg/L		<1	<0.50	<0.50	<0.60			<0.60	<0.60	<0.14		<.2	<0.2	<.2	<.2	<.2
Trichloroethylene	20	IPWQO	µg/L		<1	<0.50	<0.50	<0.40			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<.2
Vinyl Chloride	600	IPWQO	µg/L		<2.5	<0.50	<0.50	<0.34			<0.34	<0.34	<0.2		<.5	<0.2	<.5	<.5	<.5
Xylene, *o-*	40	IPWQO	µg/L		<1	<0.50	<0.50	<0.20			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<.2
Xylene, *p- + m-*	32	IPWQO	µg/L		<1	<1.0	<1.0	<0.40			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<.2
Xylenes (total)			µg/L			<1.5	<1.5	<0.40			<0.40	<0.40	<1			<0.2			
PAHs																			
Acenaphthene	5.8	CCME	µg/L		<0.2	<0.20	<0.020	<0.10			<0.10	<0.10	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Acenaphthylene			µg/L		<0.2	<0.20	<0.020	<0.11			<0.11	<0.11	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Anthracene	0.0008	IPWQO	µg/L		<10	<0.20	<0.020	<0.05			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Benzo(a)anthracene	0.0004	IPWQO	µg/L		<20	<0.20	<0.020	<0.08			<0.08	<0.08	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Benzo(a)pyrene	0.015	CCME	µg/L		<1	<0.065	<0.0050	<0.01			<0.01	<0.01	<0.01		< 0.2	<0.01	< 0.2	< 0.2	< 0.2
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L		<20	<0.20	<0.020	<0.06			<0.06	<0.06	<0.1		< 0.2	<0.1	< 0.2	< 0.2	< 0.2
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L		<10	<0.20	<0.020	<0.05			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Chrysene	0.0001	IPWQO	µg/L		<10	<0.20	<0.020	<0.05			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L		<20	<0.20	<0.020	<0.09			<0.09	<0.09	<0.1		< 0.5	<0.1	< 0.5	< 0.5	< 0.5
Fluoranthene	0.0008	IPWQO	µg/L		<10	<0.20	<0.020	<0.12			<0.12	<0.12	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Fluorene	0.2	IPWQO	µg/L		<0.2	**0.24**	<0.020	<0.09			<0.09	<0.09	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Indeno(1,2,3-cd)pyrene			µg/L		<20	<0.20	<0.020	<0.03			<0.06	<0.06	<0.1		< 0.5	<0.1	< 0.5	< 0.5	< 0.5
Naphthalene	7	IPWQO	µg/L		<0.2	<0.20	<0.020	<0.12			<0.12	<0.12	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Phenanthrene	0.03	IPWQO	µg/L		<10	**0.21**	<0.020	<0.10			<0.10	<0.10	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2
Pyrene	0.025	CCME	µg/L		<10	<0.20	<0.020	<0.05			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	< 0.2

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline Value	Standard/ Guideline Type	Units	Sample Location	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3
				Sampling Date	2005/12/02	2005/12/02	2006/01/12 MOE dataset	2006/03/30	2006/03/30	2006/05/29	2006/05/29	2006/10/06 MOE dataset	2006/12/12	2006/12/12	2006/12/19	2006/12/19	2007/03/14	2007/03/26 MOE dataset	2007/05/16	2008/04/01 MOE dataset	2008/09/10 MOE dataset
				Sample Type	Surface Water	Field Duplicate	Surface Water	Surface Water	Field Duplicate	Surface Water	Field Duplicate	Surface Water	Surface Water	Field Duplicate	Surface Water	Field Duplicate	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
					SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW VOC & PAH	SW VOC & PAH	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive
Field Parameters																					
Conductivity			µS/cm																		
Dissolved Oxygen	qualitative - see table	PWQO	mg/L																		
pH																					
Temperature			°C																		
Flow Rate			L/s																		
General																					
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L		220000	223000	194000	275000	277000	373000	373000	291000			337000	340000	183000	196000	323000	119000	334000
Ammonia (as N)			µg/L		<50	<50	ND	60	<50	60	17	ND			<50	130	230	ND	60	14	18
Ammonia, un-ionised (as N)	20	PWQO	µg/L				ND					<1						NA		NA	NA
Biological Oxygen Demand (BOD_5)			µg/L		<2000	<2000	ND	<2000	<2000	<2000	<2000	1300			<2000	<2000	2000	NA	4000	1600	3500
Calcium			µg/L				75000					26000						78000		51000	94900
Chemical Oxygen Demand (COD)			µg/L		19000	24000	28000	25000	24000	90000	48000	36000			45000	93000	24000	30000	46000	19000	40000
Chloride			µg/L		22000	23000		10000	10000	5000	5000				11000	11000	7000		29000		
Conductivity			µS/cm		631	640	542	745	746	776	774	736			759	766	488	632	1010	454	765
Dissolved Organic Carbon (DOC)			µg/L		8000	8100	7100			15100	13700	11500			9100	9000		7400	20700	6100	10100
Hardness (as $CaCO_3$)			µg/L		330000	330000				370000	370000				410000	410000			480000		
Nitrate (as N)	2930	CCME	µg/L		<1000	<1000	ND	<100	<100	<100	<100	ND			<100	<100	200	ND	<100	651	
Nitrite (as N)	18	CCME	µg/L		<10	<10	ND	<10	<10	<10	<10	ND			<10	<10	10	ND	<10	**22**	5
pH	6.5-8.5	PWQO			8.14	8.26	8.21	8.10	8.10	8.00	8.20	7.81			8.20	8.20	7.90	7.75	8.10	8	8.12
Phenol	1	PWQO	µg/L		<1	<1	ND	<1	<1	<1	<1	0			1	1	**2**	ND	**4**	ND	ND
Potassium			µg/L		4200	4400	3600			4300	4300	7300			7600	7700		4400		4130	6310
Sulphates			µg/L		94000	90000		136000	135000	71000	72000				102000	87000	65000		176000		
Total Dissolved Solids (TDS)			µg/L		402000	334000	366000	490000	480000	505000	503000	509000			422000	434000	284000	409000	583000	295000	497000
Total Kjeldahl Nitrogen (TKN)			µg/L		600	500	710	400	400	800	800	540			600	700	1100	720	1100	450	800
Total Phosphorus	30	IPWQO	µg/L		**55**	**32**	ND	<11	0	14	**60**	ND			**44**	**52**	**45**	**120**	**71**	**65**	**355**
Total Suspended Solids (TSS)			µg/L		2000	3000	25900	<1000	<1000	5000	16000	7300			<5000	5000	14000	92500	35000	27100	378000
Metals																					
Arsenic	5	IPWQO	µg/L		<1	<1	ND			1	1	ND			<1	<1		ND	2	ND	ND
Barium			µg/L		60	61	47			120	110	15			64	66		36	67	34.8	56.1
Beryllium	1100	PWQO	µg/L		<0.5	<0.5	ND			<0.5	<0.5	ND			<0.5	<0.5		ND	<0.5	ND	ND
Boron	200	IPWQO	µg/L		**690**	**790**	**540**			**620**	**600**	70			**710**	**700**		**230**	**610**	NA	**790**
Cadmium	0.5	IPWQO	µg/L		<0.1	<0.1	ND			<0.1	<0.1	ND			<0.1	<0.1		ND	<0.1	**2.04**	**1.62**
Chromium			µg/L		<5	<5	ND			<5	<5	ND			<5	<5		ND	<5	ND	ND
Cobalt	0.9	PWQO	µg/L		<1	<1	ND			0.6	0.5	ND			<0.5	<0.5		ND	0.5	ND	0.69
Copper	5	PWQO	µg/L		4	4	ND			3	4	**14**			4	4		ND	4	2.53	3.82
Iron	300	PWQO	µg/L		**1000**	**990**	87	180	69	**340**	250	**320**			280	**570**	**880**	100	**610**	141	**360**
Lead	5	IPWQO	µg/L		0.8	0.8	ND			<0.5	<0.5	ND			0.6	1.2		ND	1.5	ND	ND
Magnesium			µg/L		23000	23000	19000			32000	31000	7600			31000	31000		26000	50000	15700	30000
Manganese			µg/L		24	23	21			2200	2100	15			29	38		110	160	21.4	193
Mercury	0.2	PWQO	µg/L		<0.1	<0.1	ND			<0.1	<0.1	ND			<0.1	<0.1		ND	<0.1	ND	ND
Molybdenum	40	IPWQO	µg/L		2	2	ND			7	7	ND			1	1		ND	7	ND	ND
Nickel	25	PWQO	µg/L		2	2	ND			4	3	ND			1	<1		ND	3	ND	2.22
Silver	0.1	PWQO	µg/L		<0.5	<0.5				<0.5	<0.5				<0.1	<0.1			<0.1		
Sodium			µg/L		6200	6300	6.1			8600	8400	2.1			9800	9800		12	21000	12.2	12.8
Thallium	0.3	IPWQO	µg/L		<1	<1				<0.05	<0.05				<0.05	<0.05			<0.05		
Vanadium	6		µg/L		2	3	ND			<1	<1	**10**			<1	<1		ND	<1	ND	ND
Zinc	20	IPWQO	µg/L		6	9	ND			15	14	ND			15	15		ND	11	5.09	12.1
VOCs																					
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
1,1,1-Trichloroethane	10	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L		<0.1	0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
1,1,2-Trichloroethane	800	IPWQO	µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
1,1-Dichloroethane	200	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
1,1-Dichloroethylene	40	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
1,2-Dichlorobenzene	2.5		µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
1,2-Dichloroethane	100	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
1,2-Dichloropropane			µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
1,3-Dichlorobenzene	2.5	PWQO	µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.2	<0.2				<.2	<0.2	<1	<1
1,4-Dichlorobenzene	4	PWQO	µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
2-Hexanone			µg/L		<5	<5				<5	<5		<10	<5							
Acetone			µg/L		<10	<10				<10	<10		<20	<10					<10		
Benzene	100	IPWQO	µg/L		0.3	0.2	<.2			<0.1	<0.1	<.2	<0.2	0.2				<.2	<0.1	<1	0.4
Bromodichloromethane	200	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Bromoform	60	IPWQO	µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
Bromomethane	0.9	IPWQO	µg/L		<0.5	<0.5	<.5			<0.5	<0.5	<.5	<1	<0.5				<.5	<0.5	<2.5	<2.5
Carbon Tetrachloride	13.3	CCME	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Chlorobenzene	15	PWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Chloroethane			µg/L		<0.2	<0.2	<.5			<0.2	<0.2	<.5	<0.4	<0.2				<.5		<2.5	<2.5
Chloroform			µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Chloromethane	700	IPWQO	µg/L		<0.5	<0.5	<.5			<0.5	<0.5	<.5	<1	<0.5				<.5		<2.5	<2.5
cis-1,3-Dichloropropene			µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
Dibromochloromethane	40	IPWQO	µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
Ethylbenzene	8	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Styrene	4	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Tetrachloroethylene	50	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Toluene	0.8	IPWQO	µg/L		0.4	0.3	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
trans-1,2-Dichloroethylene	200	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
trans-1,3-Dichloropropene	7	IPWQO	µg/L		<0.2	<0.2	<.2			<0.2	<0.2	<.2	<0.4	<0.2				<.2	<0.2	<1	<1
Trichloroethylene	20	IPWQO	µg/L		<0.1	<0.1	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Vinyl Chloride	600	IPWQO	µg/L		<0.2	<0.2	<.5			<0.2	<0.2	<.5	<0.4	<0.2				<.5	<0.2	<2.5	<2.5
Xylene, *o-*	40	IPWQO	µg/L		0.7	0.7	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	0.3
Xylene, *p-* + *m-*	32	IPWQO	µg/L		0.2	0.2	<.2			<0.1	<0.1	<.2	<0.2	<0.1				<.2	<0.1	<1	<1
Xylenes (total)			µg/L		0.9	0.9				<0.1	<0.1		<0.2	<0.1					<0.1		
PAHs																					
Acenaphthene	5.8	CCME	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	<0.05				< 0.2	<0.05	<0.2	<0.2
Acenaphthylene			µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	<0.05				< 0.2	<0.05	<0.2	<0.2
Anthracene	0.0008	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	<0.05				< 0.2	<0.05	<10	<10
Benzo(a)anthracene	0.0004	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	**0.06**	**0.06**				< 0.2	<0.05	<20	**33**
Benzo(a)pyrene	0.015	CCME	µg/L		<0.01	<0.01	< 0.2			<0.01	<0.01	< 0.2	**0.05**	<0.01				< 0.2	**0.03**	<1	**35**
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L		<0.1	<0.1	< 0.2			<0.1	<0.1	< 0.2	<0.1	<0.1				< 0.2	<0.1	<20	<20
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	<0.05				< 0.2	<0.05	<10	**32**
Chrysene	0.0001	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	**0.06**				< 0.2	<0.05	<10	**41**
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L		<0.1	<0.1	< 0.5			<0.1	<0.1	< 0.5	<0.1	<0.1				< 0.5	**-**	<20	<20
Fluoranthene	0.0008	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	**0.09**	<0.05				< 0.2	**0.08**	<10	**83**
Fluorene	0.2	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	<0.05				< 0.2	<0.05	<0.2	<0.2
Indeno(1,2,3-cd)pyrene			µg/L		<0.1	<0.1	< 0.5			<0.1	<0.1	< 0.5	<0.1	<0.1				< 0.5	<0.1	<20	<20
Naphthalene	7	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	<0.05				< 0.2	<0.05	<0.2	<0.2
Phenanthrene	0.03	IPWQO	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	<0.05	<0.05				< 0.2	<0.05	<10	**25**
Pyrene	0.025	CCME	µg/L		<0.05	<0.05	< 0.2			<0.05	<0.05	< 0.2	0.07	<0.05				< 0.2	0.08	<10	73

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
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<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
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Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline Value	Standard/ Guideline Type	Sample Type / Units	Sample Location: SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW3	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4
Sampling Date				2009/07/19	2009/07/19	2009/11/24	2011/01/06	2011/03/31	2011/05/16	2011/08/26	2011/11/11	2004/11/29	2005/03/30	2005/03/30	2005/04/27 MOE dataset	2005/05/09	2005/11/16 MOE dataset	2005/12/02	2006/01/12 MOE dataset
			Surface Water	Surface Water	Field Duplicate	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
				SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Indicator	Field Duplicate	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive
Field Parameters																			
Conductivity			µS/cm				830	690	781	1580	830								
Dissolved Oxygen	qualitative - see table	PWQO	mg/L				10.46	8.5	3.42	1.05	11.12								
pH							7.97	7.55	7.29	7.15	8.03								
Temperature			°C				0.2	2.9	9.1	19.7	5.5								
Flow Rate			L/s				<0.1	<0.1	<0.1	No Measurable Flow	<0.1								
General																			
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L	94000	93000	317000	166000	153000	219000	287000	138000	68400	51300	46600	64500	144000	40600	49000	57300
Ammonia (as N)			µg/L	<50	52	<50	<20	30	264	80	65	<50	100	90	ND	80	ND	<50	ND
Ammonia, un-ionised (as N)	20	PWQO	µg/L				<1	<20	6	<20	<20				ND		ND		ND
Biological Oxygen Demand (BOD_5)			µg/L	<2000	<2000	4600	<5000	<5000	<5000	<5000	<5000	6000	<4000	<4000	3100	2000	3000	<2000	ND
Calcium			µg/L			135000	85900		87500		84400				25600		29000		26000
Chemical Oxygen Demand (COD)			µg/L	18000	27000	50000	22000	16000	30600	42000	22600	53000	25000	27000	51000	61000	45000	45000	46000
Chloride			µg/L	2300	2300	22700	25700	32700	35400	63200	13500	11600	4000	4700		6200		9000	
Conductivity			µS/cm	438	443	781	738	665	680	1300	791	228	144	147	182	299	241	210	209
Dissolved Organic Carbon (DOC)			µg/L	5400	12800	8900	15600		15300		9350	15200			15700	18000	14900	12500	12100
Hardness (as $CaCO_3$)			µg/L	246000	236000	505000	383000		329000		368000	114000				156000		92000	
Nitrate (as N)	2930	CCME	µg/L	<100	<100	<100	<50	<50	676	<50	<50	600	<1000	0	750	<1000	**5740**	2900	2700
Nitrite (as N)	18	CCME	µg/L	<100	<100	<100	<50	<50	<50	<50	<50	<100			**40**	<100	**90**	20	**500**
pH	6.5-8.5	PWQO		7.92	7.90	8.10	8.24	7.88	8.15	7.77	8.30	7.98	7.45	7.28	7.77	8.15	7.26	7.58	7.77
Phenol	1	PWQO	µg/L	<1	**1.3**	**9**	<1	<1	<1	<1	<1	**2**	**2**	**3**	ND	**4**	ND	<1	ND
Potassium			µg/L	2300	2400	<10000	4320		4500		3360				6200	4300	5600	5100	6700
Sulphates			µg/L	136000	137000	91200	247000	166000	110000	427000	278000	28800	15000	15700		9000		29000	
Total Dissolved Solids (TDS)			µg/L	314000	316000	478000	544000	462000	442000	1090000	514000	235000	141000	133000	231000	266000	263000	246000	247000
Total Kjeldahl Nitrogen (TKN)			µg/L	<150	<150	660	700	690	1750	2160	900	1000	1100	1840	1900	1740	1800	1180	
Total Phosphorus	30	IPWQO	µg/L	**30.6**	**31.9**	**410**	**60**	**80**	**73**	**1330**	**93**	**120**	**60**	**40**	**230**	**250**	**190**	**171**	**100**
Total Suspended Solids (TSS)			µg/L	2800	4800	377000	15000	35000	18000	762000	154000	12000	12000	4000	62000	38000	32700	15000	11500
Metals																			
Arsenic	5	IPWQO	µg/L	<1	<1	<10	<3		<3.0		<3.0	<1.4			ND	2	ND	1	ND
Barium			µg/L	37	36	120	48		52.6		56.5	60			31.2	31	37	46	16
Beryllium	1100	PWQO	µg/L	<1	<1	<10	<1		<1.0		<1.0	<1.4			0.12	<0.5	ND	<0.5	ND
Boron	200	IPWQO	µg/L	<50	56	<500	**226**		**233**		**228**	45			ND	110	ND	59	ND
Cadmium	0.5	IPWQO	µg/L	<0.1	<0.1	<1	<0.1		<0.10		<0.10	<1			ND	<0.1	ND	<0.1	ND
Chromium			µg/L	<1	<1	10	<3		<3.0		<3.0	11			1.3	<5	ND	6	ND
Cobalt	0.9	PWQO	µg/L	<0.8	<0.8	<8	0.5		0.75		0.62	**2**			ND	**1.4**	ND	**1.7**	ND
Copper	5	PWQO	µg/L	<1	<1	<10	<2		4.38		2.7	5			4	**13**	ND	**8**	ND
Iron	300	PWQO	µg/L	258	288	**14700**	286	**457**	**1140**	**3960**	**703**	**5400**	**2600**	**2200**	**1000**	**3300**	**1490**	**6000**	**320**
Lead	5	IPWQO	µg/L	<1	<1	<10	<1		2		2.1	2.5			ND	1.3	ND	2.7	ND
Magnesium			µg/L			40900	41000		26900		38200	9600			6900	11000	8100	8200	8000
Manganese			µg/L	34.1	32.4	925	68		226		108	47			67.2	510	59	57	70
Mercury	0.2	PWQO	µg/L	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1	<0.1			ND	<0.1	ND	<0.1	ND
Molybdenum	40	IPWQO	µg/L	11.4	11.5	<10	2		<2.0		2.6	<1.4			ND	<1	ND	<1	ND
Nickel	25	PWQO	µg/L	2.2	2.2	<20	4		3.6		3.4	4			1.7	4	ND	6	ND
Silver	0.1	PWQO	µg/L	<0.1	<0.1	<1	<0.1		<0.10		<0.10	<0.6				<0.5		<0.5	
Sodium			µg/L	6910	7020	16300	26500		24900		19400	2800			2.7	3000	3.3	2700	3.4
Thallium	0.3	IPWQO	µg/L	<0.3	<0.3	<3	<0.3		<0.3		<0.3	<1				<0.05		0.08	
Vanadium	6		µg/L	<1	<1	<10	<2		<2.0		<2.0	**14**			2.6	5	ND	**9**	ND
Zinc	20	IPWQO	µg/L	**21**	9	**55**	**49**		**30.1**		**25.4**	**23**			10.3	14	8.3	20	ND
VOCs																			
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.1	<.2
1,1,1-Trichloroethane	10	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.30		<0.30		<0.30	<0.5			<.2	<0.1	<.2	<0.1	<.2
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<1			<.2	<0.1	<.2	<0.1	<.2
1,1,2-Trichloroethane	800	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.2	<.2	<0.2	<.2
1,1-Dichloroethane	200	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.30		<0.30		<0.30	<0.4			<.2	<0.1	<.2	<0.1	<.2
1,1-Dichloroethylene	40	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.30		<0.30		<0.30	<0.5			<.2	<0.1	<.2	<0.1	<.2
1,2-Dichlorobenzene	2.5		µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.2	<.2
1,2-Dichloroethane	100	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.1	<.2	<0.1	<.2
1,2-Dichloropropane			µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.1	<.2	<0.1	<.2
1,3-Dichlorobenzene	2.5	PWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.2	<.2
1,4-Dichlorobenzene	4	PWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.2	<.2
2-Hexanone			µg/L	<20	<20	<20	<0.30		<0.30		<0.30	<10				<5		<5	
Acetone			µg/L	<20	<20	<20	<1.0		<1.0		<1.0	<10				<10		<10	
Benzene	100	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.1	<.2	<0.1	<.2
Bromodichloromethane	200	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.2			<.2	<0.1	<.2	<0.1	<.2
Bromoform	60	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.2			<.2	<0.2	<.2	<0.2	<.2
Bromomethane	0.9	IPWQO	µg/L	**2.4**	**2.7**	<1.0	<0.20		<0.20		<0.20	<3			<.5	<0.5	<.5	<0.5	<.5
Carbon Tetrachloride	13.3	CCME	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.1	<.2	<0.1	<.2
Chlorobenzene	15	PWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.1	<.2
Chloroethane			µg/L	<1.0	<1.0	<1.0	<0.20		<0.20		<0.20	<1			<.5	<0.2	<.5	<0.2	<.5
Chloroform			µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.2			<.2	<0.1	<.2	<0.1	<.2
Chloromethane	700	IPWQO	µg/L	<1.0	<1.0	<1.0	<0.40		<0.40		<0.40	<2			<.5	<0.5	<.5	<0.5	<.5
cis-1,3-Dichloropropene			µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.14			<.2	<0.2	<.2	<0.2	<.2
Dibromochloromethane	40	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.2			<.2	<0.2	<.2	<0.2	<.2
Ethylbenzene	8	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.1	<.2
Styrene	4	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.1	<.2
Tetrachloroethylene	50	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.1	<.2	<0.1	<.2
Toluene	0.8	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.2	<.2	<0.2	**1.3**
trans-1,2-Dichloroethylene	200	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<1			<.2	<0.1	<.2	<0.1	<.2
trans-1,3-Dichloropropene	7	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.30		<0.30		<0.30	<0.14			<.2	<0.2	<.2	<0.2	<.2
Trichloroethylene	20	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5			<.2	<0.1	<.2	<0.1	<.2
Vinyl Chloride	600	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.17		<0.17		<0.17	<0.2			<.5	<0.2	<.5	<0.2	<.5
Xylene, *o-*	40	IPWQO	µg/L	<0.50	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5			<.2	<0.1	<.2	<0.1	<.2
Xylene, *p- + m-*	32	IPWQO	µg/L	<1.0	<1.0	<1.0	<0.20		<0.20		<0.20	<0.5			<.2	<0.1	<.2	<0.1	<.2
Xylenes (total)			µg/L	<1.5	<1.5	<1.5	<0.20		<0.20		<0.20	<1				<0.2		<0.2	
PAHs																			
Acenaphthene	5.8	CCME	µg/L	<0.020	<0.020	<0.020	<0.10		<0.10		<0.10	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Acenaphthylene			µg/L	<0.020	<0.020	0.106	<0.11		<0.11		<0.11	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Anthracene	0.0008	IPWQO	µg/L	<0.020	<0.020	**0.073**	<0.05		<0.05		<0.05	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Benzo(a)anthracene	0.0004	IPWQO	µg/L	<0.020	<0.020	**0.292**	<0.08		<0.08		<0.08	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Benzo(a)pyrene	0.015	CCME	µg/L	<0.0050	<0.0050	**0.294**	**0.03**		<0.01		<0.01	<0.01			< 0.2	<0.01	< 0.2	<0.01	< 0.2
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L	<0.020	<0.020	**0.206**	<0.06		<0.06		<0.06	<0.1			< 0.2	<0.1	< 0.2	<0.1	< 0.2
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L	<0.020	<0.020	**0.205**	<0.05		<0.05		<0.05	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Chrysene	0.0001	IPWQO	µg/L	<0.020	<0.020	**0.31**	<0.05		<0.05		<0.05	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L	<0.020	<0.020	**0.034**	<0.09		<0.09		<0.09	<0.1			< 0.5	<0.1	< 0.5	<0.1	< 0.5
Fluoranthene	0.0008	IPWQO	µg/L	<0.020	<0.020	**0.539**	<0.12		<0.12		<0.12	**0.09**			< 0.2	<0.05	< 0.2	**0.05**	< 0.2
Fluorene	0.2	IPWQO	µg/L	<0.020	<0.020	0.034	<0.09		<0.09		<0.09	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Indeno(1,2,3-cd)pyrene			µg/L	<0.020	<0.020	0.193	<0.03		<0.06		<0.06	<0.1			< 0.5	<0.1	< 0.5	<0.1	< 0.5
Naphthalene	7	IPWQO	µg/L	<0.020	<0.020	0.035	<0.12		<0.12		<0.12	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Phenanthrene	0.03	IPWQO	µg/L	0.02	<0.020	**0.234**	<0.10		<0.10		<0.10	<0.05			< 0.2	<0.05	< 0.2	<0.05	< 0.2
Pyrene	0.025	CCME	µg/L	<0.020	<0.020	0.463	0.05		<0.05		<0.05	0.43			< 0.2	<0.05	< 0.2	<0.05	< 0.2

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline Value	Standard/ Guideline Type	Units	Sample Location: SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW5	SW5
Sampling Date:				2006/03/30	2006/10/06 MOE dataset	2006/12/12	2007/03/14	2007/03/26 MOE dataset	2008/04/01 MOE dataset	2008/09/10 MOE dataset	2009/07/19	2009/11/24	2011/01/06	2011/03/31	2011/05/16	2011/08/26	2011/11/11	2004/06/07	2004/11/29
Sample Type:				Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
				SW Indicator	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive
Field Parameters																			
Conductivity			µS/cm										540	820	279	1960	720		
Dissolved Oxygen	qualitative - see table	PWQO	mg/L										12.06	16.29	10.4	4.51	13.76		
pH													7.8	6.64	7.66	7.19	8.4		
Temperature			°C										0.2	1.9	8.9	19.5	4.7		
Flow Rate			L/s										<0.1	<0.1	<0.1	No Measurable Flow	<0.1		
General																			
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L	138000	78600	97000	31000	57300	38900	123000	116000	132000	124000	90000	86540	169000	129000	103000	26900
Ammonia (as N)			µg/L	100	ND	120	240	ND	34	21	<50	<50	<20	20	370	80	44	<50	110
Ammonia, un-ionised (as N)	20	PWQO	µg/L		<1			NA	NA	NA			<1	<20	6	<20	<20		
Biological Oxygen Demand (BOD_5)			µg/L	<2000	3000	<2000	3000	NA	2300	3200	<2000	<2000	<5000	<5000	26000	<5000	<5000	5000	7000
Calcium			µg/L		26000			22000	18700	36700		54100	65100		38300		83100		
Chemical Oxygen Demand (COD)			µg/L	42000	64000	35000	24000	44000	69000	35000	20000	37000	26000	21000	44500	33000	25800	116000	127000
Chloride			µg/L	7000		10000	5000				6700	14800	18100	15700	7640	287000	16300	20100	6120
Conductivity			µS/cm	334	202	248	122	187	178	290	479	375	486	327	271	1580	686	208	183
Dissolved Organic Carbon (DOC)			µg/L		19200	12000		10100	10000	16800	14900	11500	16100		18400		13400	24600	35400
Hardness (as $CaCO_3$)			µg/L			110000					264000	192000	247000		132000		328000	91200	81700
Nitrate (as N)	2930	CCME	µg/L	<100	ND	400	2200	1310	**3250**	0	<100	<100	1130	1880	2170	920	<50	<1000	<100
Nitrite (as N)	18	CCME	µg/L	<10	**30**	10	20	**50**	**80**	16	<100	<100	<50	<50	<50	<50	<50	<100	<100
pH	6.5-8.5	PWQO		8.10	7.63	8.00	7.30	7.47	7.68	8.23	8.26	8.13	8.17	7.94	8.01	8.02	8.34	7.83	7.10
Phenol	1	PWQO	µg/L	<1	0	1	<1	ND	ND	ND	<1	<1	<1	<1	<1	<1	<1	<1	**3**
Potassium			µg/L		7300	6000		6600	6530	4210	3400	5200	4320		3090		5970	7600	
Sulphates			µg/L	32000		24000	12000				131000	36900	116000	50500	33500	282000	220000	<5000	51600
Total Dissolved Solids (TDS)			µg/L	220000	234000	141000	68000	228000	115000	189000	348000	244000	334000	252000	240000	1070000	440000	110000	197000
Total Kjeldahl Nitrogen (TKN)			µg/L	1300	1540	1700	1800	1520	1930	1300	500	650	990	1370	3340	1340	1350	2100	2700
Total Phosphorus	30	IPWQO	µg/L	**90**	**230**	**130**	**150**	**200**	**346**	**215**	**63**	**92**	**120**	**130**	**196**	**170**	**46**	**220**	**180**
Total Suspended Solids (TSS)			µg/L	4000	20300	15000	46000	59600	92000	19200	<3000	18400	30000	47000	34000	52000	<10000	43000	77000
Metals																			
Arsenic	5	IPWQO	µg/L		ND	<1		ND	ND	ND	<1	<1	<3		<3.0		<3.0	<1.4	<1.4
Barium			µg/L		15	47		11	14.1	13.4	28	34	30		28.7		37.1	30	56
Beryllium	1100	PWQO	µg/L		ND	<0.5		ND	ND	ND	<1	<1	<1		<1.0		<1.0	<1.4	<1.4
Boron	200	IPWQO	µg/L		70	71		70	NA	65	61	58	96		33.1		150	**260**	86
Cadmium	0.5	IPWQO	µg/L		ND	<0.1		ND	**1**	**1.15**	<0.1	<0.1	<0.1		<0.10		<0.10	<1	<1
Chromium			µg/L		ND	7		ND	ND	ND	<1	2.3	<3		<3.0		<3.0	2.7	9.7
Cobalt	0.9	PWQO	µg/L		ND	**1.4**		ND	ND	**1.24**	<0.8	0.87	<0.5		0.69		<0.50	**2**	**3**
Copper	5	PWQO	µg/L		**14**	4		**19**	4	1.25	1.1	2.9	<2		3.36		1.68	3	4
Iron	300	PWQO	µg/L	**2300**	**320**	**4500**	**3500**	280	**477**	**447**	190	**1720**	**614**	**778**	**1360**	**463**	119	**3000**	**4900**
Lead	5	IPWQO	µg/L		ND	1.8		ND	ND	ND	<1	<1	<1		1.5		<1.0	3	3.6
Magnesium			µg/L		7600	9000		6700	4760	8770		13800	20600		8910		29200	11000	10000
Manganese			µg/L		15	98		18	43.9	54.3	27.7	137	35		84.2		41.2	620	380
Mercury	0.2	PWQO	µg/L		ND	<0.1		ND	ND	ND	<0.1	<0.1	<0.1		<0.1		<0.1	<0.1	<0.1
Molybdenum	40	IPWQO	µg/L		ND	<1		ND	ND	ND	6.5	1.1	<2		<2.0		<2.0	<1.4	<1.4
Nickel	25	PWQO	µg/L		ND	3		ND	ND	2.14	<2	4.2	3		<3.0		<3.0	2	4
Silver	0.1	PWQO	µg/L			<0.1					<0.1	<0.1	<0.1		<0.10		<0.10	<0.6	<0.6
Sodium			µg/L		2.1	2500		3.9	3.76	5.68	8990	11300	14500		6790		17900	6700	5000
Thallium	0.3	IPWQO	µg/L			0.08					<0.3	<0.3	<0.3		<0.3		<0.3	<1	<1
Vanadium	6		µg/L		**10**	**12**		**10**	1	ND	<1	3.1	<2		<2.0		<2.0	2	**12**
Zinc	20	IPWQO	µg/L		ND	14		13	6.63	1.38	**30.7**	**83.6**	<5		7.4		5	**63**	**54**
VOCs																			
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
1,1,1-Trichloroethane	10	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.30		<0.30		<0.30	<0.5	<0.5
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<1	<1
1,1,2-Trichloroethane	800	IPWQO	µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
1,1-Dichloroethane	200	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.5	<0.30		<0.30		<0.30	<0.4	<0.4
1,1-Dichloroethylene	40	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.30		<0.30		<0.30	<0.5	<0.5
1,2-Dichlorobenzene	2.5		µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
1,2-Dichloroethane	100	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
1,2-Dichloropropane			µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
1,3-Dichlorobenzene	2.5	PWQO	µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
1,4-Dichlorobenzene	4	PWQO	µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
2-Hexanone			µg/L			<10					<20	<20	<0.30		<0.30		<0.30	<10	<10
Acetone			µg/L			99					<20	<20	<1.0		<1.0		<1.0	78	32
Benzene	100	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
Bromodichloromethane	200	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.2	<0.2
Bromoform	60	IPWQO	µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.2	<0.2
Bromomethane	0.9	IPWQO	µg/L		<.5	<1		<.5	<2.5	<2.5	**3.2**	<1.0	<0.20		<0.20		<0.20	<3	<3
Carbon Tetrachloride	13.3	CCME	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
Chlorobenzene	15	PWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
Chloroethane			µg/L		<.5	<0.4		<.5	<2.5	<2.5	<1.0	<1.0	<0.20		<0.20		<0.20	<1	<1
Chloroform			µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.2	<0.2
Chloromethane	700	IPWQO	µg/L		<.5	<1		<.5	<2.5	<2.5	<1.0	<1.0	<0.40		<0.40		<0.40	<2	<2
cis-1,3-Dichloropropene			µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.14	<0.14
Dibromochloromethane	40	IPWQO	µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.2	<0.2
Ethylbenzene	8	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
Styrene	4	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
Tetrachloroethylene	50	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
Toluene	0.8	IPWQO	µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
trans-1,2-Dichloroethylene	200	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<1	<1
trans-1,3-Dichloropropene	7	IPWQO	µg/L		<.2	<0.4		<.2	<1	<1	<0.50	<0.50	<0.30		<0.30		<0.30	<0.14	<0.14
Trichloroethylene	20	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.20		<0.20		<0.20	<0.5	<0.5
Vinyl Chloride	600	IPWQO	µg/L		<.5	<0.4		<.5	<2.5	<2.5	<0.50	<0.50	<0.17		<0.17		<0.17	<0.2	<0.2
Xylene, *o-*	40	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<0.50	<0.50	<0.10		<0.10		<0.10	<0.5	<0.5
Xylene, *p- + m-*	32	IPWQO	µg/L		<.2	<0.2		<.2	<1	<1	<1.0	<1.0	<0.20		<0.20		<0.20	<0.5	<0.5
Xylenes (total)			µg/L			<0.2					<1.5	<1.5	<0.20		<0.20		<0.20	<1	<1
PAHs																			
Acenaphthene	5.8	CCME	µg/L		< 0.2	<0.05		< 0.2	<0.2	<0.2	0.055	<0.020	<0.10		<0.10		<0.10	<0.05	<0.05
Acenaphthylene			µg/L		< 0.2	<0.05		< 0.2	<0.2	<0.2	<0.020	<0.020	<0.11		<0.11		<0.11	<0.05	<0.05
Anthracene	0.0008	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<10	<10	<0.020	<0.020	<0.05		<0.05		<0.05	<0.05	<0.05
Benzo(a)anthracene	0.0004	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<20	<20	<0.020	<0.020	<0.08		<0.08		<0.08	<0.05	<0.05
Benzo(a)pyrene	0.015	CCME	µg/L		< 0.2	<0.01		< 0.2	<1	<1	<0.0050	<0.0050	<0.01		<0.01		<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L		< 0.2	<0.1		< 0.2	<20	<20	<0.020	<0.020	<0.06		<0.06		<0.06	<0.1	<0.1
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<10	<10	<0.020	<0.020	<0.05		<0.05		<0.05	<0.05	<0.05
Chrysene	0.0001	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<10	<10	<0.020	<0.020	<0.05		<0.05		<0.05	<0.05	<0.05
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L		< 0.5	<0.1		< 0.5	<20	<20	<0.020	<0.020	<0.09		<0.09		<0.09	<0.1	<0.1
Fluoranthene	0.0008	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<10	<10	<0.020	<0.020	<0.12		<0.12		<0.12	<0.05	<0.05
Fluorene	0.2	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.2	<0.2	0.035	<0.020	<0.09		<0.09		<0.09	<0.05	<0.05
Indeno(1,2,3-cd)pyrene			µg/L		< 0.5	<0.1		< 0.5	<20	<20	<0.020	<0.020	<0.03		<0.06		<0.06	<0.1	<0.1
Naphthalene	7	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<0.2	<0.2	0.073	<0.020	<0.12		<0.12		<0.12	<0.05	<0.05
Phenanthrene	0.03	IPWQO	µg/L		< 0.2	<0.05		< 0.2	<10	<10	**0.043**	<0.020	<0.10		<0.10		<0.10	<0.05	<0.05
Pyrene	0.025	CCME	µg/L		< 0.2	<0.05		< 0.2	<10	<10	<0.020	<0.020	<0.05		<0.05		<0.05	<0.05	<0.05

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Sample Location			SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5	SW5
	Sampling Date			2004/11/29	2005/03/30	2005/04/27 MOE dataset	2005/05/09	2005/10/13 MOE dataset	2005/11/16 MOE dataset	2005/12/02	2006/01/12 MOE dataset	2006/03/30	2006/05/29	2006/10/06 MOE dataset	2006/12/12	2007/03/14	2007/03/26 MOE dataset	2007/05/16	2008/04/01 MOE dataset
	Standard/ Guideline		Sample Type	Field Duplicate	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Value	Type	Units	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive
Field Parameters																		
Conductivity			µS/cm															
Dissolved Oxygen	qualitative - see table	PWQO	mg/L															
pH																		
Temperature			°C															
Flow Rate			L/s															
General																		
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L	22100	20500	51900	72000	85000	34800	42000	57700	72000	67000	53600	103000	29000	42500	201000	41900
Ammonia (as N)			µg/L	90	150	ND	100	ND	ND	90	ND	<50	33	ND	220	39000	ND	570	59
Ammonia, un-ionised (as N)	20	PWQO	µg/L			ND		ND	ND		ND			0			NA		**NA**
Biological Oxygen Demand (BOD_5)			µg/L	10000	4000	3900	<2000	32500	4100	3000	8800	5000	5000	7300	4000	3000	NA	4000	700
Calcium			µg/L			16000		40000	13000		16000			21000			16000		15900
Chemical Oxygen Demand (COD)			µg/L	132000	61000	119000	100000	171000	66000	250000	87000	110000	220000	154000	55000	32000	32000	110000	25000
Chloride			µg/L	6900	2940		5800			4000		4000	4000		2000	7000		5000	
Conductivity			µS/cm	177	66	121	161	221	123	122	142	161	137	133	216	100	147	392	263
Dissolved Organic Carbon (DOC)			µg/L	36100		23800	29400	47000	24600	25600	24800		40300	33300	15100		9800	29600	700
Hardness (as $CaCO_3$)			µg/L	77400			76200			54000			62000		100000			190000	
Nitrate (as N)	2930	CCME	µg/L	<100	<1000	ND	<1000	ND	310	<1000	ND	<100	<100	ND	<100	300	ND	<100	123
Nitrite (as N)	18	CCME	µg/L	<100		**40**	<0.1	ND	**50**	<10	ND	<10	<10	**150**	<10	10	**150**	30	**26**
pH	6.5-8.5	PWQO		6.88	6.60	6.99	7.59	7.47	6.77	7.46	6.72	7.60	7.40	6.62	7.80	7.00	6.88	8.10	8.31
Phenol	1	PWQO	µg/L	**4**	**7**	ND	**5**	**7.6**	ND	**12**	**7**	<1	**3**	0	**6**	<1	ND	**6**	ND
Potassium			µg/L			5900	4200	10100	6800	6000	4100		5900	46000	5200		2100		3300
Sulphates			µg/L	48800	8000		<5000			16000		7000	<10000		11000	15000		6000	
Total Dissolved Solids (TDS)			µg/L	164000	363000	251000	183000	253000	300000	210000	178000	104000	90000	975000	119000	63000	125000	242000	171000
Total Kjeldahl Nitrogen (TKN)			µg/L	3300	2100	2870	2600	3410	1240	6700	1290	2600	3000	4120	2000	1800	720	4000	260
Total Phosphorus	30	IPWQO	µg/L	**230**	**180**	**380**	**310**	**520**	**220**	**1040**	**100**	**240**	**490**	**1190**	**110**	**94**	ND	**650**	**104**
Total Suspended Solids (TSS)			µg/L	22000	50000	331000	23000	245000	19600	700000	101000	8000	74000	1050000	54000	19000	14400	550000	110000
Metals																			
Arsenic	5	IPWQO	µg/L	<1.4		ND	2	**3**	ND	5	ND		4	ND	2		ND	**20**	ND
Barium			µg/L	61		55.5	39	130	38	150	14		80	260	72		11	350	7.02
Beryllium	1100	PWQO	µg/L	<1.4		0.2	<0.5	0.42	ND	0.9	ND		<0.5	1.1	<0.5		1.1	2.2	ND
Boron	200	IPWQO	µg/L	85		ND	110	150	ND	64	ND		82	ND	21		ND	70	NA
Cadmium	0.5	IPWQO	µg/L	0		ND	<0.1	**0.9**	ND	0.4	ND		<0.1	ND	<0.1		ND	0.4	**1.35**
Chromium			µg/L	10		1.7	<5	1.4	ND	25	ND		8	ND	13		ND	59	ND
Cobalt	0.9	PWQO	µg/L	**3**		**1.6**	**1.8**	**12**	ND	**10**	ND		**6.5**	ND	**3.3**		ND	**27**	ND
Copper	5	PWQO	µg/L	5		3.6	**9**	**7.4**	ND	**24**	ND		5	ND	5		**12**	**71**	ND
Iron	300	PWQO	µg/L	**5600**	**11000**	**2980**	**6800**	**15200**	**2080**	**28000**	**4000**	**8000**	**17000**	**11200**	**12000**	**2800**	**1230**	**72000**	58.7
Lead	5	IPWQO	µg/L	4.3		ND	4.4	ND	ND	**23**	ND		3.8	ND	4.3		ND	**81**	ND
Magnesium			µg/L	10000		6700	8000	12000	6700	11000	6800		7900	19000	8400		5200	30000	16700
Manganese			µg/L	360		510	190	1590	220	530	390		1900	400	370		130	1500	27.9
Mercury	0.2	PWQO	µg/L	<0.1		0.02	<0.1	0.05	ND	<0.1	ND		<0.1	ND	<0.1		ND	<0.1	ND
Molybdenum	40	IPWQO	µg/L	<1.4		ND	<1	ND	ND	<1	ND		<1	ND	<1		ND	2	ND
Nickel	25	PWQO	µg/L	4		2.7	5	14	ND	24	ND		6	ND	7		ND	**66**	ND
Silver	0.1	PWQO	µg/L	<0.6			<0.5			**1.1**			<0.1		<0.1			0.1	
Sodium			µg/L	4900		2	3300	3.5	2.5	2500	2.7		2400	3.3	1500		2.2	3800	6.88
Thallium	0.3	IPWQO	µg/L	<1			<0.05			0.22			0.08		0.14			**0.53**	
Vanadium	6		µg/L	**14**		4.1	6	**11.6**	ND	**36**	ND		**12**	**17**	**23**		ND	**79**	ND
Zinc	20	IPWQO	µg/L	**46**		13.8	14	**83**	13	**91**	ND		**24**	**45**	**25**		13	**190**	ND
VOCs																			
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
1,1,1-Trichloroethane	10	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L	<1		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
1,1,2-Trichloroethane	800	IPWQO	µg/L	<0.5		<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
1,1-Dichloroethane	200	IPWQO	µg/L	<0.4		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
1,1-Dichloroethylene	40	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	0.4	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
1,2-Dichlorobenzene	2.5		µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
1,2-Dichloroethane	100	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
1,2-Dichloropropane			µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
1,3-Dichlorobenzene	2.5	PWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
1,4-Dichlorobenzene	4	PWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
2-Hexanone			µg/L	<10			<5			<5			<5		<10				
Acetone			µg/L	<10			<10			<10			<10		<20			<10	
Benzene	100	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Bromodichloromethane	200	IPWQO	µg/L	<0.2		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Bromoform	60	IPWQO	µg/L	<0.2		<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
Bromomethane	0.9	IPWQO	µg/L	<3		<.5	<0.5	<.5	<.5	<0.5	<.5		<0.5	<.5	<1		<.5	<0.5	<2.5
Carbon Tetrachloride	13.3	CCME	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Chlorobenzene	15	PWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Chloroethane			µg/L	<1		<.5	<0.2	<.5	<.5	<0.2	<.5		<0.2	<.5	<0.4		<.5		<2.5
Chloroform			µg/L	<0.2		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Chloromethane	700	IPWQO	µg/L	<2		<.5	<0.5	<.5	<.5	<0.5	<.5		<0.5	<.5	<1		<.5		<2.5
cis-1,3-Dichloropropene			µg/L	<0.14		<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
Dibromochloromethane	40	IPWQO	µg/L	<0.2		<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
Ethylbenzene	8	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Styrene	4	IPWQO	µg/L	<0.5		<.2	<0.1	0.29	<.2	0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Tetrachloroethylene	50	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Toluene	0.8	IPWQO	µg/L	<0.5		<.2	<0.2	0.27	<.2	**1.1**	<.2		**1.7**	<.2	0.8		<.2	<0.2	<1
trans-1,2-Dichloroethylene	200	IPWQO	µg/L	<1		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
trans-1,3-Dichloropropene	7	IPWQO	µg/L	<0.14		<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2	<.2	<0.4		<.2	<0.2	<1
Trichloroethylene	20	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Vinyl Chloride	600	IPWQO	µg/L	<0.2		<.5	<0.2	<.5	<.5	<0.2	<.5		<0.2	<.5	<0.4		<.5	<0.2	<2.5
Xylene, *o-*	40	IPWQO	µg/L	<0..5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Xylene, *p- + m-*	32	IPWQO	µg/L	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1	<.2	<0.2		<.2	<0.1	<1
Xylenes (total)			µg/L	<1			<0.2			<0.2			<0.1		<0.2			<0.1	
PAHs																			
Acenaphthene	5.8	CCME	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	<0.05	<0.2
Acenaphthylene			µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	0.4	<0.2
Anthracene	0.0008	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	**0.2**	<10
Benzo(a)anthracene	0.0004	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	**0.07**	< 0.2		<0.05	< 0.2	<0.05		< 0.2	**0.4**	<20
Benzo(a)pyrene	0.015	CCME	µg/L	<0.01		< 0.2	<0.01	< 0.2	< 0.2	**0.02**	< 0.2		<0.01	< 0.2	0.01		< 0.2	**0.4**	<1
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L	<0.1		< 0.2	<0.1	< 0.2	< 0.2	<0.1	< 0.2		<0.1	< 0.2	<0.1		< 0.2	**0.4**	<20
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	**0.2**	<10
Chrysene	0.0001	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	**0.3**	<10
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L	<0.1		< 0.5	<0.1	< 0.5	< 0.5	<0.1	< 0.5		<0.1	< 0.5	<0.1		< 0.5	-	<20
Fluoranthene	0.0008	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	**0.05**	< 0.2		<0.05	< 0.2	<0.05		< 0.2	**0.6**	**19**
Fluorene	0.2	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	0.07	<0.2
Indeno(1,2,3-cd)pyrene			µg/L	<0.1		< 0.5	<0.1	< 0.5	< 0.5	<0.1	< 0.5		<0.1	< 0.5	<0.1		< 0.5	0.5	<20
Naphthalene	7	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	<0.05	<0.2
Phenanthrene	0.03	IPWQO	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	**0.1**	**13**
Pyrene	0.025	CCME	µg/L	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05	< 0.2	<0.05		< 0.2	0.6	**15**

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline Value	Standard/ Guideline Type	Sample Type Units	Sample Location / Sampling Date	SW5 2008/09/10 MOE dataset	SW5 2009/07/19	SW5 2009/11/25	SW5 2011/01/06	SW5 2011/03/31	SW5 2011/05/16	SW5 2011/11/11	SW6 2004/11/29	SW6 2005/03/30	SW6 2005/04/27 MOE dataset	SW6 2005/05/09	SW6 2005/10/13 MOE dataset	SW6 2005/11/16 MOE dataset	SW6 2005/12/02	SW6 2006/01/12 MOE dataset	SW6 2006/03/30
					Surface Water	Surface Water	Surface Water	DRY	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
					SW Comprehensive	SW Comprehensive	SW Comprehensive		SW Indicator	SW Indicator	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator
Field Parameters																				
Conductivity			µS/cm						1530	697	1090									
Dissolved Oxygen	qualitative - see table	PWQO	mg/L						6.5	4.44	23.23									
pH									7.2	7.32	7.5									
Temperature			°C						2.6	10.4	4.1									
Flow Rate			L/s						No Measurable Flow	No Measurable Flow	No Measurable Flow									
General																				
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L		184000	155000	430000		199000	205000	308000	16900	22200	38200	57800	71000	32900	32000	36000	50000
Ammonia (as N)			µg/L		64	<50	<50		260	110	1420	70	170	ND	110	ND	ND	50	ND	<50
Ammonia, un-ionised (as N)	20	PWQO	µg/L		**NA**				<20	3	135			ND		ND	ND		ND	
Biological Oxygen Demand (BOD_5)			µg/L		2600	58000	15200		<5000	<5000	<5000	8000	4000	3700	<2000	43800	4500	<2000	3200	<2000
Calcium			µg/L		60500		153000			114000	139000			13700		80000	13000		13000	
Chemical Oxygen Demand (COD)			µg/L		80000	343000	146000		38000	62500	58000	333000	58000	82000	110000	476000	67000	120000	121000	85000
Chloride			µg/L			<2000	3500		65400	25200	24000	7480	2900		550			6000		3000
Conductivity			µS/cm		474	395	822		1410	725	975	97	71	97.9	133	195	116	116	109	121
Dissolved Organic Carbon (DOC)			µg/L		11200	29300	21700			22500	25300	27800		20600	31800	43900	19300	21000	16300	
Hardness (as $CaCO_3$)			µg/L			241000	546000			392000	484000	46300			76200			52000		
Nitrate (as N)	2930	CCME	µg/L		ND	<100	<100		<50	<50	<50	300	<1000	ND	<100	ND	1030	400	ND	<100
Nitrite (as N)	18	CCME	µg/L		**25**	<100	<100		<50	<50	<50	<100		**40**	<100	**110**	**50**	50	ND	<10
pH	6.5-8.5	PWQO			8.21	8.01	7.00		7.75	8.20	8.26	7.01	6.71	6.96	7.40	6.77	6.91	7.54	7.03	7.50
Phenol	1	PWQO	µg/L		ND	<1	**25**		<1	<1	<1	**2**	**6**	ND	**6**	ND	ND	<1	ND	<1
Potassium			µg/L		3130	<10000	<10000			3590	9250			6200	3900	13700	4900	6700	4500	
Sulphates			µg/L			52700	44300		564000	185000	210000	15200	8000		<500			24000		5000
Total Dissolved Solids (TDS)			µg/L		308000	304000	566000		1290000	498000	716000	164000	292000	225000	190000	372000	173000	230000	177000	70000
Total Kjeldahl Nitrogen (TKN)			µg/L		5250	16800	1000		3070	2370	3800	4500	1500	2090	2200	22000	1260	3900	890	600
Total Phosphorus	30	IPWQO	µg/L		**5880**	**2820**	**369**		**300**	**184**	**174**	**550**	**340**	**290**	**250**	**4670**	**180**	**534**	ND	**48**
Total Suspended Solids (TSS)			µg/L		10600000	324000	1490000		600000	117000	368000	134000	20000	77200	52000	3280000	46900	410000	107000	4000
Metals																				
Arsenic	5	IPWQO	µg/L		ND	<10	<10			<3.0	3.9	2.4		ND	2	**6**	ND	4	ND	
Barium			µg/L		27.1	<100	110			59	80.2	130		45.4	51	950	29	170	12	
Beryllium	1100	PWQO	µg/L		ND	<10	<10			<1.0	<1.0	<1.4		0.17	<0.5	4.4	ND	0.9	ND	
Boron	200	IPWQO	µg/L		ND	<500	<500			50.7	66.8	68		ND	50	ND	ND	40	ND	
Cadmium	0.5	IPWQO	µg/L		ND	<1	<1			<0.10	<0.10	<1		ND	<0.1	**4.2**	ND	0.5	ND	
Chromium			µg/L		ND	<10	11			<3.0	<3.0	21		1.7	<5	4.8	ND	26	ND	
Cobalt	0.9	PWQO	µg/L		**1.06**	<8	<8			**1.93**	**2.62**	**5**		ND	**5.3**	**37**	ND	**9.1**	ND	
Copper	5	PWQO	µg/L		1.44	<10	**11**			**6.82**	**5.92**	**14**		3.3	**6**	**18**	ND	**21**	ND	
Iron	300	PWQO	µg/L		**563**	**2310**	**18200**		**800**	**2280**	**4250**	**13000**	**7600**	**1730**	**7300**	**37200**	**2570**	**30000**	**600**	**5000**
Lead	5	IPWQO	µg/L		ND	<10	**10**			**5.5**	**6.9**	**20**		ND	4.2	ND	ND	**24**	ND	
Magnesium			µg/L		20800		40000			26000	33300	8000		6000	6800	18000	5200	9500	5400	
Manganese			µg/L		79.5	59	1070			750	638	480		120	1400	7180	130	400	150	
Mercury	0.2	PWQO	µg/L		ND	<0.1	<0.1			<0.1	<0.1	<0.1		0.02	<0.1	0.16	ND	<0.1	ND	
Molybdenum	40	IPWQO	µg/L		ND	<10	<10			<2.0	<2.0	<1.4		ND	<1	ND	ND	<1	ND	
Nickel	25	PWQO	µg/L		ND	<20	<20			7	6.3	13		2.4	6	**48**	ND	24	ND	
Silver	0.1	PWQO	µg/L			<1	<1			<0.10	<0.10	<0.6			<0.5			<0.5		
Sodium			µg/L		7.06	<5000	8300			18800	17700	1700		1.4	2100	3	1.6	1700	1.5	
Thallium	0.3	IPWQO	µg/L			<3	<3			<0.3	<0.3	<1			0.05			**0.31**		
Vanadium	6		µg/L		ND	<10	**16**			2.5	4.4	**27**		2.7	**7**	**52.4**	ND	**39**	ND	
Zinc	20	IPWQO	µg/L		3.3	**42**	**59**			**91.2**	**35.9**	**140**		13.7	17	**330**	8.1	**100**	ND	
VOCs																				
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
1,1,1-Trichloroethane	10	IPWQO	µg/L		<1	<0.50	<0.50			<0.60	<0.60	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<1		<.2	<0.1	<.2	<.2	<0.1	<.2	
1,1,2-Trichloroethane	800	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.2	<.2	<.2	<0.2	<.2	
1,1-Dichloroethane	200	IPWQO	µg/L		<1	<0.50	<0.50			<0.60	<0.60	<0.4		<.2	<0.1	<.2	<.2	<0.1	<.2	
1,1-Dichloroethylene	40	IPWQO	µg/L		<1	<0.50	<0.50			<0.60	<0.60	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
1,2-Dichlorobenzene	2.5		µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.2	<.2	
1,2-Dichloroethane	100	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
1,2-Dichloropropane			µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
1,3-Dichlorobenzene	2.5	PWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.2	<.2	
1,4-Dichlorobenzene	4	PWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.2	<.2	
2-Hexanone			µg/L			<20	<20			<0.60	<0.60	<10			<5			<5		
Acetone			µg/L			<20	<20			<2.0	<2.0	<10			<10			<10		
Benzene	100	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Bromodichloromethane	200	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.2		<.2	<0.1	<.2	<.2	<0.1	<.2	
Bromoform	60	IPWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.2		<.2	<0.2	<.2	<.2	<0.2	<.2	
Bromomethane	0.9	IPWQO	µg/L		<2.5	<1.0	<1.0			<0.40	<0.40	<3		<.5	<0.5	<.5	<.5	<0.5	<.5	
Carbon Tetrachloride	13.3	CCME	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Chlorobenzene	15	PWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Chloroethane			µg/L		<2.5	<1.0	<1.0			<0.40	<0.40	<1		<.5	<0.2	<.5	<.5	<0.2	<.5	
Chloroform			µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.2		<.2	<0.1	<.2	<.2	<0.1	<.2	
Chloromethane	700	IPWQO	µg/L		<2.5	<1.0	<1.0			<0.80	<0.80	<2		<.5	<0.5	<.5	<.5	<0.5	<.5	
cis-1,3-Dichloropropene			µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.14		<.2	<0.2	<.2	<.2	<0.2	<.2	
Dibromochloromethane	40	IPWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.2		<.2	<0.2	<.2	<.2	<0.2	<.2	
Ethylbenzene	8	IPWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Styrene	4	IPWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Tetrachloroethylene	50	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Toluene	0.8	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.2	<.2	<.2	<0.2	<.2	
trans-1,2-Dichloroethylene	200	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<1		<.2	<0.1	<.2	<.2	<0.1	<.2	
trans-1,3-Dichloropropene	7	IPWQO	µg/L		<1	<0.50	<0.50			<0.60	<0.60	<0.14		<.2	<0.2	<.2	<.2	<0.2	<.2	
Trichloroethylene	20	IPWQO	µg/L		<1	<0.50	<0.50			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Vinyl Chloride	600	IPWQO	µg/L		<2.5	<0.50	<0.50			<0.34	<0.34	<0.2		<.5	<0.2	<.5	<.5	<0.2	<.5	
Xylene, *o-*	40	IPWQO	µg/L		<1	<0.50	<0.50			<0.20	<0.20	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Xylene, *p- + m-*	32	IPWQO	µg/L		<1	<1.0	<1.0			<0.40	<0.40	<0.5		<.2	<0.1	<.2	<.2	<0.1	<.2	
Xylenes (total)			µg/L			<1.5	<1.5			<0.40	<0.40	<1			<0.2			<0.2		
PAHs																				
Acenaphthene	5.8	CCME	µg/L		<0.2	<0.20	<0.020			<0.10	<0.10	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Acenaphthylene			µg/L		<0.2	<0.20	<0.020			<0.11	<0.11	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Anthracene	0.0008	IPWQO	µg/L		<10	<0.20	<0.020			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Benzo(a)anthracene	0.0004	IPWQO	µg/L		<20	<0.20	<0.020			<0.08	<0.08	<0.05		< 0.2	<0.05	< 0.2	< 0.2	**0.06**	< 0.2	
Benzo(a)pyrene	0.015	CCME	µg/L		<1	<0.050	0.0069			<0.01	<0.01	<0.01		< 0.2	<0.01	< 0.2	< 0.2	0.01	< 0.2	
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L		<20	<0.20	<0.020			<0.06	<0.06	<0.1		< 0.2	<0.1	< 0.2	< 0.2	<0.1	< 0.2	
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L		<10	<0.20	<0.020			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Chrysene	0.0001	IPWQO	µg/L		<10	<0.20	<0.020			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L		<20	<0.20	<0.020			<0.09	<0.09	<0.1		< 0.5	<0.1	< 0.5	< 0.5	<0.1	< 0.5	
Fluoranthene	0.0008	IPWQO	µg/L		<10	<0.20	**0.022**			<0.12	<0.12	<0.05		< 0.2	<0.05	< 0.2	< 0.2	**0.05**	< 0.2	
Fluorene	0.2	IPWQO	µg/L		<0.2	<0.20	<0.020			<0.09	<0.09	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Indeno(1,2,3-cd)pyrene			µg/L		<20	<0.20	<0.020			<0.06	<0.06	<0.1		< 0.5	<0.1	< 0.5	< 0.5	<0.1	< 0.5	
Naphthalene	7	IPWQO	µg/L		<0.2	<0.20	<0.020			0.14	<0.12	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Phenanthrene	0.03	IPWQO	µg/L		<10	<0.20	0.025			<0.10	<0.10	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	
Pyrene	0.025	CCME	µg/L		<10	<0.20	<0.020			<0.05	<0.05	<0.05		< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2	

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline Value	Standard/ Guideline Type	Units	Sample Location	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW6	SW7	SW7	SW7	SW7
				Sampling Date	2006/05/29	2006/10/06 MOE dataset	2006/12/12	2007/03/14	2007/03/26 MOE dataset	2007/05/16	2008/04/01 MOE dataset	2008/09/10 MOE dataset	2009/11/24	2011/01/06	2011/03/31	2011/05/16	2011/11/11	2004/06/07	2004/08/20	2004/11/29	2005/03/30
				Sample Type	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
					SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Indicator
Field Parameters																					
Conductivity			µS/cm											260	220	44	380				
Dissolved Oxygen	qualitative - see table	PWQO	mg/L											1.51	2.07	4.37	1.9				
pH														8.03	5.82	6	6.93				
Temperature			°C											0	2.6	9.5	5.6				
Flow Rate			L/s											No Measurable Flow	No Measurable Flow	No Measurable Flow	No Measurable Flow				
General																					
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L		98000	41100	86000	25	30900	177000	39700	161000	219000	145000	28000	23100	113000	143000	164000	53500	22300
Ammonia (as N)			µg/L		71	ND	290	34000	ND	630	72	63	50	<20	140	<20	79	<50	530	<50	100
Ammonia, un-ionised (as N)	20	PWQO	µg/L			<1			NA		NA	NA		<1	<20	<1	<20				
Biological Oxygen Demand (BOD_5)			µg/L		4000	5800	2000	3	NA	5000	1300	1200	10200	<5000	<5000	10000	15000	6000	15000	8000	<4000
Calcium			µg/L			17000			13000		20700	56500	71000	44000		9790	45200				
Chemical Oxygen Demand (COD)			µg/L		500000	93000	220000	58000	53000	130000	19000	55000	92000	15000	73000	115000	254000	116000	133000	423000	32000
Chloride			µg/L		9000		7000	8000		3000			3000	2240	5400	1470	11300	18100	5250	8290	1250
Conductivity			µS/cm		182	104	192	94	120	425	207	476	449	269	109	69	389	316	311	143	58
Dissolved Organic Carbon (DOC)			µg/L		64000	32800	20900		14600	42900	5700	13600	21600	4800		28700	56200	21500		24500	
Hardness (as $CaCO_3$)			µg/L		90000		94000			210000			253000	157000		37900	174000	159000		72500	
Nitrate (as N)	2930	CCME	µg/L		<100	130	<100	400	ND	100	143	ND	100	240	70	<50	<50	<1000	100	<100	300
Nitrite (as N)	18	CCME	µg/L		10	ND	<10	10	ND	20	**23**	11	100	<50	<50	<50	<50	<100	<100	<100	
pH	6.5-8.5	PWQO			7.60	7.15	7.70	7.00	6.86	8.00	7.27	7.89	7.64	8.28	6.90	7.21	7.43	7.94	7.15	7.54	6.80
Phenol	1	PWQO	µg/L		**4**	0	**4**	**2**	ND	**5**	ND	ND	**26**	<1	<1	<1	**40**	<1	<1	**3**	**4**
Potassium			µg/L		7200	0	6700		4100		2620	3400	5600	1510		2140	5850	6200			
Sulphates			µg/L		19000		13000	14000		40000			23100	4510	15400	5610	59200	30000	7000	11000	3500
Total Dissolved Solids (TDS)			µg/L		123000	897000	126000	53000	148000	258000	134000	309000	284000	150000	170000	124000	294000	150000	261000	175000	159000
Total Kjeldahl Nitrogen (TKN)			µg/L		2800	2920	10000	3000	1490	5000	480	950	1710	700	2220	3610	8500	3100	3000	3200	1300
Total Phosphorus	30	IPWQO	µg/L		**1800**	**720**	**1500**	**120**	**180**	**570**	**89**	**290**	**244**	<20	**210**	**274**	**833**	**340**	**660**	**320**	30
Total Suspended Solids (TSS)			µg/L		880000	164000	700000	15000	54900	2400000	30100	60400	100000	13000	29000	170000	106000	61000	471000	230000	12000
Metals																					
Arsenic	5	IPWQO	µg/L		**7**	ND	**6**		ND	**17**	ND	ND	3.1	<3		<3.0	<3.0	<1.4		1.8	
Barium			µg/L		200	11	290		11	360	11.4	24.9	44	27		20.7	36.6	23		95	
Beryllium	1100	PWQO	µg/L		1.3	ND	1.5		ND	2.1	ND	ND	1	<1		<1.0	<1.0	<1.4		<1.4	
Boron	200	IPWQO	µg/L		73	ND	24		ND	83	NA	ND	50	18		21.8	38.3	**410**		87	
Cadmium	0.5	IPWQO	µg/L		**0.6**	ND	**0.6**		ND	**0.7**	**1.12**	ND	<0.1	<0.1		<0.10	<0.10	<1		<1	
Chromium			µg/L		23	ND	45		ND	48	ND	ND	1.9	<3		<3.0	<3.0	1.8		16	
Cobalt	0.9	PWQO	µg/L		**13**	ND	**15**		ND	**24**	ND	**1.05**	**1.63**	<0.5		**1.14**	**0.98**	<1		**3**	
Copper	5	PWQO	µg/L		**22**	ND	**34**		**14**	**67**	ND	1.01	3.3	<2		2.96	<0.80	<3		**10**	
Iron	300	PWQO	µg/L		**38000**	**940**	**49000**	**2300**	**490**	**63000**	290	**541**	**5270**	219	**1290**	**2540**	**2600**	**660**	**1100**	**10000**	**2500**
Lead	5	IPWQO	µg/L		**25**	ND	**36**		ND	**81**	ND	ND	1.4	<1		3.2	2	2.2		**9.2**	
Magnesium			µg/L		13000	14000	14000		4400	30000	8690	18700	18400	11400		3260	14900	16000		9300	
Manganese			µg/L		1900	200	740		49	1600	107	117	610	10		72.8	403	87		190	
Mercury	0.2	PWQO	µg/L		<0.1	ND	<0.1		ND	<0.1	ND	ND	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	
Molybdenum	40	IPWQO	µg/L		<1	ND	<1		ND	2	ND	ND	<1	<2		<2.0	<2.0	<1.4		<1.4	
Nickel	25	PWQO	µg/L		22	ND	**38**		ND	**55**	ND	ND	4.4	<3		3.6	3.4	<1		8	
Silver	0.1	PWQO	µg/L		**0.2**		0.1			0.1			<0.1	<0.1		<0.10	<0.10	<0.6		<0.6	
Sodium			µg/L		2500	2.4	1400		1.6	3900	3.4	6.72	4630	2470		2020	8510	6200		2400	
Thallium	0.3	IPWQO	µg/L		0.28		**0.47**			**0.43**			<0.3	<0.3		<0.3	<0.3	<1		<1	
Vanadium	6		µg/L		**28**	ND	**56**		ND	**67**	ND	ND	2.4	<2		2.8	<2.0	<1		**21**	
Zinc	20	IPWQO	µg/L		**97**	15	**140**		16	**180**	5.54	0.798	9.6	<5		16.7	16.1	**34**		**78**	
VOCs																					
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
1,1,1-Trichloroethane	10	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.30		<0.60	<0.60	<0.5		<0.5	
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.10		<0.20	<0.20	<1.0		<1	
1,1,2-Trichloroethane	800	IPWQO	µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.5		<0.5	
1,1-Dichloroethane	200	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.30		<0.60	<0.60	<0.4		<0.4	
1,1-Dichloroethylene	40	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.30		<0.60	<0.60	<0.5		<0.5	
1,2-Dichlorobenzene	2.5		µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
1,2-Dichloroethane	100	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.5		<0.5	
1,2-Dichloropropane			µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.5		<0.5	
1,3-Dichlorobenzene	2.5	PWQO	µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
1,4-Dichlorobenzene	4	PWQO	µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
2-Hexanone			µg/L		<30		<10						<20	<0.30		<0.60	<0.60	<10		<10	
Acetone			µg/L		<50		<20			<10			<20	<1.0		<2.0	<2.0	<10		<10	
Benzene	100	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.5		<0.5	
Bromodichloromethane	200	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.2		<0.2	
Bromoform	60	IPWQO	µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.2		<0.2	
Bromomethane	0.9	IPWQO	µg/L		<3	<.5	<1		<.5	<0.5	<2.5	<2.5	<1.0	<0.20		<0.40	<0.40	<3		<3	
Carbon Tetrachloride	13.3	CCME	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.5		<0.5	
Chlorobenzene	15	PWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
Chloroethane			µg/L		<1	<.5	<0.4		<.5		<2.5	<2.5	<1.0	<0.20		<0.40	<0.40	<1.0		<1	
Chloroform			µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.2		<0.2	
Chloromethane	700	IPWQO	µg/L		<3	<.5	<1		<.5		<2.5	<2.5	<1.0	<0.40		<0.80	<0.80	<2.0		<2	
cis-1,3-Dichloropropene			µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.14		<0.14	
Dibromochloromethane	40	IPWQO	µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.2		<0.2	
Ethylbenzene	8	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
Styrene	4	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
Tetrachloroethylene	50	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.5		<0.5	
Toluene	0.8	IPWQO	µg/L		**7**	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.20		<0.40	**1.1**	<0.5		<0.5	
trans-1,2-Dichloroethylene	200	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<1.0		<1	
trans-1,3-Dichloropropene	7	IPWQO	µg/L		<1	<.2	<0.4		<.2	<0.2	<1	<1	<0.50	<0.30		<0.60	<0.60	<0.14		<0.14	
Trichloroethylene	20	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.20		<0.40	<0.40	<0.5		<0.5	
Vinyl Chloride	600	IPWQO	µg/L		<1	<.5	<0.4		<.5	<0.2	<2.5	<2.5	<0.50	<0.17		<0.34	<0.34	<0.2		<0.2	
Xylene, *o-*	40	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<0.50	<0.10		<0.20	<0.20	<0.5		<0.5	
Xylene, *p- + m-*	32	IPWQO	µg/L		<0.5	<.2	<0.2		<.2	<0.1	<1	<1	<1.0	<0.20		<0.40	<0.40	<0.5		<0.5	
Xylenes (total)			µg/L		<0.5		<0.2			<0.1			<1.5	<0.20		<0.40	<0.40	<1.0		<1	
PAHs																					
Acenaphthene	5.8	CCME	µg/L		<0.05	< 0.2	<0.05		< 0.2	<0.05	<0.2	<0.2	<0.020	<0.10		<0.10	<0.10	<0.05		<0.05	
Acenaphthylene			µg/L		<0.05	< 0.2	<0.05		< 0.2	0.2	<0.2	<0.2	<0.020	<0.11		<0.11	<0.11	<0.05		<0.05	
Anthracene	0.0008	IPWQO	µg/L		<0.05	< 0.2	<0.05		< 0.2	**0.1**	<10	<10	<0.020	<0.05		<0.05	<0.05	<0.05		<0.05	
Benzo(a)anthracene	0.0004	IPWQO	µg/L		**0.06**	< 0.2	<0.05		< 0.2	**0.3**	<20	<20	<0.020	<0.08		<0.08	<0.08	<0.05		<0.05	
Benzo(a)pyrene	0.015	CCME	µg/L		<0.01	< 0.2	**0.02**		< 0.2	**0.2**	**12**	<1	0.0073	<0.01		<0.01	<0.01	<0.01		<0.01	
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L		<0.1	< 0.2	<0.1		< 0.2	**0.2**	<20	<20	<0.020	<0.06		<0.06	<0.06	<0.1		<0.1	
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L		<0.05	< 0.2	<0.05		< 0.2	**0.1**	**15**	<10	<0.020	<0.05		<0.05	<0.05	<0.05		<0.05	
Chrysene	0.0001	IPWQO	µg/L		<0.05	< 0.2	<0.05		< 0.2	**0.2**	**21**	<10	<0.020	<0.05		<0.05	<0.05	<0.05		<0.05	
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L		<0.1	< 0.5	<0.1		< 0.5		<20	<20	<0.020	<0.09		<0.09	<0.09	<0.1		<0.1	
Fluoranthene	0.0008	IPWQO	µg/L		<0.05	< 0.2	**0.05**		< 0.2	**0.4**	**49**	<10	<0.020	<0.12		<0.12	<0.12	<0.05		<0.05	
Fluorene	0.2	IPWQO	µg/L		<0.05	< 0.2	<0.05		< 0.2	<0.05	<0.2	<0.2	<0.020	<0.09		<0.09	<0.09	<0.05		<0.05	
Indeno(1,2,3-cd)pyrene			µg/L		<0.1	< 0.5	<0.1		< 0.5	0.2	<20	<20	<0.020	<0.03		<0.06	<0.06	<0.1		<0.1	
Naphthalene	7	IPWQO	µg/L		<0.05	< 0.2	<0.05		< 0.2	0.05	<0.2	<0.2	<0.020	<0.12		<0.12	<0.12	<0.05		<0.05	
Phenanthrene	0.03	IPWQO	µg/L		<0.05	< 0.2	<0.05		< 0.2	**0.1**	**40**	<10	<0.020	<0.10		<0.10	<0.10	<0.05		<0.05	
Pyrene	0.025	CCME	µg/L		<0.05	< 0.2	<0.05		< 0.2	0.4	**44**	<10	<0.020	<0.05		<0.05	<0.05	<0.05		<0.05	

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline Value	Standard/ Guideline Type	Sample Type Units	SW7 2005/04/27 MOE dataset Surface Water SW Comprehensive	SW7 2005/05/09 MOE dataset Surface Water SW Comprehensive	SW7 2005/10/13 MOE dataset Surface Water SW Comprehensive	SW7 2005/11/16 MOE dataset Surface Water SW Comprehensive	SW7 2005/12/02 MOE dataset Surface Water SW Comprehensive	SW7 2006/01/12 MOE dataset Surface Water SW Comprehensive	SW7 2006/03/30 Surface Water SW Indicator	SW7 2006/05/29 MOE dataset Surface Water SW Comprehensive	SW7 2006/08/10 Surface Water	SW7 2006/10/06 MOE dataset Surface Water SW Comprehensive	SW7 2006/12/12 MOE dataset Surface Water SW Comprehensive	SW7 2007/03/14 Surface Water SW Indicator	SW7 2007/03/26 MOE dataset Surface Water SW Comprehensive	SW7 2007/05/16 MOE dataset Surface Water SW Comprehensive	SW7 2008/04/01 MOE dataset Surface Water SW Comprehensive	SW7 2008/09/10 MOE dataset Surface Water SW Comprehensive
Field Parameters																			
Conductivity			µS/cm																
Dissolved Oxygen	qualitative - see table	PWQO	mg/L																
pH																			
Temperature			°C																
Flow Rate			L/s																
General																			
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L	24100	34400	52300	27400	26000	22500	26000	51000		31700	46000	12000	20100	45000	15900	76300
Ammonia (as N)			µg/L	ND	70	ND	ND	60	ND	<50	100		ND	220	150	ND	90000	13	112
Ammonia, un-ionised (as N)	20	PWQO	µg/L	ND		ND	ND		ND				#VALUE!			NA		NA	NA
Biological Oxygen Demand (BOD_5)			µg/L	5100	3000	8400	6200	<2000	2300	<4000	4000		10400	2000	<2000	NA	44000	1900	19100
Calcium			µg/L	8800		30000	10000		8200				10000			7400		9050	23900
Chemical Oxygen Demand (COD)			µg/L	83000	87000	120000	74000	99000	54000	73000	130000		90000	60000	18000	45000	82000	32000	140000
Chloride			µg/L		2000			3000		3000	2000			7000	2000		2000		
Conductivity			µS/cm	67.2	86	242	99	92	75.3	90	110		91.5	103	46	68.1	111	94	207
Dissolved Organic Carbon (DOC)			µg/L	21200	25200	36400	25200	19200	15900		33300		28400	16700		9700	28400	9500	20400
Hardness (as $CaCO_3$)			µg/L		44700			43000			52000			47000			54000		
Nitrate (as N)	2930	CCME	µg/L	ND	<1000	ND	ND	<100	ND	<100	<100		ND	400	400	ND	<100	44	ND
Nitrite (as N)	18	CCME	µg/L	ND	<100	ND	ND	10	ND	<10	<10		ND	20	<10	ND	<10	12	8
pH	6.5-8.5	PWQO		6.7	7.22	7.08	6.74	6.94	6.94	7.10	7.30		6.54	7.50	6.80	6.8	7.40	6.64	7.25
Phenol	1	PWQO	µg/L	ND	**4**	**1.9**	**1.7**	1	ND	<1	1		0	**4**	<1	ND	**3**	ND	ND
Potassium			µg/L	4200	1300	13400	4500	4400	2700		1600		6000	5500		2500		1590	3090
Sulphates			µg/L		7000			9000		13000	<1000			4000	4000		9000		
Total Dissolved Solids (TDS)			µg/L	145000	110000	243000	134000	226000	101000	60000	71000		180000	64000	30000	114000	54000	61000	134000
Total Kjeldahl Nitrogen (TKN)			µg/L	3690	2000	2250	1230	2200	910	1200	1800		1630	2000	1200	880	2200	1050	6350
Total Phosphorus	30	IPWQO	µg/L	**430**	**170**	**840**	**200**	**254**	ND	**95**	**290**		**230**	**190**	**71**	**100**	**150**	**128**	**112**
Total Suspended Solids (TSS)			µg/L	95400	50000	35900	26800	64000	10400	20000	26000		30400	10000	9000	87700	58000	39600	277000
Metals																			
Arsenic	5	IPWQO	µg/L	ND	1	ND	ND	1	ND		1		ND	2		ND	1	ND	ND
Barium			µg/L	36.7	23	29	20	47	10		17		30	54		8.2	13	10.1	17.9
Beryllium	1100	PWQO	µg/L	0.14	<0.5	0.06	ND	<0.5	ND		<0.5		ND	<0.5		ND	<0.5	ND	ND
Boron	200	IPWQO	µg/L	ND	40	160	ND	38	ND		120		ND	34		ND	31	NA	70
Cadmium	0.5	IPWQO	µg/L	ND	<0.1	**0.7**	ND	0.1	ND		<0.1		ND	<0.1		ND	<0.1	**1.58**	ND
Chromium			µg/L	1.3	<5	ND	ND	8	ND		<5		ND	10		ND	<5	ND	ND
Cobalt	0.9	PWQO	µg/L	ND	**1.2**	ND	ND	**2.4**	ND		**1.3**		ND	**2.8**		ND	0.5	ND	**2.71**
Copper	5	PWQO	µg/L	2.9	**11**	3.1	ND	**7**	ND		2		ND	5		ND	1	ND	ND
Iron	300	PWQO	µg/L	**1600**	**2600**	**4340**	**1640**	**7200**	**560**	**2600**	**3600**	**1900**	**2700**	**7600**	**1500**	**860**	**1700**	**612**	**908**
Lead	5	IPWQO	µg/L	ND	1.5	ND	ND	4.3	ND		1.1		ND	2.7		ND	<0.5	ND	ND
Magnesium			µg/L	4100	4500	9000	4400	5500	3600		5500		4600	5700		2800	5800	3340	8030
Manganese			µg/L	75.7	230	380	150	170	81		290		140	320		55	75	88.6	81.7
Mercury	0.2	PWQO	µg/L	ND	<0.1	0.05	ND	<0.1	ND		<0.1		ND	<0.1		ND	<0.1	ND	ND
Molybdenum	40	IPWQO	µg/L	ND	<1	ND	ND	<1	ND		<1		ND	<1		ND	<1	ND	ND
Nickel	25	PWQO	µg/L	2.3	3	3.7	ND	7	ND		2		ND	5		ND	2	ND	ND
Silver	0.1	PWQO	µg/L		<0.5			<0.5			<0.1			<0.1			<0.1		
Sodium			µg/L	1.2	1500	3.1	1.6	1300	1.2		1700		1.3	1100		2.5	2100	1.54	3.38
Thallium	0.3	IPWQO	µg/L		<0.05			0.08			<0.05			0.11			<0.05		
Vanadium	6		µg/L	2.9	3	1.8	ND	**11**	ND		2		ND	**17**		ND	2	ND	ND
Zinc	20	IPWQO	µg/L	14.5	20	10.7	8.8	**28**	8.8		8		7.8	**23**		ND	6	ND	1.99
VOCs																			
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
1,1,1-Trichloroethane	10	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
1,1,2-Trichloroethane	800	IPWQO	µg/L	<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
1,1-Dichloroethane	200	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
1,1-Dichloroethylene	40	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
1,2-Dichlorobenzene	2.5		µg/L	<.2	<0.1	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
1,2-Dichloroethane	100	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
1,2-Dichloropropane			µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
1,3-Dichlorobenzene	2.5	PWQO	µg/L	<.2	<0.1	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
1,4-Dichlorobenzene	4	PWQO	µg/L	<.2	<0.1	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
2-Hexanone			µg/L		<5.0			<5			<5			<30					
Acetone			µg/L		<10			<10			<10			<50			<10		
Benzene	100	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Bromodichloromethane	200	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Bromoform	60	IPWQO	µg/L	<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
Bromomethane	0.9	IPWQO	µg/L	<.5	<0.5	<.5	<.5	<0.5	<.5		<0.5		<.5	<3		<.5	<0.5	<2.5	<2.5
Carbon Tetrachloride	13.3	CCME	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Chlorobenzene	15	PWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Chloroethane			µg/L	<.5	<0.2	<.5	<.5	<0.2	<.5		<0.2		<.5	<1		<.5	<0.2	<2.5	<2.5
Chloroform			µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Chloromethane	700	IPWQO	µg/L	<.5	<0.5	<.5	<.5	<0.5	<.5		<0.5		<.5	<3		<.5		<2.5	<2.5
cis-1,3-Dichloropropene			µg/L	<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
Dibromochloromethane	40	IPWQO	µg/L	<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
Ethylbenzene	8	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Styrene	4	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Tetrachloroethylene	50	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Toluene	0.8	IPWQO	µg/L	<.2	<0.2	<.2	<.2	0.5	<.2		0.2		<.2	<1		<.2	0.3	<1	0.7
trans-1,2-Dichloroethylene	200	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
trans-1,3-Dichloropropene	7	IPWQO	µg/L	<.2	<0.2	<.2	<.2	<0.2	<.2		<0.2		<.2	<1		<.2	<0.2	<1	<1
Trichloroethylene	20	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Vinyl Chloride	600	IPWQO	µg/L	<.5	<0.2	<.5	<.5	<0.2	<.5		<0.2		<.5	<1		<.5	<0.2	<2.5	<2.5
Xylene, *o-*	40	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Xylene, *p- + m-*	32	IPWQO	µg/L	<.2	<0.1	<.2	<.2	<0.1	<.2		<0.1		<.2	<0.5		<.2	<0.1	<1	<1
Xylenes (total)			µg/L		<0.2			<0.2			<0.1			<0.5			<0.1		
PAHs																			
Acenaphthene	5.8	CCME	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<0.2	<0.2
Acenaphthylene			µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<0.2	<0.2
Anthracene	0.0008	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<10	<10
Benzo(a)anthracene	0.0004	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<20	<20
Benzo(a)pyrene	0.015	CCME	µg/L	< 0.2	<0.01	< 0.2	< 0.2	<0.01	< 0.2		<0.01		< 0.2	<0.01		< 0.2	<0.01	<1	<1
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L	< 0.2	<0.1	< 0.2	< 0.2	<0.1	< 0.2		<0.1		< 0.2	<0.1		< 0.2	<0.1	<20	<20
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<10	<10
Chrysene	0.0001	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<10	<10
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L	< 0.5	<0.1	< 0.5	< 0.5	<0.1	< 0.5		<0.1		< 0.5	<0.1		< 0.5		<20	<20
Fluoranthene	0.0008	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	**0.05**	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<10	<10
Fluorene	0.2	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<0.2	<0.2
Indeno(1,2,3-cd)pyrene			µg/L	< 0.5	<0.1	< 0.5	< 0.5	<0.1	< 0.5		<0.1		< 0.5	<0.1		< 0.5	<0.1	<20	<20
Naphthalene	7	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<0.2	<0.2
Phenanthrene	0.03	IPWQO	µg/L	< 0.2	<0.05	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<10	<10
Pyrene	0.025	CCME	µg/L	< 0.2	<0.5	< 0.2	< 0.2	<0.05	< 0.2		<0.05		< 0.2	<0.05		< 0.2	<0.05	<10	<10

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

Table G-1 Surface Water Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Standard/ Guideline			Sample Location	SW7	SW7	SW7	SW7	SW7	SW7	SW7	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW8	SW8
				Sampling Date	2009/07/19	2009/11/24	2011/01/06	2011/03/31	2011/05/16	2011/08/26	2011/11/11	2004/11/29 Background	2005/03/30 Background	2005/04/27 MOE dataset	2005/05/09 Background	2005/10/13 MOE dataset	2005/11/16 MOE dataset	2005/12/02 Background	2006/01/12 MOE dataset	2006/03/30 Background
			Sample Type		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	DRY	Surface Water	Surface Water	Surface Water	Surface Water
	Value	*Type*	*Units*		SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive	SW Indicator	SW Comprehensive	SW Comprehensive		SW Comprehensive	SW Comprehensive	SW Comprehensive	SW Indicator
Field Parameters																				
Conductivity			µS/cm				260	170	192	510	140			49			110		71	
Dissolved Oxygen	qualitative - see table	PWQO	mg/L				9.46	8.34	4.95	4.95	2.55			7.77			5.21		9.04	
pH							8.01	6.62	6.94	7.14	7.06			6.48			7.29		7.82	
Temperature			°C				1.1	4	9	23.7	5			10.73			8.41		5.17	
Flow Rate			L/s				No Measurable Flow	No Measurable Flow	No Measurable Flow	No Measurable Flow	No Measurable Flow									
General																				
Alkalinity ($CaCO_3$)	Note	PWQO	µg/L		136000	141000	44000	66000	68100	140000	38700	7000	9000	12600	37300		11500	12000	10000	14000
Ammonia (as N)			µg/L		<50	50	230	30	154	190	78	<50	80	ND	100		ND	<50	ND	<50
Ammonia, un-ionised (as N)	20	PWQO	µg/L				<1	<20	1	<20	<20			ND			ND		ND	
Biological Oxygen Demand (BOD_5)			µg/L		3000	4300	51000	<5000	46000	57000	<5000	<3000	<4000	1200	2000		2600	<2000	1500	<2000
Calcium			µg/L			42600	28500		26900		17500			7000			11000		7500	
Chemical Oxygen Demand (COD)			µg/L		39000	20000	2250000	152000	80100	1090000	125000	70000	30000	70000	130000		45000	52000	50000	60000
Chloride			µg/L		7300	2000	14900	1800	3320	1840	4510	7530	1410		2000			7000		2000
Conductivity			µS/cm		255	269	233	151	198	417	166	120	46	45.2	106		109	89	61.7	67
Dissolved Organic Carbon (DOC)			µg/L		16500	6900	63100		29700		45900	18200		20300	35100		16800	14500	14400	
Hardness (as $CaCO_3$)			µg/L		179000	150000	108000		99200		73500	50900			57700			37000		
Nitrate (as N)	2930	CCME	µg/L		150	100	<50	<50	<50	<50	<50	100	200	ND	<1000		ND	600	ND	<100
Nitrite (as N)	18	CCME	µg/L		<100	100	<50	<50	<50	<50	<50	<100		**50**	<100		ND	50	ND	<10
pH	6.5-8.5	PWQO			8.28	8.39	7.11	7.22	7.61	7.56	7.08	6.54	6.54	**6.4**	7.00		6.34	6.74	6.61	6.70
Phenol	1	PWQO	µg/L		<1	**6**	**53**	<1	**2**	1	**4**	**2**	**2**	ND	**4**		ND	<1	ND	<1
Potassium			µg/L		1500	1600	3440		3770		5850			7500	3500		3100	3200	4100	
Sulphates			µg/L		3300	3900	46900	6160	23500	88800	25600	35800	7300		11000			14000		13000
Total Dissolved Solids (TDS)			µg/L		166000	144000	222000	156000	180000	186000	198000	186000	101000	264000	312000		132000	132000	188000	46000
Total Kjeldahl Nitrogen (TKN)			µg/L		420	600	19100	4440	7400	35000	3360	1500	1400	2230	3700		970	1300	1200	2900
Total Phosphorus	30	IPWQO	µg/L		**70**	**49**	**500**	**570**	**3170**	**4150**	**177**	**250**	**50**	**340**	**700**		**150**	**153**	**160**	**420**
Total Suspended Solids (TSS)			µg/L		64000	17600	2420000	150000	378000	2550000	68000	33000	10000	77800	110000		17600	20000	5200	2000
Metals																				
Arsenic	5	IPWQO	µg/L		1.4	1	<3		<3.0		<3.0	<1.4		ND	3		ND	1	ND	
Barium			µg/L		56	38	379		62.1		30.4	82		59.1	81		30	53	21	
Beryllium	1100	PWQO	µg/L		<1	1	3		<1.0		<1.0	<1.4		0.25	0.6		ND	<0.5	ND	
Boron	200	IPWQO	µg/L		<50	50	69		71.8		48	31		ND	120		ND	23	ND	
Cadmium	0.5	IPWQO	µg/L		<0.1	<0.1	**1.6**		0.24		0.19	<1		ND	0.3		ND	<1	ND	
Chromium			µg/L		1.8	1.6	83		<3.0		<3.0	13		1.7	8		ND	7	ND	
Cobalt	0.9	PWQO	µg/L		0.85	<0.8	**7.7**		**1.64**		**2.19**	**2**		ND	**4.1**		ND	**1.6**	ND	
Copper	5	PWQO	µg/L		2.2	2.8	<2		**6.35**		3.53	**6**		4.2	**23**		ND	**6**	ND	
Iron	300	PWQO	µg/L		**1460**	**1070**	**26300**	**2840**	**5480**	**8650**	**5110**	**5900**	**2300**	**1130**	**13000**		**610**	**4100**	**470**	**7800**
Lead	5	IPWQO	µg/L		1.3	1	**30**		**12.4**		3.9	4.8		ND	**6.5**		ND	3.1	ND	
Magnesium			µg/L			10600	9000		7790		7240	5500		4700	5400		3800	3900	3600	
Manganese			µg/L		99.7	47.8	484		270		239	66		29.9	190		38	57	41	
Mercury	0.2	PWQO	µg/L		<0.1	<0.1	<0.1		<0.1		<0.1	<0.1		0.03	**1.2**		ND	<0.1	ND	
Molybdenum	40	IPWQO	µg/L		2	1	<2		<2.0		<2.0	<1.4		ND	<1		ND	<1	ND	
Nickel	25	PWQO	µg/L		2.6	<2.7	24		4.6		4.2	5		2.4	9		ND	5	ND	
Silver	0.1	PWQO	µg/L		<0.1	<0.1	<0.1		<0.10		<0.10	<0.6			**2.5**			<0.5		
Sodium			µg/L		2500	2130	8410		4320		3420	1100		1	1700		1.2	1200	1.1	
Thallium	0.3	IPWQO	µg/L		<0.3	<0.3	<0.3		<0.3		<0.3	<1			0.12			0.1		
Vanadium	6		µg/L		2.9	2.6	**31**		4.4		4	**18**		4.2	**15**		ND	**14**	ND	
Zinc	20	IPWQO	µg/L		**53.9**	4.5	**191**		**64**		**22**	**30**		11.3	**70**		10	**24**	9.4	
VOCs																				
1,1,1,2-Tetrachloroethane	20	IPWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.1	<.2	
1,1,1-Trichloroethane	10	IPWQO	µg/L		<0.50	<0.50	<0.60		<0.60		<0.60	<0.5		<.2	<0.1		<.2	<0.1	<.2	
1,1,2,2-Tetrachloroethane	70	IPWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<1		<.2	<0.1		<.2	<0.1	<.2	
1,1,2-Trichloroethane	800	IPWQO	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.5		<.2	<0.2		<.2	<0.2	<.2	
1,1-Dichloroethane	200	IPWQO	µg/L		<0.50	<0.50	<0.60		<0.60		<0.60	<0.4		<.2	<0.1		<.2	<0.1	<.2	
1,1-Dichloroethylene	40	IPWQO	µg/L		<0.50	<0.50	<0.60		<0.60		<0.60	<0.5		<.2	<0.1		<.2	<0.1	<.2	
1,2-Dichlorobenzene	2.5		µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.2	<.2	
1,2-Dichloroethane	100	IPWQO	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.5		<.2	<0.1		<.2	<0.1	<.2	
1,2-Dichloropropane			µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.5		<.2	<0.1		<.2	<0.1	<.2	
1,3-Dichlorobenzene	2.5	PWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.2	<.2	
1,4-Dichlorobenzene	4	PWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.2	<.2	
2-Hexanone			µg/L		<20	<20	<0.60		<0.60		<0.60	<10			<5			<5		
Acetone			µg/L		<20	<20	<2.0		<2.0		<2.0	<10			<10			<10		
Benzene	100	IPWQO	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Bromodichloromethane	200	IPWQO	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.2		<.2	<0.1		<.2	<0.1	<.2	
Bromoform	60	IPWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.2		<.2	<0.2		<.2	<0.2	<.2	
Bromomethane	0.9	IPWQO	µg/L		1.5	<1.0	<0.40		<0.40		<0.40	<3		<.5	<0.5		<.5	<0.5	<.5	
Carbon Tetrachloride	13.3	CCME	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Chlorobenzene	15	PWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Chloroethane			µg/L		<1.0	<1.0	<0.40		<0.40		<0.40	<1		<.5	<0.2		<.5	<0.2	<.5	
Chloroform			µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.2		<.2	<0.1		<.2	<0.1	<.2	
Chloromethane	700	IPWQO	µg/L		<1.0	<1.0	<0.80		<0.80		<0.80	<2		<.5	<0.5		<.5	<0.5	<.5	
cis-1,3-Dichloropropene			µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.14		<.2	<0.2		<.2	<0.2	<.2	
Dibromochloromethane	40	IPWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.2		<.2	<0.2		<.2	<0.2	<.2	
Ethylbenzene	8	IPWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Styrene	4	IPWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Tetrachloroethylene	50	IPWQO	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Toluene	0.8	IPWQO	µg/L		<0.50	<0.50	**58**		<0.40		<0.40	<0.5		<.2	<0.2		<.2	<0.2	<.2	
trans-1,2-Dichloroethylene	200	IPWQO	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<1		<.2	<0.1		<.2	<0.1	<.2	
trans-1,3-Dichloropropene	7	IPWQO	µg/L		<0.50	<0.50	<0.60		<0.60		<0.60	<0.14		<.2	<0.2		<.2	<0.2	<.2	
Trichloroethylene	20	IPWQO	µg/L		<0.50	<0.50	<0.40		<0.40		<0.40	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Vinyl Chloride	600	IPWQO	µg/L		<0.50	<0.50	<0.34		<0.34		<0.34	<0.2		<.5	<0.2		<.5	<0.2	<.5	
Xylene, *o-*	40	IPWQO	µg/L		<0.50	<0.50	<0.20		<0.20		<0.20	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Xylene, *p- + m-*	32	IPWQO	µg/L		<1.0	<1.0	<0.40		<0.40		<0.40	<0.5		<.2	<0.1		<.2	<0.1	<.2	
Xylenes (total)			µg/L		<1.5	<1.5	<0.40		<0.40		<0.40	<1			<0.2			<0.2		
PAHs																				
Acenaphthene	5.8	CCME	µg/L		<0.020	<0.020	<0.10		<0.10		<0.10	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Acenaphthylene			µg/L		<0.020	<0.020	<0.11		<0.11		<0.11	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Anthracene	0.0008	IPWQO	µg/L		<0.020	<0.020	<0.05		<0.05		<0.05	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Benzo(a)anthracene	0.0004	IPWQO	µg/L		<0.020	<0.020	**0.1**		<0.08		<0.08	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Benzo(a)pyrene	0.015	CCME	µg/L		<0.0050	<0.0050	<0.01		<0.01		<0.01	<0.01		< 0.2	<0.01		< 0.2	<0.01	< 0.2	
Benzo(g,h,i)perylene	0.00002	IPWQO	µg/L		<0.020	<0.020	<0.06		<0.06		<0.06	<0.1		< 0.2	<0.1		< 0.2	<0.1	< 0.2	
Benzo(k)fluoranthene	0.0002	IPWQO	µg/L		<0.020	<0.020	<0.05		<0.05		<0.05	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Chrysene	0.0001	IPWQO	µg/L		<0.020	<0.020	<0.05		<0.05		<0.05	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Dibenzo(a,h)anthracene	0.002	IPWQO	µg/L		<0.020	<0.020	<0.09		<0.09		<0.09	<0.1		< 0.5	<0.1		< 0.5	<0.1	< 0.5	
Fluoranthene	0.0008	IPWQO	µg/L		<0.020	<0.020	<0.12		<0.12		<0.12	<0.05		< 0.2	<0.05		< 0.2	**0.05**	< 0.2	
Fluorene	0.2	IPWQO	µg/L		0.036	<0.020	<0.09		<0.09		<0.09	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Indeno(1,2,3-cd)pyrene			µg/L		<0.020	<0.020	<0.03		<0.06		<0.06	<0.1		< 0.5	<0.1		< 0.5	<0.1	< 0.5	
Naphthalene	7	IPWQO	µg/L		<0.020	<0.020	<0.12		<0.12		<0.12	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Phenanthrene	0.03	IPWQO	µg/L		**0.035**	<0.020	<0.10		<0.10		<0.10	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	
Pyrene	0.025	CCME	µg/L		<0.020	<0.020	<0.05		<0.05		<0.05	<0.05		< 0.2	<0.05		< 0.2	<0.05	< 0.2	

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
ND	No amount above detection limit was found
25	Highlighting indicates that parameter concentration exceeds referenced standard

AGAT Laboratories

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATHEW WELSH

PROJECT NO: 05100128.01

AGAT WORK ORDER: 11T483118

WATER ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Apr 11, 2011

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T483118
PROJECT NO: 05100128.01

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATHEW WELSH

Brooks Landfill - Surface Water Indicator Parameters

DATE SAMPLED: Mar 31, 2011 | DATE RECEIVED: Apr 01, 2011 | DATE REPORTED: Apr 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2334577	SW3 2334580	SW4 2334586	SW5 2334592	SW6 2334598	SW7 2334604	SW8 2334610	SWD1 2334616
BOD (5)	mg/L		5	<5	<5	<5	<5	<5	<5	<5	<5
pH	pH Units	6.5-8.5	NA	6.84	7.88	7.94	7.75	6.90	7.22	6.52	7.00
Electrical Conductivity	uS/cm		2	108	665	327	1410	109	151	45	108
Total Dissolved Solids	mg/L		20	132	462	252	1290	170	156	160	130
Total Suspended Solids	mg/L		10	25	35	47	600	29	150	27	26
Alkalinity (as CaCO3)	mg/L		5	25	153	90	199	28	66	9	26
Chloride	mg/L		0.10	12.5	32.7	15.7	65.4	5.40	1.80	2.95	12.4
Nitrate as N	mg/L		0.05	0.07	<0.05	1.88	<0.05	0.07	<0.05	0.06	0.06
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	7.53	166	50.5	564	15.4	6.16	6.93	7.45
Ammonia as N	mg/L		0.02	<0.02	0.03	0.02	0.26	0.14	0.03	<0.02	<0.02
Ammonia-Un-ionized	mg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L		5	23	16	21	38	73	152	37	25
Phenols	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Kjeldahl Nitrogen	mg/L		0.10	0.88	0.69	1.37	3.07	2.22	4.44	1.67	1.08
Total Phosphorus	mg/L	0.03	0.02	0.12	0.08	0.13	0.30	0.21	0.57	0.27	0.11
Iron	mg/L	0.3	0.010	1.16	0.457	0.778	0.800	1.29	2.84	1.96	1.27

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO (mg/L)

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 11T483118

PROJECT NO: 05100128.01

5835 COOPERS AVENUE
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CLIENT NAME: GENIVAR INC

ATTENTION TO: MATHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2334577	SW1	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	1.16
2334577	SW1	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.12
2334580	SW3	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	0.457
2334580	SW3	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.08
2334586	SW4	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	0.778
2334586	SW4	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.13
2334592	SW5	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	0.800
2334592	SW5	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.30
2334598	SW6	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	1.29
2334598	SW6	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.21
2334604	SW7	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	2.84
2334604	SW7	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.57
2334610	SW8	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	1.96
2334610	SW8	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.27
2334616	SWD1	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	1.27
2334616	SWD1	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.11

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T483118

PROJECT NO: 05100128.01

ATTENTION TO: MATHEW WELSH

Water Analysis

RPT Date: Apr 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - Surface Water Indicator Parameters															
BOD (5)	1	2334577	< 5	< 5	0.0%	< 5	105%	75%	125%						
pH	1	2334580	7.88	8.01	1.6%	N/A	100%	90%	110%						
Electrical Conductivity	1	2334580	665	669	0.6%	< 2	99%	80%	120%						
Total Dissolved Solids	1	2334616	130	128	1.6%	< 20	98%	80%	120%						
Total Suspended Solids	1		< 10	< 10	0.0%	< 10	102%	80%	120%						
Alkalinity (as CaCO3)	1	2334580	153	163	6.3%	< 5	99%	80%	120%						
Chloride	1	2334580	32.7	32.2	1.5%	< 0.10	100%	90%	110%	108%	90%	110%	100%	80%	120%
Nitrate as N	1	2334580	< 0.05	< 0.05	0.0%	< 0.05	95%	90%	110%	109%	90%	110%	103%	80%	120%
Nitrite as N	1	2334580	< 0.05	< 0.05	0.0%	< 0.05	NA	90%	110%	107%	90%	110%	104%	80%	120%
Sulphate	1	2334580	166	163	1.8%	< 0.10	99%	90%	110%	104%	90%	110%	99%	80%	120%
Ammonia as N	1	2334610	< 0.02	< 0.02	0.0%	< 0.02	100%	80%	120%	97%	90%	110%	98%	80%	120%
Chemical Oxygen Demand	1		14	13	7.4%	< 5	92%	90%	110%	101%	90%	110%	120%	70%	130%
Phenols	1		< 0.001	< 0.001	0.0%	< 0.001	102%	90%	110%	100%	90%	110%	102%	70%	130%
Total Kjeldahl Nitrogen	1		81.8	83.4	1.9%	< 0.10	103%	80%	120%	101%	80%	120%	110%	70%	130%
Total Phosphorus	1		0.06	0.06	0.0%	< 0.02	108%	90%	110%	102%	90%	110%	94%	70%	130%
Iron	1		0.0575	0.0552	4.1%	< 0.010	94%	90%	110%	94%	80%	120%	101%	70%	130%

Certified By:

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T483118

PROJECT NO: 05100128.01

ATTENTION TO: MATHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Dissolved Solids	INOR 1028	SM 2540 C	BALANCE
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Iron	MET-93-61003	EPA SW-846 6020A & 200.8	ICP-MS

AGAT Laboratories

3 coolers

5835 Coopers Avenue
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Toll free: 800-856-6261
www.agatlabs.com
http://webearth.agatlabs.com

CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 3.1 AGAT WO #: 11T485118
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St. Brantford, ON
Phone: 519-756-9422 Fax: 519-756-6723
Project: 05100128.01 PO: 05100128.01
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes / No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: Matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ____
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If Yes, please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	SW Indicator (Q4704) per Quote			LABORATORY USE ONLY LAB SAMPLE ID
SW1	March 31/11		SW	6												V			
SW3	March 31/11		SW	6												V			
SW4	March 31/11		SW	6												V			
SW5	March 31/11		SW	6												V			
SW6	March 31/11		SW	6												V			
SW7	March 31/11		SW	6												V			
SW8	March 31/11		SW	6												V			
SWD1	March 31/11		SW	6												V			

Samples Relinquished By (print name & sign): Tamara Hamilton
Date/Time: April 1/11 10:20
Samples Received By (print name & sign):
Date/Time: April 1/11 10:20
Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign):
Date/Time: 1:00

Pink Copy - Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of 1
NO: 151040

AGAT Laboratories

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: Brooks landfill

AGAT WORK ORDER: 11T493844

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Elizabeth Polakowska, MSc (Animal Sci), PhD (Agri Sci), Inorganic Lab Supervisor

DATE REPORTED: Jun 03, 2011

PAGES (INCLUDING COVER): 18

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill Surface Water - VOCs

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2409506	RDL	SW3 2409529	SW4 2409541	RDL	SW5 2409554	SW6 2409568	SW7 2409581
Chloromethane	µg/L	700	0.80	<0.80	0.40	<0.40	<0.40	0.80	<0.80	<0.80	<0.80
Vinyl Chloride	µg/L	600	0.34	<0.34	0.17	<0.17	<0.17	0.34	<0.34	<0.34	<0.34
Bromomethane	µg/L	0.9	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Chloroethane	µg/L		0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Trichlorofluoromethane	µg/L		0.80	<0.80	0.40	<0.40	<0.40	0.80	<0.80	<0.80	<0.80
Acetone	µg/L		2.0	<2.0	1.0	<1.0	<1.0	2.0	<2.0	<2.0	<2.0
1,1 Dichloroethylene	µg/L	40	0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60	<0.60	<0.60
Methylene Chloride	µg/L	100	0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60	<0.60	<0.60
trans- 1,2-dichloroethylene	µg/L	200	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Methyl tert-butyl ether	µg/L	200	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	µg/L	200	0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60	<0.60	<0.60
Methyl Ethyl Ketone	µg/L	400	2.0	<2.0	1.0	<1.0	<1.0	2.0	<2.0	<2.0	<2.0
cis- 1,2-Dichloroethylene	µg/L	200	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Chloroform	µg/L		0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
1,2 - Dichloroethane	µg/L	100	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	µg/L	10	0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60	<0.60	<0.60
Carbon Tetrachloride	µg/L		0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Benzene	µg/L	100	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
1,2-Dichloropropane	µg/L	0.7	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Trichloroethylene	µg/L	20	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Bromodichloromethane	µg/L	200	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	ug/L		0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Methyl Isobutyl Ketone	µg/L		2.0	<2.0	1.0	<1.0	<1.0	2.0	<2.0	<2.0	<2.0
trans-1,3-Dichloropropene	µg/L	7	0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60	<0.60	<0.60
1,1,2-Trichloroethane	µg/L	800	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Toluene	µg/L	0.8	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
2-Hexanone	µg/L		0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60	<0.60	<0.60
Dibromochloromethane	µg/L	40	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
Ethylene Dibromide	µg/L	5	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Tetrachloroethylene	µg/L	50	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
1,1,1,2-Tetrachloroethane	µg/L	20	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
Chlorobenzene	µg/L	15	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill Surface Water - VOCs

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2409506	RDL	SW3 2409529	SW4 2409541	RDL	SW5 2409554	SW6 2409568	SW7 2409581
m & p-Xylene	µg/L	32	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Bromoform	µg/L	60	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
Styrene	µg/L	4	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
1,1,2,2-Tetrachloroethane	µg/L	70	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
1,3-Dichlorobenzene	µg/L	2.5	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20	<0.20	<0.20
1,3-Dichloropropene (Cis + Trans)	µg/L		0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60	<0.60	<0.60
Xylene Mixture (Total)	µg/L		0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40	<0.40	<0.40
Surrogate	Unit	Acceptable Limits									
Toluene-d8	% Recovery	60-130		105		103	106		107	102	96
4-Bromofluorobenzene	% Recovery	70-130		121		118	116		119	122	104

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

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Brooks Landfill Surface Water - VOCs

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW8 2409594	RDL	SWD1 2409607
Chloromethane	µg/L	700	0.40	<0.40	0.80	<0.80
Vinyl Chloride	µg/L	600	0.17	<0.17	0.34	<0.34
Bromomethane	µg/L	0.9	0.20	<0.20	0.40	<0.40
Chloroethane	µg/L		0.20	<0.20	0.40	<0.40
Trichlorofluoromethane	µg/L		0.40	<0.40	0.80	<0.80
Acetone	µg/L		1.0	<1.0	2.0	<2.0
1,1 Dichloroethylene	µg/L	40	0.30	<0.30	0.60	<0.60
Methylene Chloride	µg/L	100	0.30	<0.30	0.60	<0.60
trans- 1,2-dichloroethylene	µg/L	200	0.20	<0.20	0.40	<0.40
Methyl tert-butyl ether	µg/L	200	0.20	<0.20	0.40	<0.40
1,1-Dichloroethane	µg/L	200	0.30	<0.30	0.60	<0.60
Methyl Ethyl Ketone	µg/L	400	1.0	<1.0	2.0	<2.0
cis- 1,2-Dichloroethylene	µg/L	200	0.20	<0.20	0.40	<0.40
Chloroform	µg/L		0.20	<0.20	0.40	<0.40
1,2 - Dichloroethane	µg/L	100	0.20	<0.20	0.40	<0.40
1,1,1-Trichloroethane	µg/L	10	0.30	<0.30	0.60	<0.60
Carbon Tetrachloride	µg/L		0.20	<0.20	0.40	<0.40
Benzene	µg/L	100	0.20	<0.20	0.40	<0.40
1,2-Dichloropropane	µg/L	0.7	0.20	<0.20	0.40	<0.40
Trichloroethylene	µg/L	20	0.20	<0.20	0.40	<0.40
Bromodichloromethane	µg/L	200	0.20	<0.20	0.40	<0.40
cis-1,3-Dichloropropene	ug/L		0.20	<0.20	0.40	<0.40
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	2.0	<2.0
trans-1,3-Dichloropropene	µg/L	7	0.30	<0.30	0.60	<0.60
1,1,2-Trichloroethane	µg/L	800	0.20	<0.20	0.40	<0.40
Toluene	µg/L	0.8	0.20	<0.20	0.40	<0.40
2-Hexanone	µg/L		0.30	<0.30	0.60	<0.60
Dibromochloromethane	µg/L	40	0.10	<0.10	0.20	<0.20
Ethylene Dibromide	µg/L	5	0.20	<0.20	0.40	<0.40
Tetrachloroethylene	µg/L	50	0.20	<0.20	0.40	<0.40
1,1,1,2-Tetrachloroethane	µg/L	20	0.10	<0.10	0.20	<0.20
Chlorobenzene	µg/L	15	0.10	<0.10	0.20	<0.20
Ethylbenzene	µg/L	8	0.10	<0.10	0.20	<0.20

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Certificate of Analysis

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill Surface Water - VOCs

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW8 2409594	RDL	SWD1 2409607
m & p-Xylene	µg/L	32	0.20	<0.20	0.40	<0.40
Bromoform	µg/L	60	0.10	<0.10	0.20	<0.20
Styrene	µg/L	4	0.10	<0.10	0.20	<0.20
1,1,2,2-Tetrachloroethane	µg/L	70	0.10	<0.10	0.20	<0.20
o-Xylene	µg/L	40	0.10	<0.10	0.20	<0.20
1,3-Dichlorobenzene	µg/L	2.5	0.10	<0.10	0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	0.10	<0.10	0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	0.10	<0.10	0.20	<0.20
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30	0.60	<0.60
Xylene Mixture (Total)	µg/L		0.20	<0.20	0.40	<0.40
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	60-130		93		99
4-Bromofluorobenzene	% Recovery	70-130		104		80

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

2409506 Dilution factor=2
The sample was diluted because the sample was foamy. The reporting detection limit has been corrected for the dilution factor used.

2409554-2409581 Dilution factor=2
The sample was diluted because the sample was foamy. The reporting detection limit has been corrected for the dilution factor used.

2409607 Dilution factor=2
The sample was diluted because the sample was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2409506	SW3 2409529	SW4 2409541	SW5 2409554	SW6 2409568	SW7 2409581	SW8 2409594	SWD1 2409607
Naphthalene	µg/L	7	0.12	<0.12	<0.12	<0.12	0.14	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L	0.2	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L	0.03	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L	0.0008	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L	0.0008	0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L	0.0004	0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L	0.0001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b/j)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L	0.0002	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L	0.002	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L	0.00002	0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Surrogate	Unit	Acceptable Limits									
Chrysene-d12	%	60-130		48	81	64	69	62	23	26	34

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

2409506 Recoveries of Chrysene-d12 was below our allowable QC range. Due to the nature of sample, emulsion was observed during liquid-liquid solvent extraction.

2409581-2409607 Recoveries of Chrysene-d12 was below our allowable QC range. Due to the nature of sample, emulsion was observed during liquid-liquid solvent extraction.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2409506	SW3 2409529	SW4 2409541	SW5 2409554	SW6 2409568	SW7 2409581	SW8 2409594	SWD1 2409607
Alkalinity (as CaCO3)	µg/L		5000	32260	219000	86540	205000	23100	68100	55800	31600
Ammonia as N	µg/L		20	<20	264	370	110	<20	154	218	<20
BOD (5)	µg/L		5000	<5000	<5000	26000	<5000	10000	46000	12000	<5000
Calcium	µg/L		50	13500	87500	38300	114000	9790	26900	22600	13600
Chemical Oxygen Demand	µg/L		5000	34700	30600	44500	62500	115000	80100	87300	33100
Chloride	µg/L		100	8220	35400	7640	25200	1470	3320	3420	8280
Electrical Conductivity	uS/cm		2	105	680	271	725	69	198	154	104
Dissolved Organic Carbon	µg/L		500	19300	15300	18400	22500	28700	29700	22400	21400
Total Hardness (as CaCO3)	µg/L		500	48500	329000	132000	392000	37900	99200	76100	49000
Nitrate as N	µg/L		50	<50	676	2170	<50	<50	<50	2950	<50
Nitrite as N	µg/L		50	<50	<50	<50	<50	<50	<50	81	<50
pH	pH Units	6.5-8.5	NA	7.38	8.15	8.01	8.20	7.21	7.61	7.74	7.45
Phenols	µg/L	1.0	1	<1	<1	<1	<1	<1	2	2	<1
Potassium	µg/L		50	1390	4500	3090	3590	2140	3770	2070	1380
Sulphate	µg/L		100	4850	110000	33500	185000	5610	23500	10100	4850
Total Dissolved Solids	µg/L		20000	108000	442000	240000	498000	124000	180000	188000	108000
Total Kjeldahl Nitrogen	µg/L		100	1560	1750	3340	2370	3610	7400	4510	1590
Total Phosphorus	µg/L	20	20	118	73	196	184	274	3170	867	116
Total Suspended Solids	µg/L		10000	19000	18000	34000	117000	170000	378000	1970000	21000
Arsenic	µg/L	100	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Barium	µg/L		2.0	16.2	52.6	28.7	59.0	20.7	62.1	56.5	16.0
Beryllium	µg/L	11	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	200	10.0	12.6	233	33.1	50.7	21.8	71.8	30.1	13.4
Cadmium	µg/L	0.2	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.24	0.11	<0.10
Chromium	µg/L	8.9	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Cobalt	µg/L	0.9	0.50	<0.50	0.75	0.69	1.93	1.14	1.64	1.67	<0.50
Copper	µg/L	5	0.80	1.38	4.38	3.36	6.82	2.96	6.35	6.02	1.46
Iron	µg/L	300	10.0	1490	1140	1360	2280	2540	5480	3550	1550
Lead	µg/L	5	1.0	<1.0	2.0	1.5	5.5	3.2	12.4	3.2	<1.0
Magnesium	µg/L		50	3600	26900	8910	26000	3260	7790	4780	3650
Manganese	µg/L		2.0	28.7	226	84.2	750	72.8	270	153	29.5
Dissolved Mercury	µg/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	µg/L	40	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Certified By: Elizabeth Pokokowska

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AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2409506	SW3 2409529	SW4 2409541	SW5 2409554	SW6 2409568	SW7 2409581	SW8 2409594	SWD1 2409607
Nickel	µg/L	25	3.0	<3.0	3.6	<3.0	7.0	3.6	4.6	3.3	<3.0
Silver	µg/L	0.1	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	µg/L		50	3080	24900	6790	18800	2020	4320	1940	3220
Thallium	µg/L	0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Vanadium	µg/L	6	2.0	<2.0	<2.0	<2.0	2.5	2.8	4.4	4.0	<2.0
Zinc	µg/L	30	5.0	7.1	30.1	7.4	91.2	16.7	64.0	15.4	11.7

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Elizabeth Rolokowska

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Certificate of Analysis

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

pH & TSS (Water)

DATE SAMPLED: May 16, 2011 | DATE RECEIVED: May 17, 2011 | DATE REPORTED: Jun 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Discharge 2409620
pH	pH Units	6.5-8.5	NA	8.23
Total Suspended Solids	µg/L		10000	56000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Elizabeth Rolokowska

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Guideline Violation

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2409506	SW1	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	1490
2409506	SW1	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	118
2409529	SW3	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Boron	200	233
2409529	SW3	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	1140
2409529	SW3	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	73
2409529	SW3	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	30.1
2409541	SW4	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	1360
2409541	SW4	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	196
2409554	SW5	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.93
2409554	SW5	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Copper	5	6.82
2409554	SW5	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2280
2409554	SW5	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Lead	5	5.5
2409554	SW5	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	184
2409554	SW5	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	91.2
2409568	SW6	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.14
2409568	SW6	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2540
2409568	SW6	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	274
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cadmium	0.2	0.24
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.64
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Copper	5	6.35
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	5480
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Lead	5	12.4
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Phenols	1.0	2
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	3170

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Guideline Violation

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

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CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2409581	SW7	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	64.0
2409594	SW8	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.67
2409594	SW8	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Copper	5	6.02
2409594	SW8	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	3550
2409594	SW8	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Phenols	1.0	2
2409594	SW8	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	867
2409607	SWD1	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	1550
2409607	SWD1	PWQO.	GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	116

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date: Jun 03, 2011

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
PAHs in Water															
Naphthalene	1					< 0.12	101%	60%	140%	87%	60%	140%		60%	140%
Acenaphthylene	1					< 0.11	104%	60%	140%	88%	60%	140%		60%	140%
Acenaphthene	1					< 0.10	109%	60%	140%	90%	60%	140%		60%	140%
Fluorene	1					< 0.09	106%	60%	140%	90%	60%	140%		60%	140%
Phenanthrene	1					< 0.10	106%	60%	140%	90%	60%	140%		60%	140%
Anthracene	1					< 0.05	110%	60%	140%	91%	60%	140%		60%	140%
Fluoranthene	1					< 0.12	104%	60%	140%	90%	60%	140%		60%	140%
Pyrene	1					< 0.05	104%	60%	140%	88%	60%	140%		60%	140%
Benzo(a)anthracene	1					< 0.08	84%	60%	140%	83%	60%	140%		60%	140%
Chrysene	1					< 0.05	110%	60%	140%	96%	60%	140%		60%	140%
Benzo(b/j)fluoranthene	1					< 0.05	99%	60%	140%	90%	60%	140%		60%	140%
Benzo(k)fluoranthene	1					< 0.05	104%	60%	140%	92%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	95%	60%	140%	85%	60%	140%		60%	140%
Indeno(1,2,3-cd)pyrene	1					< 0.06	104%	60%	140%	88%	60%	140%		60%	140%
Dibenzo(a,h)anthracene	1					< 0.09	105%	60%	140%	86%	60%	140%		60%	140%
Benzo(g,h,i)perylene	1					< 0.06	105%	60%	140%	89%	60%	140%		60%	140%
Brooks Landfill Surface Water - VOCs															
Chloromethane	1	2409529	< 0.40	< 0.40	0.0%	< 0.40	112%	60%	130%	101%	60%	130%	99%	60%	130%
Vinyl Chloride	1	2409529	< 0.17	< 0.17	0.0%	< 0.17	114%	60%	130%	89%	60%	130%	101%	60%	130%
Bromomethane	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	110%	60%	130%	92%	60%	130%	99%	60%	130%
Chloroethane	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	118%	60%	130%	87%	60%	130%	107%	60%	130%
Trichlorofluoromethane	1	2409529	< 0.40	< 0.40	0.0%	< 0.40	124%	60%	130%	86%	60%	130%	117%	60%	130%
Acetone	1	2409529	< 1.0	< 1.0	0.0%	< 1.0	101%	60%	130%	114%	60%	130%	98%	60%	130%
1,1 Dichloroethylene	1	2409529	< 0.30	< 0.30	0.0%	< 0.30	112%	60%	130%	83%	60%	130%	83%	60%	130%
Methylene Chloride	1	2409529	< 0.30	< 0.30	0.0%	< 0.30	115%	60%	130%	87%	60%	130%	76%	60%	130%
trans- 1,2-dichloroethylene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	119%	60%	130%	88%	60%	130%	94%	60%	130%
Methyl tert-butyl ether	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	120%	60%	130%	95%	60%	130%	102%	60%	130%
1,1-Dichloroethane	1	2409529	< 0.30	< 0.30	0.0%	< 0.30	106%	60%	130%	86%	60%	130%	98%	60%	130%
Methyl Ethyl Ketone	1	2409529	< 1.0	< 1.0	0.0%	< 1.0	77%	60%	130%	86%	60%	130%	116%	60%	130%
cis- 1,2-Dichloroethylene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	105%	60%	130%	92%	60%	130%	98%	60%	130%
Chloroform	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	114%	60%	130%	84%	60%	130%	97%	60%	130%
1,2 - Dichloroethane	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	113%	60%	130%	89%	60%	130%	104%	60%	130%
1,1,1-Trichloroethane	1	2409529	< 0.30	< 0.30	0.0%	< 0.30	113%	60%	130%	83%	60%	130%	102%	60%	130%
Carbon Tetrachloride	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	116%	60%	130%	82%	60%	130%	113%	60%	130%
Benzene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	105%	60%	130%	91%	60%	130%	100%	60%	130%
1,2-Dichloropropane	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	108%	60%	130%	93%	60%	130%	98%	60%	130%
Trichloroethylene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	116%	60%	130%	86%	60%	130%	97%	60%	130%
Bromodichloromethane	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	92%	60%	130%	107%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis (Continued)

RPT Date: Jun 03, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
cis-1,3-Dichloropropene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	117%	60%	130%	99%	60%	130%	106%	60%	130%
Methyl Isobutyl Ketone	1	2409529	< 1.0	< 1.0	0.0%	< 1.0	104%	60%	130%	100%	60%	130%	98%	60%	130%
trans-1,3-Dichloropropene	1	2409529	< 0.30	< 0.30	0.0%	< 0.30	95%	60%	130%	79%	60%	130%	96%	60%	130%
1,1,2-Trichloroethane	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	115%	60%	130%	93%	60%	130%	104%	60%	130%
Toluene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	115%	60%	130%	86%	60%	130%	102%	60%	130%
2-Hexanone	1	2409529	< 0.30	< 0.30	0.0%	< 0.30	107%	60%	130%	95%	60%	130%	87%	60%	130%
Dibromochloromethane	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	112%	60%	130%	90%	60%	130%	106%	60%	130%
Ethylene Dibromide	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	105%	60%	130%	95%	60%	130%	110%	60%	130%
Tetrachloroethylene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	109%	60%	130%	85%	60%	130%	109%	60%	130%
1,1,1,2-Tetrachloroethane	1	2409529	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	79%	60%	130%	99%	60%	130%
Chlorobenzene	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	106%	60%	130%	88%	60%	130%	105%	60%	130%
Ethylbenzene	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	98%	60%	130%	82%	60%	130%	100%	60%	130%
m & p-Xylene	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	115%	60%	130%	80%	60%	130%	105%	60%	130%
Bromoform	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	107%	60%	130%	89%	60%	130%	103%	60%	130%
Styrene	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	82%	60%	130%	84%	60%	130%	84%	60%	130%
1,1,2,2-Tetrachloroethane	1	2409529	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	82%	60%	130%	111%	60%	130%
o-Xylene	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	109%	60%	130%	82%	60%	130%	102%	60%	130%
1,3-Dichlorobenzene	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	117%	60%	130%	87%	60%	130%	101%	60%	130%
1,4-Dichlorobenzene	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	119%	60%	130%	84%	60%	130%	93%	60%	130%
1,2-Dichlorobenzene	1	2409529	< 0.10	< 0.10	0.0%	< 0.10	105%	60%	130%	85%	60%	130%	103%	60%	130%
1,3-Dichloropropene (Cis + Trans)	1	2409529	< 0.30	< 0.30	0.0%	< 0.30	95%	60%	130%	79%	60%	130%	96%	60%	130%
Xylene Mixture (Total)	1	2409529	< 0.20	< 0.20	0.0%	< 0.20	109%	60%	130%	82%	60%	130%	102%	60%	130%

Certified By: Jacky Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jun 03, 2011

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
GENIVAR - Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)															
Alkalinity (as CaCO3)	1	2409506	32260	31350	2.9%	< 5000	97%	80%	120%						
Ammonia as N	1		< 20	< 20	0.0%	< 20	102%	90%	110%	105%	90%	110%	88%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	105%	75%	125%						
Calcium	1	2409554	114000	113000	0.9%	< 50	98%	90%	110%	98%	90%	110%	102%	70%	130%
Chemical Oxygen Demand	1		25700	25000	2.8%	< 5000	98%	90%	110%	92%	90%	110%	98%	70%	130%
Chloride	1	2409529	35400	35100	0.9%	< 100	107%	90%	110%	100%	90%	110%	117%	80%	120%
Electrical Conductivity	1	2409506	105	104	1.0%	< 2	103%	80%	120%						
Dissolved Organic Carbon	1		5500	5300	3.7%	< 500	93%	90%	110%	100%	90%	110%	94%	80%	120%
Nitrate as N	1	2409529	676	735	8.4%	< 50	106%	90%	110%	103%	90%	110%	113%	80%	120%
Nitrite as N	1	2409529	< 50	< 50	0.0%	< 50	NA	90%	110%	96%	90%	110%	112%	80%	120%
pH	1	2409506	7.38	7.43	0.7%		100%	80%	120%						
Phenols	1	2409594	2	2	0.0%	< 1	104%	90%	110%	101%	90%	110%	87%	80%	120%
Potassium	1	2409554	3590	3420	4.9%	< 50	98%	90%	110%	98%	90%	110%	101%	70%	130%
Sulphate	1	2409529	110000	108000	1.8%	< 100	110%	90%	110%	103%	90%	110%	114%	80%	120%
Total Dissolved Solids	1		146000	136000	7.1%	< 20000	88%	80%	120%						
Total Kjeldahl Nitrogen	1		300	260	14.3%	< 100	106%	80%	120%	107%	80%	120%	115%	70%	130%
Total Phosphorus	1		100	105	4.9%	< 20	102%	90%	110%	105%	90%	110%	102%	70%	130%
Total Suspended Solids	1	2409541	34000	35000	2.9%	< 10000	104%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	98%	90%	110%	98%	90%	110%	107%	70%	130%
Barium	1		89.2	87.8	1.6%	< 2.0	100%	90%	110%	101%	90%	110%	102%	70%	130%
Beryllium	1		< 1.0	< 1.0	0.0%	< 1.0	101%	90%	110%	102%	90%	110%	101%	70%	130%
Boron	1		26.1	25.4	2.7%	< 10.0	100%	90%	110%	103%	90%	110%	105%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	100%	90%	110%	103%	90%	110%	101%	70%	130%
Chromium	1		3.2	3.3	3.1%	< 3.0	98%	90%	110%	97%	90%	110%	101%	70%	130%
Cobalt	1		0.76	0.75	1.3%	< 0.50	99%	90%	110%	100%	90%	110%	100%	70%	130%
Copper	1		2.87	2.84	1.1%	< 0.80	100%	90%	110%	97%	90%	110%	97%	70%	130%
Iron	1		< 10.0	< 10.0	0.0%	< 10.0	101%	90%	110%	92%	90%	110%	101%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	100%	90%	110%	99%	90%	110%	96%	70%	130%
Magnesium	1	2409554	26000	26100	0.4%	< 50	99%	90%	110%	99%	90%	110%	103%	70%	130%
Manganese	1		126	127	0.8%	< 2.0	97%	90%	110%	98%	90%	110%	95%	70%	130%
Molybdenum	1		< 2.0	< 2.0	0.0%	< 2.0	99%	90%	110%	100%	90%	110%	101%	70%	130%
Nickel	1		< 3.0	< 3.0	0.0%	< 3.0	100%	90%	110%	100%	90%	110%	100%	70%	130%
Silver	1		< 0.10	< 0.10	0.0%	< 0.10	100%	90%	110%	101%	90%	110%	90%	70%	130%
Sodium	1	2409554	18800	18800	0.0%	< 50	101%	90%	110%	100%	90%	110%	101%	70%	130%
Thallium	1		< 0.3	< 0.3	0.0%	< 0.3	100%	90%	110%	100%	90%	110%	98%	70%	130%
Vanadium	1		< 2.0	< 2.0	0.0%	< 2.0	98%	90%	110%	98%	90%	110%	101%	70%	130%
Zinc	1		179	184	2.8%	< 5.0	103%	90%	110%	103%	90%	110%	107%	70%	130%

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

ATTENTION TO: MATTHEW WELSH

Water Analysis (Continued)

RPT Date: Jun 03, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By: Elizabeth Pokolowska

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b/j)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T493844

PROJECT NO: Brooks landfill

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	TITRATION
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE

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6.0

5835 Coopers Avenue
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Toll free: 800-856-6261
www.agatlabs.com http://webearth.agatlabs.com

CHAIN OF CUSTODY RECORD

3 Lg Black cooler with whit LIDS

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 3.0 AGAT WO #: 11T493844
Notes:

Client Information
Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colbogne St
Brantford On
Phone: 519-756-9427 Fax: 519-756-6723
Project: ~~519-756-9427~~ PO: 519-756-6723
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? (Yes) No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: MatthewJwelsh@genivar.com
2. Name:
Email:

Regulatory Requirements
☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ____
☑ Prov. Water Quality Objectives (PWQO)
☐ Drinking Water (circle one) 170/243/252
Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☑ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 1 to 3 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (except Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	Sw Inorganics	Sw Metals	Sw PAHs	Sw VOCs	pH/TSS		LAB SAMPLE ID
Sw1	16 May 11		SW	12												✓	✓	✓	✓			
SW3				12												✓	✓	✓	✓			
SW4				12												✓	✓	✓	✓			
SW5				12												✓	✓	✓	✓			
SW6				12												✓	✓	✓	✓			
SW7				12												✓	✓	✓	✓			
SW8				12												✓	✓	✓	✓			
SWD1				12												✓	✓	✓	✓			
TDS Discharge			Discharge	2																✓		

Samples Relinquished By (print name & sign): Matt Welsh
Date/Time: 17 May 11
Samples Received By (print name & sign):
Date/Time: May. 17. 11 9:15 Am
Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign):
Date/Time: May. 17. 11 12:58

Pink Copy – Client
Yellow Copy - AGAT
White Copy - AGAT

PAGE ____ of ____
NO: 117586

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FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: Bailey Walters

PROJECT NO: 111-53338-00-64012

AGAT WORK ORDER: 11T523467

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Sep 02, 2011

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T523467

PROJECT NO: 111-53338-00-64012

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

Brooks Landfill - Surface Water Indicator Parameters

DATE SAMPLED: Aug 26, 2011 | DATE RECEIVED: Aug 29, 2011 | DATE REPORTED: Sep 02, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW4 2658736	SW3 2658738	SW7 2658744	SW100 2658750
BOD (5)	mg/L		5	<5	<5	57	<5
pH	pH Units	6.5-8.5	NA	8.02	7.77	7.56	7.99
Electrical Conductivity	uS/cm		2	1580	1300	417	1570
Total Dissolved Solids	mg/L		20	1070	1090	186	1060
Total Suspended Solids	mg/L		10	52	762	2550	30
Alkalinity (as CaCO3)	mg/L		5	169	287	140	178
Chloride	mg/L		0.10	287	63.2	1.84	287
Nitrate as N	mg/L		0.05	0.92	<0.05	<0.05	0.87
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	282	427	88.8	290
Ammonia as N	mg/L		0.02	0.08	0.08	0.19	0.11
Ammonia-Un-ionized	mg/L		0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L		5	33	42	1090	38
Phenols	mg/L	0.001	0.001	<0.001	<0.001	0.001	<0.001
Total Kjeldahl Nitrogen	mg/L		0.10	1.34	2.16	35.0	1.37
Total Phosphorus	mg/L	0.03	0.02	0.17	1.33	4.15	0.17
Iron	mg/L	0.3	0.010	0.463	3.96	8.65	0.484

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO (mg/L)

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 11T523467

PROJECT NO: 111-53338-00-64012

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CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2658736	SW4	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	0.463
2658736	SW4	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.17
2658738	SW3	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	3.96
2658738	SW3	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	1.33
2658744	SW7	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	8.65
2658744	SW7	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	4.15
2658750	SW100	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Iron	0.3	0.484
2658750	SW100	PWQO (mg/L)	Brooks Landfill - Surface Water Indicator Parameters	Total Phosphorus	0.03	0.17

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T523467

PROJECT NO: 111-53338-00-64012

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date: Sep 02, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - Surface Water Indicator Parameters															
BOD (5)	1		14	14	0.0%	< 5	96%	75%	125%						
pH	1		7.87	7.87	0.0%	N/A	100%	90%	110%						
Electrical Conductivity	1		1310	1330	1.5%	< 2	100%	80%	120%						
Total Dissolved Solids	1		328	332	1.2%	< 20	104%	80%	120%						
Total Suspended Solids	1		< 10	< 10	0.0%	< 10	98%	80%	120%						
Alkalinity (as CaCO3)	1		367	377	2.7%	< 5	100%	80%	120%						
Chloride	1		16.4	16.5	0.6%	< 0.10	94%	90%	110%	97%	90%	110%	116%	80%	120%
Nitrate as N	1		1.00	0.94	6.2%	< 0.05	90%	90%	110%	100%	90%	110%	97%	80%	120%
Nitrite as N	1		< 0.05	< 0.05	0.0%	< 0.05	NA	90%	110%	105%	90%	110%	114%	80%	120%
Sulphate	1		45.1	45.1	0.0%	< 0.10	92%	90%	110%	99%	90%	110%	91%	80%	120%
Ammonia as N	1	2658736	0.08	0.08	0.0%	< 0.02	93%	90%	110%	91%	90%	110%	80%	80%	120%
Chemical Oxygen Demand	1	2658736	33	33	0.0%	< 5	105%	90%	110%	101%	90%	110%	113%	70%	130%
Phenols	1	2658750	< 0.001	< 0.001	0.0%	< 0.001	100%	90%	110%	101%	90%	110%	102%	80%	120%
Total Kjeldahl Nitrogen	1		1.36	1.43	5.0%	< 0.10	101%	80%	120%	97%	80%	120%	101%	70%	130%
Total Phosphorus	1		0.51	0.54	5.7%	< 0.02	107%	90%	110%	104%	90%	110%	113%	80%	120%
Iron	1		0.286	0.278	2.8%	< 0.010	102%	90%	110%	93%	90%	110%	101%	70%	130%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T523467

PROJECT NO: 111-53338-00-64012

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Iron	MET-93-61003	EPA SW-846 6020A & 200.8	ICP-MS

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CLIENT NAME: GENIVAR
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: MATTHEW WELSH

PROJECT NO: Brooks Landfill

AGAT WORK ORDER: 11T549297

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Nov 22, 2011

PAGES (INCLUDING COVER): 17

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	RDL	SW4 2908626	RDL	SW6 2908645	RDL	SW8 2908657	SW3 2908671
1,1,1,2-Tetrachloroethane	µg/L	20	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,1,1-Trichloroethane	µg/L	10	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
1,1,2,2-Tetrachloroethane	µg/L	70	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,1,2-Trichloroethane	µg/L	800	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
1,1 Dichloroethylene	µg/L	40	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
1,2-Dibromoethane (EDB)	µg/L	5	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,2 - Dichloroethane	µg/L	100	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
1,3-Dichlorobenzene	µg/L	2.5	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
2-Hexanone	µg/L		0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
Acetone	µg/L		2.0	<2.0	1.0	<1.0	2.0	<2.0	1.0	<1.0	<1.0
Benzene	µg/L	100	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Bromoform	µg/L	60	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Bromomethane	µg/L	0.9	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Carbon Tetrachloride	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Chlorobenzene	µg/L	15	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Chloroethane	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Chloroform	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Chloromethane	µg/L	700	0.80	<0.80	0.40	<0.40	0.80	<0.80	0.40	<0.40	<0.40
cis- 1,2-Dichloroethylene	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Dibromochloromethane	µg/L	40	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Dichlorodifluoromethane	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Ethylbenzene	µg/L	8	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Dichloromethane (Methylene Chloride)	µg/L	100	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
Methyl Isobutyl Ketone	µg/L		2.0	<2.0	1.0	<1.0	2.0	<2.0	1.0	<1.0	<1.0
Methyl tert-butyl ether (MTBE)	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Methyl Ethyl Ketone, MEK (2-Butanone)	µg/L	400	2.0	<2.0	1.0	<1.0	2.0	<2.0	1.0	<1.0	<1.0

Certified By: Jordy Takewaki

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CANADA L4Z 1Y2
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Certificate of Analysis

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	RDL	SW4 2908626	RDL	SW6 2908645	RDL	SW8 2908657	SW3 2908671
Styrene	µg/L	4	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Tetrachloroethylene	µg/L	50	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Toluene	µg/L	0.8	0.40	<0.40	0.20	<0.20	0.40	1.1	0.20	<0.20	<0.20
trans- 1,2-dichloroethylene	µg/L	200	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
trans-1,3-Dichloropropene	µg/L	7	0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
Trichloroethylene	µg/L	20	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Trichlorofluoromethane (Freon 11)	µg/L		0.80	<0.80	0.40	<0.40	0.80	<0.80	0.40	<0.40	<0.40
Trihalomethanes (Total)	µg/L		1.0	<1.0	0.5	<0.5	1.0	<1.0	0.5	<0.5	<0.5
Vinyl Chloride	µg/L	600	0.34	<0.34	0.17	<0.17	0.34	<0.34	0.17	<0.17	<0.17
o-Xylene	µg/L	40	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
m & p-Xylene	µg/L	32	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Xylene Mixture (Total)	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Toluene-d8	% Recovery	60-130		94		95		93		92	95
4-Bromofluorobenzene	% Recovery	70-130		72		73		77		74	75

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW5 2908683	SW7 2908696	SWD1 2908711
1,1,1,2-Tetrachloroethane	µg/L	20	0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10	0.60	<0.60	<0.60	<0.60
1,1,2,2-Tetrachloroethane	µg/L	70	0.20	<0.20	<0.20	<0.20
1,1,2-Trichloroethane	µg/L	800	0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	µg/L	200	0.60	<0.60	<0.60	<0.60
1,1 Dichloroethylene	µg/L	40	0.60	<0.60	<0.60	<0.60
1,2-Dibromoethane (EDB)	µg/L	5	0.40	<0.40	<0.40	<0.40
1,2-Dichlorobenzene	µg/L	2.5	0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	0.40	<0.40	<0.40	<0.40
1,2-Dichloropropane	µg/L	0.7	0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	µg/L	2.5	0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L		0.60	<0.60	<0.60	<0.60
Acetone	µg/L		2.0	<2.0	<2.0	<2.0
Benzene	µg/L	100	0.40	<0.40	<0.40	<0.40
Bromodichloromethane	µg/L	200	0.40	<0.40	<0.40	<0.40
Bromoform	µg/L	60	0.20	<0.20	<0.20	<0.20
Bromomethane	µg/L	0.9	0.40	<0.40	<0.40	<0.40
Carbon Tetrachloride	µg/L		0.40	<0.40	<0.40	<0.40
Chlorobenzene	µg/L	15	0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L		0.40	<0.40	<0.40	<0.40
Chloroform	µg/L		0.40	<0.40	<0.40	<0.40
Chloromethane	µg/L	700	0.80	<0.80	<0.80	<0.80
cis- 1,2-Dichloroethylene	µg/L	200	0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	ug/L		0.40	<0.40	<0.40	<0.40
Dibromochloromethane	µg/L	40	0.20	<0.20	<0.20	<0.20
Dichlorodifluoromethane	µg/L		0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	8	0.20	<0.20	<0.20	<0.20
Dichloromethane (Methylene Chloride)	µg/L	100	0.60	<0.60	<0.60	<0.60
Methyl Isobutyl Ketone	µg/L		2.0	<2.0	<2.0	<2.0
Methyl tert-butyl ether (MTBE)	µg/L	200	0.40	<0.40	<0.40	<0.40
Methyl Ethyl Ketone, MEK (2-Butanone)	µg/L	400	2.0	<2.0	<2.0	<2.0

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill VOCs (water)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW5 2908683	SW7 2908696	SWD1 2908711
Styrene	µg/L	4	0.20	<0.20	<0.20	<0.20
Tetrachloroethylene	µg/L	50	0.40	<0.40	<0.40	<0.40
Toluene	µg/L	0.8	0.40	<0.40	<0.40	<0.40
trans- 1,2-dichloroethylene	µg/L	200	0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	µg/L	7	0.60	<0.60	<0.60	<0.60
Trichloroethylene	µg/L	20	0.40	<0.40	<0.40	<0.40
Trichlorofluoromethane (Freon 11)	µg/L		0.80	<0.80	<0.80	<0.80
Trihalomethanes (Total)	µg/L		1.0	<1.0	<1.0	<1.0
Vinyl Chloride	µg/L	600	0.34	<0.34	<0.34	<0.34
o-Xylene	µg/L	40	0.20	<0.20	<0.20	<0.20
m & p-Xylene	µg/L	32	0.40	<0.40	<0.40	<0.40
Xylene Mixture (Total)	µg/L		0.40	<0.40	<0.40	<0.40
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	60-130		89	88	112
4-Bromofluorobenzene	% Recovery	70-130		73	73	75

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO(ug/L)

2908589 Dilution factor= 2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

2908645 Dilution factor= 2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

2908683-2908711 Dilution factor= 2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

PAHs in Water

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	SW4 2908626	SW6 2908645	SW8 2908657	SW3 2908671	SW5 2908683	SW7 2908696	SWD1 2908711
Naphthalene	µg/L	7	0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	µg/L	0.2	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Phenanthrene	µg/L	0.03	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L	0.0008	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/L	0.0008	0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Pyrene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	µg/L	0.0004	0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chrysene	µg/L	0.0001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/L	0.0002	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dibenzo(a,h)anthracene	µg/L	0.002	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	µg/L	0.00002	0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
2-and 1-methyl Napthalene	µg/L	2.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Chrysene-d12	%	60-130		67	90	78	73	83	81	74	72

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO(ug/L)

2908589-2908711 Note: The result for Benzo(b)Flouranthene is the total of the Benzo(b)&(j)Flouranthene isomers because the isomers co-elute on the GC column.

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AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 21, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	SW4 2908626	SW6 2908645	SW8 2908657	SW3 2908671	SW5 2908683	SW7 2908696	SWD1 2908711
Alkalinity (as CaCO3)	µg/L		5000	68900	129000	113000	12000	138000	308000	38700	68900
Ammonia as N	µg/L		20	62	44	79	92	65	1420	78	62
Ammonia-Un-ionized	µg/L	20	20	<20	<20	<20	<20	<20	135	<20	<20
BOD (5)	µg/L		5000	<5000	<5000	15000	9000	<5000	<5000	<5000	<5000
Calcium	µg/L		50	45400	83100	45200	15000	84400	139000	17500	45500
Chemical Oxygen Demand	µg/L		5000	146000	25800	254000	142000	22600	58000	125000	116000
Chloride	µg/L		100	48600	16300	11300	1470	13500	24000	4510	48400
Electrical Conductivity	uS/cm		2	415	686	389	129	791	975	166	410
Dissolved Organic Carbon	µg/L		500	27500	13400	56200	22400	9350	25300	45900	25100
Total Hardness (as CaCO3)	µg/L		500	170000	328000	174000	54800	368000	484000	73500	170000
Nitrate as N	µg/L		50	<50	<50	<50	<50	<50	<50	<50	<50
Nitrite as N	µg/L		50	<50	<50	<50	<50	<50	<50	<50	<50
pH	pH Units	6.5-8.5	NA	7.52	8.34	7.43	6.63	8.30	8.26	7.08	7.55
Phenols	µg/L	1.0	1	<1	<1	40	<1	<1	<1	4	<1
Potassium	µg/L		50	5340	5970	5850	3200	3360	9250	5850	5380
Sulphate	µg/L		100	54300	220000	59200	36500	278000	210000	25600	53900
Total Dissolved Solids	µg/L		20000	312000	440000	294000	160000	514000	716000	198000	340000
Total Kjeldahl Nitrogen	µg/L		100	3840	1350	8500	6300	1150	3800	3360	3950
Total Phosphorus	µg/L	30	20	1000	46	833	535	93	174	177	953
Total Suspended Solids	µg/L		10000	296000	<10000	106000	130000	154000	368000	68000	308000
Arsenic	µg/L	100	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3.9	<3.0	<3.0
Barium	µg/L		2.0	54.4	37.1	36.6	37.7	56.5	80.2	30.4	49.6
Beryllium	µg/L	11	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	µg/L	200	10.0	25.6	150	38.3	25.8	228	66.8	48.0	35.0
Cadmium	µg/L	0.2	0.10	0.17	<0.10	<0.10	0.17	<0.10	<0.10	0.19	0.15
Chromium	µg/L	8.9	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Cobalt	µg/L	0.9	0.50	1.28	<0.50	0.98	1.29	0.62	2.62	2.19	1.27
Copper	µg/L	5	0.80	4.70	1.68	<0.80	5.15	2.70	5.92	3.53	4.21
Iron	µg/L	300	10.0	15600	119	2600	2410	703	4250	5110	14800
Lead	µg/L	5	1.0	1.7	<1.0	2.0	2.5	2.1	6.9	3.9	1.6
Magnesium	µg/L		50	13700	29200	14900	4210	38200	33300	7240	13700
Manganese	µg/L		2.0	245	41.2	403	126	108	638	239	257
Dissolved Mercury	µg/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Certificate of Analysis

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: Nov 11, 2011 | DATE RECEIVED: Nov 14, 2011 | DATE REPORTED: Nov 21, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW1 2908589	SW4 2908626	SW6 2908645	SW8 2908657	SW3 2908671	SW5 2908683	SW7 2908696	SWD1 2908711
Molybdenum	µg/L	40	2.0	<2.0	<2.0	<2.0	<2.0	2.6	<2.0	<2.0	<2.0
Nickel	µg/L	25	3.0	3.7	<3.0	3.4	3.3	3.4	6.3	4.2	3.5
Silver	µg/L	0.1	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	µg/L		50	10300	17900	8510	1570	19400	17700	3420	10300
Thallium	µg/L	0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Vanadium	µg/L	6	2.0	2.5	<2.0	<2.0	4.7	<2.0	4.4	4.0	2.3
Zinc	µg/L	30	5.0	124	5.0	16.1	29.1	25.4	35.9	22.0	109
% Difference Cation/Anion					0.9	2.5	9.2	3.7	1.9	10.6	1.6

Parameter	Unit	G / S	RDL	Leachate 2908723
Alkalinity (as CaCO3)	µg/L		5000	3700000
Ammonia as N	µg/L		20	384000
Ammonia-Un-ionized	µg/L	20	20	25000
BOD (5)	µg/L		5000	484000
Calcium	µg/L		50	203000
Chemical Oxygen Demand	µg/L		5000	1680000
Chloride	µg/L		1000	1440000
Electrical Conductivity	uS/cm		2	10300
Dissolved Organic Carbon	µg/L		500	555000
Nitrate as N	µg/L		500	<500
pH	pH Units	6.5-8.5	NA	8.08
Sulphate	µg/L		1000	75100
Total Dissolved Solids	µg/L		20000	5800000
Barium	µg/L		2.0	329
Boron	µg/L	200	100	16100
Iron	µg/L	300	10.0	2210
Magnesium	µg/L		50	410000
Sodium	µg/L		50	1090000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO(ug/L)

Certified By:

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Guideline Violation

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

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CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.28
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	15600
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	1000
2908589	SW1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	124
2908626	SW4	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	46
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	0.98
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2600
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Phenols	1.0	40
2908645	SW6	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	833
2908645	SW6	PWQO(ug/L)	Brooks Landfill VOCs (water)	Toluene	0.8	1.1
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.29
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Copper	5	5.15
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2410
2908657	SW8	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	535
2908671	SW3	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Boron	200	228
2908671	SW3	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	703
2908671	SW3	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	93
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Ammonia-Un-ionized	20	135
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	2.62
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Copper	5	5.92
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	4250
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Lead	5	6.9
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	174
2908683	SW5	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	35.9

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Guideline Violation

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

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CLIENT NAME: GENIVAR

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	2.19
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	5110
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Phenols	1.0	4
2908696	SW7	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	177
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Cobalt	0.9	1.27
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	14800
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	30	953
2908711	SWD1	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Zinc	30	109
2908723	Leachate	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Ammonia-Un-ionized	20	25000
2908723	Leachate	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Boron	200	16100
2908723	Leachate	PWQO(ug/L)	Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)	Iron	300	2210

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
PAHs in Water															
Naphthalene	1	2908671	< 0.12	< 0.12	0.0%	< 0.12	89%	50%	140%	94%	50%	140%	96%	50%	140%
Acenaphthylene	1	2908671	< 0.11	< 0.11	0.0%	< 0.11	106%	50%	140%	124%	50%	140%	119%	50%	140%
Acenaphthene	1	2908671	< 0.10	< 0.10	0.0%	< 0.10	91%	50%	140%	100%	50%	140%	98%	50%	140%
Fluorene	1	2908671	< 0.09	< 0.09	0.0%	< 0.09	91%	50%	140%	105%	50%	140%	99%	50%	140%
Phenanthrene	1	2908671	< 0.10	< 0.10	0.0%	< 0.10	94%	50%	140%	110%	50%	140%	106%	50%	140%
Anthracene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	110%	50%	140%	105%	50%	140%
Fluoranthene	1	2908671	< 0.12	< 0.12	0.0%	< 0.12	93%	50%	140%	111%	50%	140%	112%	50%	140%
Pyrene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	94%	50%	140%	109%	50%	140%	111%	50%	140%
Benzo(a)anthracene	1	2908671	< 0.08	< 0.08	0.0%	< 0.08	100%	50%	140%	102%	50%	140%	115%	50%	140%
Chrysene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	106%	50%	140%	114%	50%	140%	108%	50%	140%
Benzo(b)fluoranthene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	111%	50%	140%	100%	50%	140%
Benzo(k)fluoranthene	1	2908671	< 0.05	< 0.05	0.0%	< 0.05	107%	50%	140%	97%	50%	140%	95%	50%	140%
Benzo(a)pyrene	1	2908671	< 0.01	< 0.01	0.0%	< 0.01	91%	50%	140%	90%	50%	140%	85%	50%	140%
Indeno(1,2,3-cd)pyrene	1	2908671	< 0.06	< 0.06	0.0%	< 0.06	90%	50%	140%	78%	50%	140%	82%	50%	140%
Dibenzo(a,h)anthracene	1	2908671	< 0.09	< 0.09	0.0%	< 0.09	86%	50%	140%	83%	50%	140%	87%	50%	140%
Benzo(g,h,i)perylene	1	2908671	< 0.06	< 0.06	0.0%	< 0.06	97%	50%	140%	83%	50%	140%	87%	50%	140%
2-and 1-methyl Napthalene	1	2908671	< 0.20	< 0.20	0.0%	< 0.20	90%	50%	140%	90%	50%	140%	92%	50%	140%
Brooks Landfill VOCs (water)															
1,1,1,2-Tetrachloroethane	1	2908626	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	110%	60%	130%	85%	60%	130%
1,1,1-Trichloroethane	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	81%	60%	130%	109%	60%	130%	86%	60%	130%
1,1,2,2-Tetrachloroethane	1	2908626	< 0.10	< 0.10	0.0%	< 0.10		60%	130%	123%	60%	130%	100%	60%	130%
1,1,2-Trichloroethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	86%	60%	130%	116%	60%	130%	98%	60%	130%
1,1-Dichloroethane	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	79%	60%	130%	107%	60%	130%	93%	60%	130%
1,1 Dichloroethylene	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	77%	60%	130%	72%	60%	130%	74%	60%	130%
1,2-Dibromoethane (EDB)	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	110%	60%	130%	94%	60%	130%
1,2-Dichlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	72%	60%	130%	84%	60%	130%	126%	60%	130%
1,2 - Dichloroethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	86%	60%	130%	84%	60%	130%
1,2-Dichloropropane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	84%	60%	130%	98%	60%	130%	84%	60%	130%
1,3-Dichlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	74%	60%	130%	80%	60%	130%	129%	60%	130%
1,4-Dichlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	71%	60%	130%	83%	60%	130%	116%	60%	130%
2-Hexanone	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	100%	60%	130%	114%	60%	130%	106%	60%	130%
Acetone	1	2908626	< 1.0	< 1.0	0.0%	< 1.0	123%	60%	130%	96%	60%	130%	91%	60%	130%
Benzene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	100%	60%	130%	126%	60%	130%
Bromodichloromethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	77%	60%	130%	90%	60%	130%	93%	60%	130%
Bromoform	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	83%	60%	130%	84%	60%	130%	130%	60%	130%
Bromomethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	90%	60%	130%	95%	60%	130%	95%	60%	130%
Carbon Tetrachloride	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	71%	60%	130%	79%	60%	130%	83%	60%	130%
Chlorobenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	85%	60%	130%	121%	60%	130%	116%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Chloroethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	86%	60%	130%	93%	60%	130%	91%	60%	130%
Chloroform	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	81%	60%	130%	94%	60%	130%	93%	60%	130%
Chloromethane	1	2908626	< 0.40	< 0.40	0.0%	< 0.40	107%	60%	130%	103%	60%	130%	97%	60%	130%
cis- 1,2-Dichloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	86%	60%	130%	98%	60%	130%	97%	60%	130%
cis-1,3-Dichloropropene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	72%	60%	130%	83%	60%	130%	79%	60%	130%
Dibromochloromethane	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	75%	60%	130%	94%	60%	130%	78%	60%	130%
Dichlorodifluoromethane	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	96%	60%	130%	121%	60%	130%	123%	60%	130%
Ethylbenzene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	82%	60%	130%	115%	60%	130%	124%	60%	130%
Dichloromethane (Methylene Chloride)	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	72%	60%	130%	72%	60%	130%	77%	60%	130%
Methyl Isobutyl Ketone	1	2908626	< 1.0	< 1.0	0.0%	< 1.0	94%	60%	130%	115%	60%	130%	108%	60%	130%
Methyl tert-butyl ether (MTBE)	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	79%	60%	130%	107%	60%	130%	76%	60%	130%
Methyl Ethyl Ketone, MEK (2-Butanone)	1	2908626	< 1.0	< 1.0	0.0%	< 1.0	94%	60%	130%	113%	60%	130%	98%	60%	130%
Styrene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	76%	60%	130%	88%	60%	130%	106%	60%	130%
Tetrachloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	87%	60%	130%	120%	60%	130%	108%	60%	130%
Toluene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	93%	60%	130%	122%	60%	130%	125%	60%	130%
trans- 1,2-dichloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	119%	60%	130%	92%	60%	130%
trans-1,3-Dichloropropene	1	2908626	< 0.30	< 0.30	0.0%	< 0.30	75%	60%	130%	86%	60%	130%	74%	60%	130%
Trichloroethylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	101%	60%	130%	106%	60%	130%
Trichlorofluoromethane (Freon 11)	1	2908626	< 0.40	< 0.40	0.0%	< 0.40	86%	60%	130%	76%	60%	130%	90%	60%	130%
Vinyl Chloride	1	2908626	< 0.17	< 0.17	0.0%	< 0.17	85%	60%	130%	100%	60%	130%	100%	60%	130%
o-Xylene	1	2908626	< 0.10	< 0.10	0.0%	< 0.10	82%	60%	130%	121%	60%	130%	128%	60%	130%
m & p-Xylene	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	120%	60%	130%	61%	60%	130%
Xylene Mixture (Total)	1	2908626	< 0.20	< 0.20	0.0%	< 0.20	82%	60%	130%	121%	60%	130%	128%	60%	130%

Certified By: Jacky Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - SW,GW, Leachate & S53 Parameters - (PWQO) (µg/L)															
Alkalinity (as CaCO3)	1	2908589	68900	69200	0.4%	< 5000	98%	80%	120%						
Ammonia as N	1	2908589	62	54	13.8%	< 20	102%	90%	110%	99%	90%	110%	110%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	97%	75%	125%						
Calcium	1	2908626	83100	79700	4.2%	< 50	94%	90%	110%	94%	90%	110%	92%	70%	130%
Chemical Oxygen Demand	1		32500	29000	11.4%	< 5000	106%	90%	110%	103%	90%	110%	100%	70%	130%
Chloride	1	2908645	11300	11400	0.9%	< 100	95%	90%	110%	97%	90%	110%	101%	80%	120%
Electrical Conductivity	1	2908589	415	415	0.0%	< 2	103%	80%	120%						
Dissolved Organic Carbon	1		4200	4100	2.4%	< 500	98%	90%	110%	90%	90%	110%	82%	80%	120%
Nitrate as N	1	2908645	< 50	< 50	0.0%	< 50	100%	90%	110%	103%	90%	110%	103%	80%	120%
Nitrite as N	1	2908645	< 50	< 50	0.0%	< 50	NA	90%	110%	93%	90%	110%	104%	80%	120%
pH	1	2908589	7.52	7.56	0.5%	N/A	100%	80%	120%						
Phenols	1	2908589	< 1	< 1	0.0%	< 1	98%	90%	110%	97%	90%	110%	95%	80%	120%
Potassium	1	2908626	5970	5550	7.3%	< 50	93%	90%	110%	93%	90%	110%	92%	70%	130%
Sulphate	1	2908645	59200	58900	0.5%	< 100	101%	90%	110%	99%	90%	110%	93%	80%	120%
Total Dissolved Solids	1	2908671	514000	516000	0.4%	< 20000	96%	80%	120%						
Total Kjeldahl Nitrogen	1	2908589	3840	3930	2.3%	< 100	105%	80%	120%	108%	80%	120%	110%	70%	130%
Total Phosphorus	1		2460	2520	2.4%	< 20	104%	90%	110%	92%	90%	110%	106%	80%	120%
Total Suspended Solids	1	2908671	154000	162000	5.1%	< 10000	98%	80%	120%						
Arsenic	1	2908589	< 3.0	< 3.0	0.0%	< 3.0	105%	90%	110%	107%	80%	120%	115%	70%	130%
Barium	1	2908589	54.4	52.1	4.3%	< 2.0	100%	90%	110%	100%	90%	110%	99%	70%	130%
Beryllium	1	2908589	< 1.0	< 1.0	0.0%	< 1.0	111%	80%	120%	106%	90%	110%	100%	70%	130%
Boron	1	2908589	25.6	26.3	2.7%	< 10.0	109%	90%	110%	108%	90%	110%	104%	70%	130%
Cadmium	1	2908589	0.17	0.17	0.0%	< 0.10	101%	90%	110%	108%	90%	110%	119%	70%	130%
Chromium	1	2908589	< 3.0	< 3.0	0.0%	< 3.0	103%	90%	110%	109%	90%	110%	108%	70%	130%
Cobalt	1	2908589	1.28	1.32	3.1%	< 0.50	104%	90%	110%	105%	90%	110%	106%	70%	130%
Copper	1	2908589	4.70	4.90	4.2%	< 0.80	105%	90%	110%	108%	90%	110%	104%	70%	130%
Iron	1	2908589	15600	15900	1.9%	< 10.0	105%	90%	110%	96%	90%	110%	95%	70%	130%
Lead	1	2908589	1.7	1.7	0.0%	< 1.0	104%	90%	110%	110%	90%	110%	107%	70%	130%
Magnesium	1	2908626	29200	27800	4.9%	< 50	96%	90%	110%	96%	90%	110%	95%	70%	130%
Manganese	1	2908589	245	259	5.6%	< 2.0	102%	90%	110%	101%	90%	110%	99%	70%	130%
Dissolved Mercury	1	2908626	< 0.1	< 0.1	0.0%	< 0.1	105%	90%	110%	101%	90%	110%	104%	70%	130%
Molybdenum	1	2908589	< 2.0	< 2.0	0.0%	< 2.0	100%	90%	110%	110%	90%	110%	99%	70%	130%
Nickel	1	2908589	3.7	3.6	2.7%	< 3.0	107%	90%	110%	106%	90%	110%	103%	70%	130%
Silver	1	2908589	< 0.10	< 0.10	0.0%	< 0.10	103%	90%	110%	110%	90%	110%	95%	70%	130%
Sodium	1	2908626	17900	16900	5.7%	< 50	95%	90%	110%	96%	90%	110%	95%	70%	130%
Thallium	1	2908589	< 0.3	< 0.3	0.0%	< 0.3	98%	90%	110%	100%	90%	110%	98%	70%	130%
Vanadium	1	2908589	2.5	2.4	4.1%	< 2.0	102%	90%	110%	100%	90%	110%	101%	70%	130%
Zinc	1	2908589	124	125	0.8%	< 5.0	104%	90%	110%	111%	80%	120%	113%	70%	130%

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

Water Analysis (Continued)

RPT Date:			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dibromoethane (EDB)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichloromethane (Methylene Chloride)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether (MTBE)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone, MEK (2-Butanone)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane (Freon 11)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trihalomethanes (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

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http://www.agatlabs.com

Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

PROJECT NO: Brooks Landfill

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Napthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T549297

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
% Difference Cation/Anion			CALCULATION

4 Cooler 6.6

AGAT Laboratories

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 4.3
AGAT WO #: 11T549297
Lab Temperature:
Notes:

Client Information:
Company: Genivar
Contact: Matt Welsh
Address: 1425 Cormorant Rd.
Ancaster L9G4V5
Phone: 2892390100 Fax: 2892390109
Project: Brooks Landfill PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.) — Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use — Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (specify) ____
☑ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☑ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
*TAT is exclusive of weekends and statutory holidays

Invoice To: Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☑ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: MattWelsh
Email: matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: Bailey.Walters@genivar.com

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride-Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ N-Total ☐ Hg ☐ pH ☐ NO_3/NO_2	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_3	VOC: ☐ VOC ☐ THM ☑ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	✓ SW inorganics + metals	✓ SW PAHs	✓ SW VOCs	Leachate Indicator
SW1	Nov 11/11	AM	SW	12																		✓	✓	✓	
SW4		PM	SW	12																		✓	✓	✓	
SW6		PM	SW	12																		✓	✓	✓	
SW8		PM	SW	12																		✓	✓	✓	
SW3		AM	SW	13	→ because of Lab QC - PAH bottle																	✓	✓	✓	
SW5		AM	SW	12																		✓	✓	✓	
SW7		AM	SW	12																		✓	✓	✓	
SWD1		AM	SW	12																		✓	✓	✓	
Leachate		AM	GW	6																					✓

Samples Relinquished by (print name & sign): Matt Welsh
Date/Time: Nov 14
Samples Received by (Print name & sign): Robert Nov 14/11
Date/Time: 11:30
Samples Relinquished by (print name & sign):
Date/Time:
Samples Received by (Print name & sign):
Date/Time: 4:30

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page ____ of ____
NO: 165583

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

Table H-1 s53 TDS Pond Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

GENIVAR

Parameter	Parameter Suite	Units	s53 Trigger Parameters Value	s53 Trigger Parameters *Type*	PWQO Value	PWQO *Type*	Sample Location	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond
							Sampling Date	2006/11/22	2007/01/03	2007/01/16	2007/02/14	2007/03/16	2007/03/27	2007/04/04	2007/04/13	2007/05/01	2007/05/01	2007/08/28	2007/10/10	2009/07/23	2009/11/24
Field Parameters																				
Conductivity		µS/cm			see table			308	572		110	673	930	1210		1170		980	1270	407	626
Dissolved Oxygen (DO)		mg/L						8.13	13.77		17.27		10.53	13.33		20.23			12.79	5.63	
pH								8.15	7.65		7.54	8.42	8.03	7.71		8.1		7.49	7.82	9.75	8.48
Temperature		°C			qualitative			6.6	5.1		1.1	3.1	15.1	10.9		14.5		20.2	15.5	21.6	
General																				
Alkalinity (CaCO3)		µg/L			Note	PWQO		135000	111000		172000	128000		144000		155000		218000	126000	77000	107000
Ammonia (as N)		µg/L						<50	60		60	160		<50		170			90	<50	
Ammonia, un-ionised (as N)		µg/L	20		20	PWQO		<1	<1		<1	<1		<1		4			2	<1	
Biological Oxygen Demand (BOD5)		µg/L						<2000	<2000		<2000	<2000		<2000		3000	2000		<2000	<2000	
Chemical Oxygen Demand (COD)		µg/L						16000	17000		36000	17000		31000		25000			29000	<10000	
Chloride		µg/L						4000	3000		5000	5000		9000		8000		7000	14000	7000	3200
Conductivity		µS/cm											954		1170			645	1410	399	626
Hardness (as CaCO3)		µg/L											450000		580000			320000	810000	213000	340000
Nitrate (as N)		µg/L			2930	CCME		100	400		200	500		300		<100			3100	150	
Nitrite (as N)		µg/L			18	CCME		<10	10		10	30		20		10			150	<100	
pH			6.5-8.5	Limit	6.5-8.5	PWQO							7.9		8.1	8.2		8.2	8.1	8.08	8.48
Phenol		µg/L			1	PWQO		<1	1		1	2		2		2			<1	<1	
Sulphates		µg/L						63000	186000		421000	427000		410000		522000		126000	649000	120000	226000
Total Dissolved Solids (TDS)		µg/L						223000	347000		660000	600000		720000		806000			502000	256000	
Total Kjeldahl Nitrogen (TKN)		µg/L						900	800		1200	1400		1100		1100			1300		
Total Phosphorus		µg/L	320		30	IPWQO		**54**	**50**		**47**	**77**		**57**		25			**31**	27.3	
Total Suspended Solids (TSS)		µg/L	25000	Limit				25000	**150000**		**45000**	**63000**	21000	**27000**	20000	4000	15000		17000	7600	
Metals																				
Arsenic		µg/L			5	IPWQO		<1	1		<1	<1		<1		<1		2	1	<1	<1
Barium		µg/L						38	50		51	48		52		51		44	65	20	37
Boron		µg/L	1500	Limit	200	IPWQO		24	26		50	40		38		71		53	66	<50	<50
Cadmium		µg/L			0.5	IPWQO		<0.1	<0.1		<0.1	<0.1		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1
Chromium		µg/L						<5	41	<5	<5	<5		<5		<5		<5	<5	1.5	1
Copper		µg/L			5	PWQO		3	5		2	3		3		2		2	2	<1	2
Iron		µg/L	4350	Limit	300	PWQO		2700	4600		810	3100		850		610			550	388	
Lead		µg/L			5	IPWQO		1	2		<0.5	1.4		<0.5		<0.5			<0.5	<1	
Mercury		µg/L			0.2	PWQO		<0.1	<0.1		<0.1	<0.1		<0.1		<0.1			<0.1	<0.1	
Zinc		µg/L	110	Limit	20	IPWQO		14	17		8	10		9		6			<5	12	
VOCs																				
1,1,1,2-Tetrachloroethane		µg/L			20	IPWQO														
1,1,1-Trichloroethane		µg/L			10	IPWQO														
1,1,2,2-Tetrachloroethane		µg/L			70	IPWQO														
1,1,2-Trichloroethane		µg/L			800	IPWQO														
1,1-Dichloroethane		µg/L			200	IPWQO														
1,1-Dichloroethylene		µg/L			40	IPWQO														
1,2-Dibromoethane (EDB)		µg/L																		
1,2-Dichlorobenzene		µg/L			2.5															
1,2-Dichloroethane		µg/L			100	IPWQO														
1,2-Dichloropropane		µg/L																		
1,3-Dichlorobenzene		µg/L			2.5	PWQO														
1,4-Dichlorobenzene		µg/L			4	PWQO														
2-Hexanone		µg/L																		
Acetone		µg/L																		
Benzene		µg/L			100	IPWQO														
Bromodichloromethane		µg/L			200	IPWQO														
Bromoform		µg/L			60	IPWQO														
Bromomethane		µg/L			0.9	IPWQO														
Carbon Disulphide		µg/L																		
Carbon Tetrachloride		µg/L			13.3	CCME														
Chlorobenzene		µg/L			15	PWQO														
Chloroethane		µg/L																		
Chloroform		µg/L																		
Chloromethane		µg/L			700	IPWQO														
cis-1,2-Dichloroethylene		µg/L			200	IPWQO														
cis-1,3-Dichloropropene		µg/L																		
Dibromochloromethane		µg/L			40	IPWQO														
Dichlorodifluoromethane		µg/L																		
Dichloromethane(Methylene Chloride)		µg/L			100	IPWQO														
Ethylbenzene		µg/L			8	IPWQO		<0.1	<0.1		<0.1	<0.1		<0.1		<0.1			<0.1	<0.5	
Methyl isobutyl ketone		µg/L																		
Methyl t-butyl ether (MTBE)		µg/L			200	IPWQO														
Methyl-ethyl ketone, MEK (2-Butanone)		µg/L			400	IPWQO														
Styrene		µg/L			4	IPWQO														
Tetrachloroethylene		µg/L			50	IPWQO														
Toluene		µg/L	0.8	Limit	0.8	IPWQO														
trans-1,2-Dichloroethylene		µg/L			200	IPWQO														
trans-1,3-Dichloropropene		µg/L			7	IPWQO														
Trichloroethylene		µg/L			20	IPWQO														
Trichlorofluoromethane (FREON 11)		µg/L																		
Trihalomethanes (total)		µg/L																		
Vinyl Chloride		µg/L			600	IPWQO														
Xylene, *o-*		µg/L			40	IPWQO														
Xylene, *p- + m-*		µg/L			32	IPWQO														
Xylenes (total)		µg/L																		
PAHs																				
1-Methyl + 2-Methylnaphthalene		µg/L			2	IPWQO														
2-Methylnaphthalene		µg/L																		
Acenaphthene		µg/L			5.8	CCME														
Acenaphthylene		µg/L																		
Anthracene		µg/L			0.0008	IPWQO														
Benzo(a)anthracene		µg/L			0.0004	IPWQO														
Benzo(a)pyrene		µg/L			0.015	CCME		<0.01	<0.01		<0.01	<0.01		<0.01		<0.01			<0.01	<0.05	
Benzo(b)fluoranthene		µg/L																		
Benzo(g,h,i)perylene		µg/L			0.00002	IPWQO														
Benzo(k)fluoranthene		µg/L			0.0002	IPWQO														
Chrysene		µg/L			0.0001	IPWQO														
Dibenzo(a,h)anthracene		µg/L			0.002	IPWQO														
Fluoranthene		µg/L			0.0008	IPWQO														
Fluorene		µg/L	0.2	Limit	0.2	IPWQO														
Indeno(1,2,3-cd)pyrene		µg/L																		
Naphthalene		µg/L	7	Limit	7	IPWQO		0.1	<0.05		<0.05	<0.5		<0.05		<0.05			<0.05	<0.2	
Phenanthrene		µg/L			0.03	IPWQO														
Pyrene		µg/L			0.025	CCME														

Notes:

PWQO	Ontario Provincial Water Quality Objective (1994 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<	Parameter concentration is less than laboratory detection limit
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that parameter concentration exceeds TDS pond trigger value.

Table H-1 s53 TDS Pond Quality
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Parameter			s53 Trigger Parameters		PWQO		Sample Location	TDS Pond	TDS Pond	TDS Discharge	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond
							Sampling Date	2010/12/23	2011/03/04	2011/05/16	2011/06/10	2011/07/07	2011/09/26	2011/10/27	2011/12/12
	Parameter Suite	Units	Value	*Type*	Value	*Type*		s53 Stormwater	s53 Trigger Parameters	s53 Stormwater	s53 Stormwater, VOC, PAH	s53 Stormwater	VOC, PAH	s53 Stormwater
Field Parameters															
Conductivity		µS/cm						702	149000	727	1010	722	2320		1330
Dissolved Oxygen (DO)		mg/L			see table					8.71	5.99	4.13	7.03		8.33
pH								8.25		8.3	7.48	8.35	7.94		8.2
Temperature		°C			qualitative			0		11.6	24.2	28.6	24.5		4.9
General															
Alkalinity (CaCO3)		µg/L			Note	PWQO		151000	149000		151000	177000	206000		137000
Ammonia (as N)		µg/L						100	330		<20	<20	180		282
Ammonia, un-ionised (as N)		µg/L	20		20	PWQO		3			<1	<1	6		<1
Biological Oxygen Demand (BOD5)		µg/L						<5000	<5000		<5000	<5000	<5000		<5000
Chemical Oxygen Demand (COD)		µg/L						19000	7000		25000	22500	33000		27500
Chloride		µg/L						26200	13200		9890	10600	13900		15400
Conductivity		µS/cm						711	624		680	765	692		887
Hardness (as CaCO3)		µg/L						382000	353000			389000	390000		443000
Nitrate (as N)		µg/L			2930	CCME		<50	490		<50	<50	<50		297
Nitrite (as N)		µg/L			18	CCME		<50	<50		<50	<50	<50		<50
pH			6.5-8.5	Limit	6.5-8.5	PWQO		8.25	8.12	8.23	8.05	8.44	8.34		7.95
Phenol		µg/L			1	PWQO		<1	<1		<1	<1	<1		<1
Sulphates		µg/L						240000	203000		252000	252000	233000		350000
Total Dissolved Solids (TDS)		µg/L						582000	446000		508000	530000	532000		654000
Total Kjeldahl Nitrogen (TKN)		µg/L						270	1330		420		700		1090
Total Phosphorus		µg/L	320		30	IPWQO			20		**31**	**37**	**80**		**34**
Total Suspended Solids (TSS)		µg/L	25000	Limit				<10000	<10	**56000**	12000	22000	**27500**		<10000
Metals															
Arsenic		µg/L			5	IPWQO		<3	<3.0		<3.0	<3.0	<3.0		<3.0
Barium		µg/L						44	40		55.6	59.5	75.5		47.1
Boron		µg/L	1500	Limit	200	IPWQO		218	**214**		**255**	**303**	**346**		**370**
Cadmium		µg/L			0.5	IPWQO		<0.1	<0.10		<0.10	<0.10	<0.10		<0.10
Chromium		µg/L						<3.0	3		<3.0	<3.0	<3.0		<3.0
Copper		µg/L			5	PWQO		<2	2		1.98	1.71	1.23		2.54
Iron		µg/L	4350	Limit	300	PWQO		212	119		262	287	239		154
Lead		µg/L			5	IPWQO		<1	<1.0		<1.0	<1.0	<1.0		<1.0
Mercury		µg/L			0.2	PWQO		<0.1			<0.05	<0.05	<0.1		<0.1
Zinc		µg/L	110	Limit	20	IPWQO		<5	20		5.9	18.5	18.9		**65.3**
VOCs															
1,1,1,2-Tetrachloroethane		µg/L			20	IPWQO						<0.10		<0.10	<0.10
1,1,1-Trichloroethane		µg/L			10	IPWQO						<0.30		<0.30	<0.30
1,1,2,2-Tetrachloroethane		µg/L			70	IPWQO						<0.10		<0.10	<0.10
1,1,2-Trichloroethane		µg/L			800	IPWQO						<0.20		<0.20	<0.20
1,1-Dichloroethane		µg/L			200	IPWQO						<0.30		<0.30	<0.30
1,1-Dichloroethylene		µg/L			40	IPWQO						<0.30			<0.30
1,2-Dibromoethane (EDB)		µg/L													
1,2-Dichlorobenzene		µg/L			2.5							<0.10		<0.10	<0.10
1,2-Dichloroethane		µg/L			100	IPWQO						<0.20			<0.20
1,2-Dichloropropane		µg/L										<0.20		<0.20	<0.20
1,3-Dichlorobenzene		µg/L			2.5	PWQO						<0.10		<0.10	<0.10
1,4-Dichlorobenzene		µg/L			4	PWQO						<0.10		<0.10	<0.10
2-Hexanone		µg/L										<0.30		<0.30	<0.30
Acetone		µg/L										<1.0		<1.0	190
Benzene		µg/L			100	IPWQO						<0.20		<0.20	<0.20
Bromodichloromethane		µg/L			200	IPWQO						<0.20		<0.20	<0.20
Bromoform		µg/L			60	IPWQO						<0.10		<0.10	<0.10
Bromomethane		µg/L			0.9	IPWQO						<0.20		<0.20	<0.20
Carbon Disulphide		µg/L													
Carbon Tetrachloride		µg/L			13.3	CCME						<0.20		<0.20	<0.20
Chlorobenzene		µg/L			15	PWQO						<0.10		<0.10	<0.10
Chloroethane		µg/L										<0.20		<0.20	<0.20
Chloroform		µg/L										<0.20		<0.20	<0.20
Chloromethane		µg/L			700	IPWQO						<0.40		<0.40	<0.40
cis-1,2-Dichloroethylene		µg/L			200	IPWQO									<0.20
cis-1,3-Dichloropropene		µg/L										<0.20		<0.20	<0.20
Dibromochloromethane		µg/L			40	IPWQO						<0.10		<0.10	<0.10
Dichlorodifluoromethane		µg/L										<0.20		<0.20	<0.20
Dichloromethane(Methylene Chloride)		µg/L			100	IPWQO									
Ethylbenzene		µg/L			8	IPWQO		<0.10	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10
Methyl isobutyl ketone		µg/L												<1.0	<1.0
Methyl t-butyl ether (MTBE)		µg/L			200	IPWQO									
Methyl-ethyl ketone, MEK (2-Butanone)		µg/L			400	IPWQO									
Styrene		µg/L			4	IPWQO						<0.10		<0.10	<0.10
Tetrachloroethylene		µg/L			50	IPWQO						<0.20		<0.20	<0.20
Toluene		µg/L	0.8	Limit	0.8	IPWQO						<0.20		<0.20	<0.20
trans-1,2-Dichloroethylene		µg/L			200	IPWQO						<0.20			<0.20
trans-1,3-Dichloropropene		µg/L			7	IPWQO						<0.30		<0.30	<0.30
Trichloroethylene		µg/L			20	IPWQO						<0.20		<0.20	<0.20
Trichlorofluoromethane (FREON 11)		µg/L													
Trihalomethanes (total)		µg/L													
Vinyl Chloride		µg/L			600	IPWQO						<0.17		<0.17	<0.17
Xylene, *o-*		µg/L			40	IPWQO						<0.10			<0.10
Xylene, *p- + m-*		µg/L			32	IPWQO						<0.20			<0.20
Xylenes (total)		µg/L										<0.20			<0.20
PAHs															
1-Methyl + 2-Methylnaphthalene		µg/L			2	IPWQO									0.47
2-Methylnaphthalene		µg/L										<0.20			
Acenaphthene		µg/L			5.8	CCME						<0.10		<0.10	<0.10
Acenaphthylene		µg/L										<0.11		<0.11	<0.11
Anthracene		µg/L			0.0008	IPWQO						<0.05		<0.05	<0.05
Benzo(a)anthracene		µg/L			0.0004	IPWQO						<0.08		<0.08	<0.08
Benzo(a)pyrene		µg/L			0.015	CCME		<0.01	<1		<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene		µg/L										<0.05		<0.05	<0.05
Benzo(g,h,i)perylene		µg/L			0.00002	IPWQO						<0.06		<0.06	<0.06
Benzo(k)fluoranthene		µg/L			0.0002	IPWQO						<0.05		<0.05	<0.05
Chrysene		µg/L			0.0001	IPWQO						<0.05		<0.05	<0.05
Dibenzo(a,h)anthracene		µg/L			0.002	IPWQO						<0.09		<0.09	<0.09
Fluoranthene		µg/L			0.0008	IPWQO						<0.12		<0.12	<0.12
Fluorene		µg/L	0.2	Limit	0.2	IPWQO						<0.09		<0.09	0.1
Indeno(1,2,3-cd)pyrene		µg/L										<0.06		<0.06	<0.06
Naphthalene		µg/L	7	Limit	7	IPWQO		<0.12	0.4		<0.12	<0.12	<0.12	<0.12	<0.12
Phenanthrene		µg/L			0.03	IPWQO						<0.10		<0.10	**0.13**
Pyrene		µg/L			0.025	CCME						<0.05		<0.05	<0.05

Notes:

PWQO	Ontario Provincial Water Quality Objective (1994 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<	Parameter concentration is less than laboratory detection limit
<blank>	Not Analysed
25	Highlighting indicates that parameter concentration exceeds relevant standard
25	Highlighting indicates that parameter concentration exceeds TDS pond trigger value.

AGAT Laboratories

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: Bailey Walters

PROJECT NO: 5-10-0128.00

AGAT WORK ORDER: 11T476459

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Mar 10, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T476459
PROJECT NO: 5-10-0128.00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

Edwards Landfill Stormwater Monitoring - Organics

DATE SAMPLED: Mar 04, 2011 | DATE RECEIVED: Mar 04, 2011 | DATE REPORTED: Mar 10, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 2287740
Ethylbenzene	mg/L	0.002	0.0001	<0.0001
Benzo(a)pyrene	mg/L		0.001	<0.001
Naphthalene	mg/L		0.0003	0.0004

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Toronto Storm Bylaw

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T476459
PROJECT NO: 5-10-0128.00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

Edwards Landfill - Stormwater Monitoring Parameters (Partial Report)

DATE SAMPLED: Mar 04, 2011 | DATE RECEIVED: Mar 04, 2011 | DATE REPORTED: Mar 10, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 2287740
BOD (5)	mg/L		5	<5
Electrical Conductivity	uS/cm		2	624
pH	pH Units	6.5-8.5	NA	8.12
Total Dissolved Solids	mg/L		20	446
Total Suspended Solids	mg/L		10	<10
Alkalinity (as CaCO3)	mg/L		5	149
Chloride	mg/L		0.10	13.2
Nitrate as N	mg/L		0.05	0.49
Nitrite as N	mg/L		0.05	<0.05
Sulphate	mg/L		0.10	203
Ammonia as N	mg/L		0.02	0.33
Phenols	mg/L	0.001	0.001	<0.001
Chemical Oxygen Demand	mg/L		5	7
Total Kjeldahl Nitrogen	mg/L		0.10	1.33
Total Phosphorus	mg/L	0.03	0.02	0.02
Calcium	mg/L		0.05	76.5
Magnesium	mg/L		0.05	39.4
Total Hardness (as CaCO3)	mg/L		10	353
Arsenic	mg/L	0.1	0.003	<0.003
Barium	mg/L		0.002	0.040
Boron	mg/L	0.20	0.010	0.214
Cadmium	mg/L	0.0002	0.0001	<0.0001
Chromium	mg/L		0.003	0.003
Copper	mg/L	0.005	0.002	0.002
Iron	mg/L	0.3	0.010	0.119
Lead	mg/L	0.005	0.001	<0.001
Zinc	mg/L	0.03	0.005	0.020

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO (mg/L)

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 11T476459

PROJECT NO: 5-10-0128.00

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CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2287740	TDS Pond	PWQO (mg/L)	Edwards Landfill - Stormwater Monitoring Parameters (Partial Report)	Boron	0.20	0.214

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T476459

PROJECT NO: 5-10-0128.00

ATTENTION TO: Bailey Walters

Trace Organics Analysis

RPT Date: Mar 10, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Edwards Landfill Stormwater Monitoring - Organics															
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.0001	111%	60%	130%	96%	60%	130%	84%	60%	130%
Benzo(a)pyrene	1					< 0.001	86%	70%	130%	105%	70%	130%		70%	130%
Naphthalene	1					< 0.0003	106%	60%	140%	99%	60%	140%		60%	140%

Certified By: Jordy Takewaki

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T476459

PROJECT NO: 5-10-0128.00

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date: Mar 10, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Edwards Landfill - Stormwater Monitoring Parameters (Partial Report)															
BOD (5)	1		153	150	2.0%	< 5	94%	75%	125%						
Electrical Conductivity	1		315	314	0.3%	< 2	96%	80%	120%						
pH	1		8.02	7.97	0.6%	N/A	100%	80%	120%						
Total Dissolved Solids	1	2287740	446	462	3.5%	< 20	96%	80%	120%						
Total Suspended Solids	1		< 10	< 10	0.0%	< 10	104%	80%	120%						
Alkalinity (as CaCO3)	1		102	103	1.0%	< 5	98%	90%	110%						
Chloride	1		36.7	36.0	1.9%	< 0.10	98%	90%	110%	102%	90%	110%	95%	85%	115%
Nitrate as N	1		< 0.05	< 0.05	0.0%	< 0.05	98%	90%	110%	100%	90%	110%	103%	85%	115%
Nitrite as N	1		< 0.05	< 0.05	0.0%	< 0.05	NA	90%	110%	91%	90%	110%	108%	85%	115%
Sulphate	1		61.2	60.3	1.5%	< 0.10	100%	90%	110%	103%	90%	110%	91%	80%	120%
Ammonia as N	1		< 0.02	< 0.02	0.0%	< 0.02	108%	90%	110%	98%	90%	110%	102%	80%	120%
Phenols	1		< 0.001	< 0.001	0.0%	< 0.001	104%	90%	110%	97%	90%	110%	100%	80%	120%
Chemical Oxygen Demand	1	2287740	7	6	15.4%	< 5	109%	90%	110%	94%	90%	110%	108%	70%	130%
Total Kjeldahl Nitrogen	1		< 0.10	< 0.10	0.0%	< 0.10	92%	80%	120%	96%	80%	120%	103%	70%	130%
Total Phosphorus	1		< 0.02	< 0.02	0.0%	< 0.02	92%	90%	110%	99%	90%	110%	105%	70%	130%
Calcium	1	2287740	76.5	76.5	0.0%	< 0.05	101%	90%	110%	104%	90%	110%	101%	70%	130%
Magnesium	1	2287740	39.4	39.2	0.5%	< 0.05	102%	90%	110%	102%	90%	110%	99%	70%	130%
Arsenic	1		< 0.003	< 0.003	0.0%	< 0.003	103%	90%	110%	109%	90%	110%	109%	70%	130%
Barium	1		0.141	0.142	0.7%	< 0.002	102%	90%	110%	110%	90%	110%	101%	70%	130%
Boron	1		0.016	0.016	0.0%	< 0.010	99%	90%	110%	96%	90%	110%	102%	70%	130%
Cadmium	1		< 0.0001	< 0.0001	0.0%	< 0.0001	97%	90%	110%	110%	90%	110%	105%	70%	130%
Chromium	1		< 0.003	< 0.003	0.0%	< 0.003	102%	90%	110%	103%	90%	110%	102%	70%	130%
Copper	1		< 0.002	< 0.002	0.0%	< 0.002	102%	90%	110%	101%	80%	120%	105%	70%	130%
Iron	1		< 0.010	< 0.010	0.0%	< 0.010	95%	90%	110%	108%	90%	110%	101%	70%	130%
Lead	1		< 0.001	< 0.001	0.0%	< 0.001	105%	90%	110%	112%	80%	120%	100%	70%	130%
Zinc	1		0.0069	0.0064	7.5%	< 0.005	99%	90%	110%	108%	90%	110%	104%	70%	130%

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T476459

PROJECT NO: 5-10-0128.00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Ethylbenzene	VOL-91- 5001	EPA SW-846 5030 & 8260	P & T GC/MS
Benzo(a)pyrene	ORG 5505	EPA SW-846 3510C & 8270	GC/MS
Naphthalene	ORG 5505	EPA SW-846 3510C & 8270	GC/MS
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010 & 200.7 & SM 2340 B	ICP/OES
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

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Certificate of Analysis

AGAT WORK ORDER: 11T501199
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: Jun 10, 2011 | DATE RECEIVED: Jun 13, 2011 | DATE REPORTED: Jun 14, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 2470866
Alkalinity (as CaCO3)	µg/L		5000	
Ammonia as N	µg/L		20	
Ammonia-Un-ionized	µg/L	0.02	20	
BOD (5)	µg/L		5000	
Chemical Oxygen Demand	µg/L		5000	
Chloride	µg/L		100	
Electrical Conductivity	uS/cm		2	680
Total Hardness (as CaCO3)	µg/L		500	
Nitrate as N	µg/L		50	
Nitrite as N	µg/L		50	
pH	pH Units	6.5-8.5	NA	8.05
Phenols	µg/L	1.0	1	
Sulphate	µg/L		100	
Total Dissolved Solids	µg/L		20000	
Total Kjeldahl Nitrogen	µg/L		100	
Total Phosphorus	µg/L	20	20	
Total Suspended Solids	µg/L		10000	12000
Arsenic	µg/L	100	3.0	
Barium	µg/L		2.0	
Boron	µg/L	200	10.0	
Cadmium	µg/L	0.2	0.10	
Chromium	µg/L	8.9	3.0	
Copper	µg/L	5	0.80	
Iron	µg/L	300	10.0	
Lead	µg/L	5	1.0	
Mercury	µg/L	0.2	0.05	
Zinc	µg/L	30	5.0	
% Difference/ Ion Balance	%		NA	
Anion Sum	meq/L		NA	
Cation Sum	meq/L		NA	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Tony Nash

AGAT Laboratories

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CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 2.4 AGAT WO #: 11T501199
Notes:

Client Information
Company: Genivar Inc
Contact: Matt Welsh
Address: 110 Colborne St.
Brantford, ON
Phone: 519-7569422 Fax:
Project: 111-53338-02 PO: 111-53338-02
AGAT Quotation #: 911-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes / No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Matt Welsh
Email: Matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements
☐ Regulation 153 Table ___ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☐ Sewer Use Region ___ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ___
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☑ 1 Working Day See Note
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	S53 Storm Mtl	S53 Leachate				LABORATORY USE ONLY LAB SAMPLE ID
TDS Pond	June 10/11		Surface	13												✓					* Idny TAT for PHCs
Leachate	June 10/11		Leachate	14													✓				

Samples Relinquished By (print name & sign): Bailey Walters — Date/Time:
Samples Relinquished By (print name & sign): — Date/Time:
Samples Received By (print name & sign): — Date/Time: June 13/11 1226
Samples Received By (print name & sign): — Date/Time: 4:00

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE ___ of ___
NO: 151044

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CLIENT NAME: GENIVAR
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: Bailey Walters

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T533039

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Oct 04, 2011

PAGES (INCLUDING COVER): 13

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

s53 Leachate - Benzo(a)pyrene and Naphthalene

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Sep 30, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2743178
Naphthalene	µg/L	7	0.12	1.8
Benzo(a)pyrene	µg/L		0.01	<0.01
Surrogate	**Unit**	**Acceptable Limits**		
Chrysene-d12	%	60-130		98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

s53 Stormwater (PWQO) - Organics

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Sep 30, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 2743094
Ethylbenzene	µg/L	8	0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01
Naphthalene	µg/L	7	0.12	<0.12
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		83
4-Bromofluorobenzene	% Recovery	70-130		116
Chrysene-d12	% Recovery	50-130		93

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

s53- Leachate Volatile Organic Compounds in Water

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Sep 30, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2743178
Vinyl Chloride	µg/L	600	1.70	<1.70
Methylene Chloride	µg/L	100	3.00	<3.00
Benzene	µg/L	100	2.00	<2.00
Toluene	µg/L	0.8	2.00	13
Ethylbenzene	µg/L	8	1.00	<1.00
1,4-Dichlorobenzene	µg/L	4	1.00	<1.00
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		75
4-Bromofluorobenzene	% Recovery	70-130		87

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

2743178 Dilution factor= 10
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

Brooks Landfill - s53 Storm Water Parameters

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Oct 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 2743094
Alkalinity (as CaCO3)	µg/L		5000	206000
Ammonia as N	µg/L		20	180
BOD (5)	µg/L		5000	<5000
Chemical Oxygen Demand	µg/L		5000	33000
Chloride	µg/L		100	13900
Electrical Conductivity	uS/cm		2	692
Nitrate as N	µg/L		50	<50
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	8.34
Phenols	µg/L	1.0	1	<1
Sulphate	µg/L		100	233000
Total Dissolved Solids	µg/L		20000	532000
Total Hardness (as CaCO3)	µg/L		500	390000
Total Kjeldahl Nitrogen	µg/L		100	700
Total Phosphorus	µg/L	20	20	80
Total Suspended Solids	µg/L		10000	27500
Arsenic	µg/L	100	3.0	<3.0
Barium	µg/L		2.0	75.5
Boron	µg/L	200	10.0	346
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0
Copper	µg/L	5	0.80	1.23
Iron	µg/L	300	10.0	239
Lead	µg/L	5	1.0	<1.0
Dissolved Mercury	µg/L		0.1	<0.1
Zinc	µg/L	30	5.0	18.9

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By:

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AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

Brooks Landfill - Leachate Parameters - (PWQO)

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Oct 03, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 2743178
Alkalinity (as CaCO3)	µg/L		5000	2550000
Ammonia as N	µg/L		20	165000
BOD (5)	µg/L		5000	540000
Calcium	µg/L		50	238000
Chemical Oxygen Demand	µg/L		5000	1350000
Chloride	µg/L		100	1150000
Electrical Conductivity	uS/cm		2	6200
Dissolved Organic Carbon	µg/L		500	412000
Total Hardness (as CaCO3)	µg/L		500	2040000
Nitrate as N	µg/L		50	<50
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	7.90
Phenols	µg/L	1.0	1	766
Potassium	µg/L		50	246000
Sulphate	µg/L		100	220000
Total Dissolved Solids	µg/L		20000	4580000
Total Kjeldahl Nitrogen	µg/L		100	229000
Total Phosphorus	µg/L	20	20	4880
Total Suspended Solids	µg/L		10000	6510000
Arsenic	µg/L	100	3.0	56.1
Barium	µg/L		2.0	234
Boron	µg/L	200	10.0	10500
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	76.6
Copper	µg/L	5	0.80	17.4
Iron	µg/L	300	10.0	6950
Lead	µg/L	5	1.0	4.1
Magnesium	µg/L		50	351000
Dissolved Mercury	µg/L		0.1	<0.1
Sodium	µg/L		50	821000
Zinc	µg/L	30	5.0	101
% Difference/ Ion Balance	%		NA	Error

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 11T533039
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

Brooks Landfill - Leachate Parameters - (PWQO)

DATE SAMPLED: Sep 26, 2011	DATE RECEIVED: Sep 27, 2011	DATE REPORTED: Oct 03, 2011	SAMPLE TYPE: Water

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

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Guideline Violation

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

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CLIENT NAME: GENIVAR

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2743094	TDS Pond	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Boron	200	346
2743094	TDS Pond	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Total Phosphorus	20	80
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Boron	200	10500
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Chromium	8.9	76.6
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Copper	5	17.4
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Iron	300	6950
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Phenols	1.0	766
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Total Phosphorus	20	4880
2743178	Leachate	PWQO.	Brooks Landfill - Leachate Parameters - (PWQO)	Zinc	30	101
2743178	Leachate	PWQO.	s53- Leachate Volatile Organic Compounds in Water	Toluene	0.8	13

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53 Stormwater (PWQO) - Organics															
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	71%	60%	130%	114%	60%	130%	95%	60%	130%
Benzo(a)pyrene	1					< 0.01	100%	60%	140%	100%	60%	140%		60%	140%
Naphthalene	1					< 0.12	103%	60%	140%	100%	60%	140%		60%	140%
s53 Leachate - Benzo(a)pyrene and Naphthalene															
Naphthalene	1					< 0.12	100%	60%	140%	100%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	103%	60%	140%	100%	90%	110%		60%	140%
s53- Leachate Volatile Organic Compounds in Water															
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	102%	50%	140%	115%	50%	140%	123%	50%	140%
Methylene Chloride	1		< 0.30	< 0.30	0.0%	< 0.30	105%	50%	140%	107%	60%	130%	108%	50%	140%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	88%	50%	140%	114%	60%	130%	101%	50%	140%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	84%	50%	140%	106%	60%	130%	106%	50%	140%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	71%	50%	140%	95%	60%	130%	95%	50%	140%
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	84%	50%	140%	94%	60%	130%	86%	50%	140%

Certified By: Jordy Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - s53 Storm Water Parameters															
Alkalinity (as CaCO3)	1		25000	25000	0.0%	< 5000	99%	80%	120%						
Ammonia as N	1		80	70	13.3%	< 20	99%	90%	110%	94%	90%	110%	103%	80%	120%
BOD (5)	1	2743094	< 5000	< 5000	0.0%	< 5000	90%	75%	125%						
Chemical Oxygen Demand	1		60900	58400	4.2%	< 5000	91%	90%	110%	100%	90%	110%	90%	70%	130%
Chloride	1		21300	21100	0.9%	< 100	94%	90%	110%	94%	90%	110%	100%	80%	120%
Electrical Conductivity	1		353	352	0.3%	< 2	101%	80%	120%						
Nitrate as N	1		< 50	< 50	0.0%	< 50	91%	90%	110%	103%	90%	110%	103%	80%	120%
Nitrite as N	1		< 50	< 50	0.0%	< 50	NA	90%	110%	94%	90%	110%	108%	80%	120%
pH	1		7.52	7.54	0.3%		100%	90%	110%						
Phenols	1		< 1	< 1	0.0%	< 1	101%	90%	110%	97%	90%	110%	96%	80%	120%
Sulphate	1		332000	328000	1.2%	< 100	104%	90%	110%	97%	90%	110%	97%	80%	120%
Total Dissolved Solids	1		550000	550000	0.0%	< 20000	100%	80%	120%						
Total Kjeldahl Nitrogen	1		1420	1390	2.1%	< 100	103%	80%	120%	102%	80%	120%	106%	70%	130%
Total Phosphorus	1		326	322	1.2%	< 20	100%	90%	110%	96%	90%	110%	104%	80%	120%
Total Suspended Solids	1		86000	89000	3.4%	< 10000	98%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	98%	90%	110%	101%	90%	110%	105%	70%	130%
Barium	1		75.4	74.6	1.1%	< 2.0	99%	90%	110%	102%	90%	110%	105%	70%	130%
Boron	1		138	142	2.9%	< 10.0	105%	90%	110%	102%	90%	110%	107%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	95%	90%	110%	97%	90%	110%	99%	70%	130%
Chromium	1		< 3.0	< 3.0	0.0%	< 3.0	106%	90%	110%	108%	90%	110%	105%	70%	130%
Copper	1		2.57	2.54	1.2%	< 0.80	105%	90%	110%	110%	90%	110%	109%	70%	130%
Iron	1		378	368	2.7%	< 10.0	90%	90%	110%	109%	90%	110%	101%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	103%	90%	110%	107%	90%	110%	105%	70%	130%
Dissolved Mercury	1		< 0.1	< 0.1	0.0%	< 0.1	98%	90%	110%	104%	90%	110%	99%	70%	130%
Zinc	1		14.8	14.5	2.0%	< 5.0	100%	90%	110%	105%	90%	110%	103%	70%	130%
Brooks Landfill - Leachate Parameters - (PWQO)															
Dissolved Organic Carbon	1		1400	1400	0.0%	< 500	99%	90%	110%	100%	90%	110%	94%	80%	120%
Potassium	1	2743094	5560	5640	1.4%	< 50	101%	90%	110%	100%	90%	110%	103%	70%	130%
Sodium	1	2743094	23400	22100	5.7%	< 50	99%	90%	110%	100%	90%	110%	100%	70%	130%

Certified By:

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG 5505	EPA SW-846 3510C & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Naphthalene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chrysene-d12	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T533039

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
% Difference/ Ion Balance		SM 1030 E	CALCULATION

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1.9
AGAT WO #: 11T533039
Lab Temperature: 1.0
Notes:

Client Information:
Company: GENIVAR INC.
Contact: Bailey Walters
Address: 1425 Cormorant Road
Ancaster ON
Phone: 289-239-0100 Fax: 289-239-0109
Project: 111-53338-00 PO: 111-53338-00 · 0064012 100
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ____ (Indicate one)
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region ____ (Indicate one)
☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (specify)
☑ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☐ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☑ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
*TAT is exclusive of weekends and statutory holidays

Invoice To:
Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☐ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: Bailey Walters
Email: bailey.walters@genivar.com
2. Name:
Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ NO2/NO3 ☐ N-Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH3 ☐ TKN ☐ NO3 ☐ NO2 ☐ NO2/NO3	VOC: ☐ VOC ☐ THM ☑ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	✓ S53 Leachate	✓ S53 Storm
TDS Pond	Sept 26/11		SW	17																	✓		
Leachate.	Sept 26/11		Leachate	12																		✓	

Samples Relinquished by (print name & sign): Matt Welch — Date/Time
Samples Relinquished by (print name & sign): — Date/Time
Samples Received by (Print name & sign): 09/27/11 — Date/Time 1240
Samples Received by (Print name & sign): — Date/Time 2735

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page ____ of ____
NO: 160970

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

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CLIENT NAME: GENIVAR
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: BAILEY WALTERS

PROJECT NO: Brooks Rd Landfill

AGAT WORK ORDER: 11T558674

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Dec 16, 2011

PAGES (INCLUDING COVER): 17

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

PAHs in Water

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 3002598
Naphthalene	µg/L		0.12	<0.12
Acenaphthylene	µg/L		0.11	<0.11
Acenaphthene	µg/L		0.10	<0.10
Fluorene	µg/L		0.09	0.10
Phenanthrene	µg/L		0.10	0.13
Anthracene	µg/L		0.05	<0.05
Fluoranthene	µg/L		0.12	<0.12
Pyrene	µg/L		0.05	<0.05
Benzo(a)anthracene	µg/L		0.08	<0.08
Chrysene	µg/L		0.05	<0.05
Benzo(b)fluoranthene	µg/L		0.05	<0.05
Benzo(k)fluoranthene	µg/L		0.05	<0.05
Benzo(a)pyrene	µg/L		0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.06	<0.06
Dibenzo(a,h)anthracene	µg/L		0.09	<0.09
Benzo(g,h,i)perylene	µg/L		0.06	<0.06
2-and 1-methyl Napthalene	µg/L		0.20	0.47
Surrogate	**Unit**	**Acceptable Limits**		
Chrysene-d12	%	60-130		71

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

3002598 Note: The result for Benzo(b)Flouranthene is the total of the Benzo(b)&(j)Flouranthene isomers because the isomers co-elute on the GC column.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

Volatile Organic Compounds in Water

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 3002598
Dichlorodifluoromethane	µg/L		0.20	<0.20
Chloromethane	µg/L		0.40	<0.40
Vinyl Chloride	µg/L		0.17	<0.17
Bromomethane	µg/L		0.20	<0.20
Chloroethane	µg/L		0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40
Acetone	µg/L		1.0	190
1,1 Dichloroethylene	µg/L		0.30	<0.30
Methylene Chloride	µg/L		0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20
Chloroform	µg/L		0.20	<0.20
1,2 - Dichloroethane	µg/L		0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20
Benzene	µg/L		0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20
Trichloroethylene	µg/L		0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20
Toluene	µg/L		0.20	<0.20
2-Hexanone	µg/L		0.30	<0.30
Dibromochloromethane	µg/L		0.10	<0.10
Ethylene Dibromide	µg/L		0.10	<0.10
Tetrachloroethylene	µg/L		0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

Volatile Organic Compounds in Water

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 3002598
Ethylbenzene	µg/L		0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20
Bromoform	µg/L		0.10	<0.10
Styrene	µg/L		0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10
o-Xylene	µg/L		0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30
Xylene Mixture (Total)	µg/L		0.20	<0.20
n-Hexane	µg/L		0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		117
4-Bromofluorobenzene	% Recovery	70-130		119

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

s53 Leachate - Benzo(a)pyrene and Naphthalene

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 3002662	misc pond 3002675
Naphthalene	µg/L	7	0.12	0.49	<0.12
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01
Surrogate	**Unit**	**Acceptable Limits**			
Chrysene-d12	%	60-130		95	65

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

s53- Leachate Volatile Organic Compounds in Water

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 3002662	RDL	misc pond 3002675
Vinyl Chloride	µg/L		0.68	<0.68	0.17	<0.17
Methylene Chloride	µg/L		1.2	<1.2	0.30	<0.30
Benzene	µg/L		0.80	0.97	0.20	<0.20
Toluene	µg/L		0.80	<0.80	0.20	<0.20
Ethylbenzene	µg/L		0.40	<0.40	0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.40	<0.40	0.10	<0.10
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	60-130		113		111
4-Bromofluorobenzene	% Recovery	70-130		113		119

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

3002662 Dilution factor=4
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

Brooks Landfill - S53 Leachate Parameters - (PWQO)

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	misc pond 3002675
Alkalinity (as CaCO3)	µg/L		5000	234000
Ammonia as N	µg/L		20	26
Ammonia-Un-ionized	µg/L	0.02	20	<20
BOD (5)	µg/L		5000	<5000
Chemical Oxygen Demand	µg/L		5000	25300
Chloride	µg/L		100	4880
Electrical Conductivity	uS/cm		2	558
Dissolved Organic Carbon	µg/L		500	12200
Total Hardness (as CaCO3)	µg/L		500	294000
Nitrate as N	µg/L		50	<50
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	8.16
Phenols	µg/L	1.0	1	<1
Sulphate	µg/L		100	74600
Total Dissolved Solids	µg/L		20000	156000
Total Kjeldahl Nitrogen	µg/L		100	580
Total Phosphorus	µg/L		20	29
Total Suspended Solids	µg/L		10000	<10000
Arsenic	µg/L	100	3.0	<3.0
Barium	µg/L		2.0	53.8
Boron	µg/L	200	10.0	73.0
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0
Copper	µg/L	5	0.80	1.46
Iron	µg/L	300	10.0	224
Lead	µg/L	5	1.0	<1.0
Dissolved Mercury	µg/L		0.1	<0.1
Zinc	µg/L	30	5.0	<5.0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Tony Nash

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

Brooks Landfill - S53 Leachate Parameters - (PWQO)

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Leachate 3002662
Alkalinity (as CaCO3)	µg/L		5000	2270000
Ammonia as N	µg/L		20	166000
Ammonia-Un-ionized	µg/L	0.02	20	8880
BOD (5)	µg/L		5000	163000
Chemical Oxygen Demand	µg/L		5000	807000
Chloride	µg/L		1000	1000000
Electrical Conductivity	uS/cm		2	6600
Dissolved Organic Carbon	µg/L		500	288000
Total Hardness (as CaCO3)	µg/L		500	1960000
Nitrate as N	µg/L		500	<500
Nitrite as N	µg/L		500	<500
pH	pH Units	6.5-8.5	NA	8.04
Phenols	µg/L	1.0	1	344
Sulphate	µg/L		1000	408000
Total Dissolved Solids	µg/L		20000	4960000
Total Kjeldahl Nitrogen	µg/L		100	196000
Total Phosphorus	µg/L		20	1705
Total Suspended Solids	µg/L		10000	154000
Arsenic	µg/L	100	3.0	55.5
Barium	µg/L		2.0	265
Boron	µg/L	200	100	14100
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	51.8
Copper	µg/L	5	0.80	11.3
Iron	µg/L	300	10.0	5360
Lead	µg/L	5	1.0	6.0
Dissolved Mercury	µg/L		0.1	<0.1
Zinc	µg/L	30	5.0	94.9

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Tony Nash

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Certificate of Analysis

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

CLIENT NAME: GENIVAR

ATTENTION TO: BAILEY WALTERS

Brooks Landfill - Storm Water S53 Parameters - (PWQO)

DATE SAMPLED: Dec 12, 2011 | DATE RECEIVED: Dec 13, 2011 | DATE REPORTED: Dec 16, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	TDS Pond 3002598
Alkalinity (as CaCO3)	µg/L		5000	137000
Ammonia as N	µg/L		20	282
Ammonia-Un-ionized	µg/L	0.02	20	<20
BOD (5)	µg/L		5000	<5000
Chemical Oxygen Demand	µg/L		5000	27500
Chloride	µg/L		100	15400
Electrical Conductivity	uS/cm		2	887
Total Hardness (as CaCO3)	µg/L		500	443000
Nitrate as N	µg/L		50	297
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	7.95
Phenols	µg/L	1.0	1	<1
Sulphate	µg/L		100	350000
Total Dissolved Solids	µg/L		20000	654000
Total Kjeldahl Nitrogen	µg/L		100	1090
Total Phosphorus	µg/L		20	34
Total Suspended Solids	µg/L		10000	<10000
Arsenic	µg/L	100	3.0	<3.0
Barium	µg/L		2.0	47.1
Boron	µg/L	200	10.0	370
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0
Copper	µg/L	5	0.80	2.54
Iron	µg/L	300	10.0	154
Lead	µg/L	5	1.0	<1.0
Dissolved Mercury	µg/L		0.1	<0.1
Zinc	µg/L	30	5.0	65.3

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Tony Nash

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Guideline Violation

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

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SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
3002598	TDS Pond	PWQO.	Brooks Landfill - Storm Water S53 Parameters - (PWQO)	Boron	200	370
3002598	TDS Pond	PWQO.	Brooks Landfill - Storm Water S53 Parameters - (PWQO)	Zinc	30	65.3
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Ammonia-Un-ionized	0.02	8880
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Boron	200	14100
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Chromium	8.9	51.8
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Copper	5	11.3
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Iron	300	5360
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Lead	5	6.0
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Phenols	1.0	344
3002662	Leachate	PWQO.	Brooks Landfill - S53 Leachate Parameters - (PWQO)	Zinc	30	94.9

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Quality Assurance

CLIENT NAME: GENIVAR
AGAT WORK ORDER: 11T558674
PROJECT NO: Brooks Rd Landfill
ATTENTION TO: BAILEY WALTERS

Trace Organics Analysis

RPT Date: Dec 16, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53- Leachate Volatile Organic Compounds in Water															
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	99%	60%	130%	87%	60%	130%	75%	60%	130%
Methylene Chloride	1		< 0.3	< 0.3	0.0%	< 0.3	115%	60%	140%	110%	140%	140%	91%	60%	140%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	111%	60%	130%	99%	60%	130%	114%	60%	130%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	103%	60%	130%	83%	60%	130%	94%	60%	130%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	100%	60%	130%	79%	60%	130%	92%	60%	130%
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	103%	60%	130%	83%	60%	130%	82%	60%	130%
PAHs in Water															
Naphthalene	1					< 0.12	99%	60%	140%	92%	60%	140%		60%	140%
Acenaphthylene	1					< 0.11	99%	60%	140%	90%	60%	140%		60%	140%
Acenaphthene	1					< 0.10	102%	60%	140%	93%	60%	140%		60%	140%
Fluorene	1					< 0.09	100%	60%	140%	95%	60%	140%		60%	140%
Phenanthrene	1					< 0.10	97%	60%	140%	97%	60%	140%		60%	140%
Anthracene	1					< 0.05	95%	60%	140%	93%	60%	140%		60%	140%
Fluoranthene	1					< 0.12	91%	60%	140%	97%	60%	140%		60%	140%
Pyrene	1					< 0.05	92%	60%	140%	95%	60%	140%		60%	140%
Benzo(a)anthracene	1					< 0.08	103%	60%	140%	106%	60%	140%		60%	140%
Chrysene	1					< 0.05	96%	60%	140%	98%	60%	140%		60%	140%
Benzo(b)fluoranthene	1					< 0.05	96%	60%	140%	94%	60%	140%		60%	140%
Benzo(k)fluoranthene	1					< 0.05	101%	60%	140%	98%	60%	140%		60%	140%
Benzo(a)pyrene	1					< 0.01	102%	60%	140%	87%	60%	140%		60%	140%
Indeno(1,2,3-cd)pyrene	1					< 0.06	108%	60%	140%	97%	60%	140%		60%	140%
Dibenzo(a,h)anthracene	1					< 0.09	99%	60%	140%	88%	60%	140%		60%	140%
Benzo(g,h,i)perylene	1					< 0.06	98%	60%	140%	84%	60%	140%		60%	140%
2-and 1-methyl Napthalene	1					< 0.20	103%	60%	140%	91%	140%	140%		60%	140%
Volatile Organic Compounds in Water															
Dichlorodifluoromethane	1		< 0.20	< 0.20	0.0%	< 0.20	83%	60%	130%	75%	60%	130%	83%	60%	130%
Chloromethane	1		< 0.40	< 0.40	0.0%	< 0.40	81%	60%	130%	101%	60%	130%	75%	60%	130%
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	99%	60%	130%	87%	60%	130%	75%	60%	130%
Bromomethane	1		< 0.20	< 0.20	0.0%	< 0.20	74%	60%	130%	77%	60%	130%	70%	60%	130%
Chloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	82%	60%	130%	106%	60%	130%
Trichlorofluoromethane	1		< 0.40	< 0.40	0.0%	< 0.40	115%	60%	130%	118%	60%	130%	111%	60%	130%
Acetone	1		< 1.0	< 1.0	0.0%	< 1.0	109%	60%	130%	109%	60%	130%	103%	60%	130%
1,1 Dichloroethylene	1		< 0.30	< 0.30	0.0%	< 0.30	117%	60%	130%	106%	60%	130%	107%	60%	130%
Methylene Chloride	1		< 0.30	< 0.30	0.0%	< 0.30	115%	60%	130%	117%	60%	130%	71%	60%	130%
trans- 1,2-dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	88%	60%	130%	116%	60%	130%	113%	60%	130%
Methyl tert-butyl ether	1		< 0.20	< 0.20	0.0%	< 0.20	105%	60%	130%	105%	60%	130%	115%	60%	130%
1,1-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	113%	60%	130%	101%	60%	130%	113%	60%	130%
Methyl Ethyl Ketone	1		< 1.0	< 1.0	0.0%	< 1.0	90%	60%	130%	103%	60%	130%	105%	60%	130%

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

ATTENTION TO: BAILEY WALTERS

Trace Organics Analysis (Continued)

RPT Date: Dec 16, 2011

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
cis- 1,2-Dichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	86%	60%	130%	96%	60%	130%	112%	60%	130%
Chloroform	1		< 0.20	< 0.20	0.0%	< 0.20	106%	60%	130%	105%	60%	130%	114%	60%	130%
1,2 - Dichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	103%	60%	130%	98%	60%	130%	102%	60%	130%
1,1,1-Trichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	110%	60%	130%	96%	60%	130%	113%	60%	130%
Carbon Tetrachloride	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	100%	60%	130%	116%	60%	130%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	111%	60%	130%	99%	60%	130%	114%	60%	130%
1,2-Dichloropropane	1		< 0.20	< 0.20	0.0%	< 0.20	110%	60%	130%	102%	60%	130%	111%	60%	130%
Trichloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	108%	60%	130%	102%	60%	130%	113%	60%	130%
Bromodichloromethane	1		< 0.20	< 0.20	0.0%	< 0.20	113%	60%	130%	104%	60%	130%	109%	60%	130%
cis-1,3-Dichloropropene	1		< 0.20	< 0.20	0.0%	< 0.20	117%	60%	130%	97%	60%	130%	101%	60%	130%
Methyl Isobutyl Ketone	1		< 1.0	< 1.0	0.0%	< 1.0	87%	60%	130%	102%	60%	130%	106%	60%	130%
trans-1,3-Dichloropropene	1		< 0.30	< 0.30	0.0%	< 0.30	100%	60%	130%	88%	60%	130%	86%	60%	130%
1,1,2-Trichloroethane	1		< 0.20	< 0.20	0.0%	< 0.20	100%	60%	130%	91%	60%	130%	90%	60%	130%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	103%	60%	130%	83%	60%	130%	94%	60%	130%
2-Hexanone	1		< 0.30	< 0.30	0.0%	< 0.30	79%	60%	130%	103%	60%	130%	107%	60%	130%
Dibromochloromethane	1		< 0.10	< 0.10	0.0%	< 0.10	108%	60%	130%	85%	60%	130%	86%	60%	130%
Ethylene Dibromide	1		< 0.10	< 0.10	0.0%	< 0.10	113%	60%	130%	85%	60%	130%	90%	60%	130%
Tetrachloroethylene	1		< 0.20	< 0.20	0.0%	< 0.20	110%	60%	130%	89%	60%	130%	96%	60%	130%
1,1,1,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10		60%	130%	88%	60%	130%	95%	60%	130%
Chlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	105%	60%	130%	82%	60%	130%	90%	60%	130%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	100%	60%	130%	79%	60%	130%	92%	60%	130%
m & p-Xylene	1		< 0.20	< 0.20	0.0%	< 0.20	112%	60%	130%	92%	60%	130%	92%	60%	130%
Bromoform	1		< 0.10	< 0.10	0.0%	< 0.10	113%	60%	130%	80%	60%	130%	83%	60%	130%
Styrene	1		< 0.10	< 0.10	0.0%	< 0.10	100%	60%	130%	71%	60%	130%	87%	60%	130%
1,1,2,2-Tetrachloroethane	1		< 0.10	< 0.10	0.0%	< 0.10	114%	60%	130%	86%	60%	130%	86%	60%	130%
o-Xylene	1		< 0.10	< 0.10	0.0%	< 0.10	108%	60%	130%	87%	60%	130%	86%	60%	130%
1,3-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	106%	60%	130%	83%	60%	130%	87%	60%	130%
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	103%	60%	130%	83%	60%	130%	82%	60%	130%
1,2-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	110%	60%	130%	85%	60%	130%	83%	60%	130%
1,2,4-Trichlorobenzene	1		< 0.30	< 0.30	0.0%	< 0.30	98%	60%	130%	104%	60%	130%	77%	60%	130%
1,3-Dichloropropene (Cis + Trans)	1		< 0.30	< 0.30	0.0%	< 0.30	100%	60%	130%	88%	60%	130%	86%	60%	130%
Xylene Mixture (Total)	1		< 0.20	< 0.20	0.0%	< 0.20	110%	60%	130%	90%	60%	130%	89%	60%	130%
n-Hexane	1		< 0.20	< 0.20	0.0%	< 0.20		60%	130%	70%	60%	130%	75%	60%	130%

Certified By:

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Quality Assurance

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

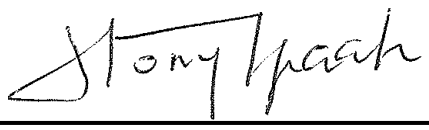
ATTENTION TO: BAILEY WALTERS

Water Analysis

RPT Date: Dec 16, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - Storm Water S53 Parameters - (PWQO)															
Alkalinity (as CaCO3)	1	3002598	137000	137000	0.0%	< 5000	99%	80%	120%						
Ammonia as N	1		0.08	0.07	13.3%	< 20	97%	90%	110%	94%	90%	110%	115%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	93%	75%	125%						
Chemical Oxygen Demand	1		9330	8390	10.6%	< 5000	105%	90%	110%	93%	90%	110%	105%	70%	130%
Chloride	1		85400	83800	1.9%	< 100	100%	90%	110%	106%	90%	110%	105%	80%	120%
Electrical Conductivity	1	3002598	887	884	0.3%	< 2	100%	80%	120%						
Nitrate as N	1		< 50	< 50	0.0%	< 50	94%	90%	110%	92%	90%	110%	101%	80%	120%
Nitrite as N	1		< 50	< 50	0.0%	< 50	NA	90%	110%	91%	90%	110%	103%	80%	120%
pH	1	3002598	7.95	8.02	0.9%		100%	80%	120%						
Phenols	1	3002598	< 1	< 1	0.0%	< 1	101%	90%	110%	96%	90%	110%	95%	80%	120%
Sulphate	1		463000	458000	1.1%	< 100	99%	90%	110%	101%	90%	110%	88%	80%	120%
Total Dissolved Solids	1		494000	516000	4.4%	< 20000	106%	80%	120%						
Total Kjeldahl Nitrogen	1		8020	8080	0.7%	< 100	103%	80%	120%	104%	80%	120%	97%	70%	130%
Total Phosphorus	1		0.03	0.02	NA	< 20	100%	90%	110%	100%	90%	110%	99%	80%	120%
Total Suspended Solids	1		< 10000	< 10000	0.0%	< 10000	94%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	99%	90%	110%	NA	90%	110%	118%	70%	130%
Barium	1		13.3	12.5	6.2%	< 2.0	103%	90%	110%	100%	90%	110%	99%	70%	130%
Boron	1		225	232	3.1%	< 10.0	110%	90%	110%	110%	90%	110%	114%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	100%	90%	110%	108%	90%	110%	109%	70%	130%
Chromium	1		< 3.0	< 3.0	0.0%	< 3.0	103%	90%	110%	108%	90%	110%	110%	70%	130%
Copper	1		1.30	1.42	8.8%	< 0.80	106%	90%	110%	108%	90%	110%	103%	70%	130%
Iron	1		104	117	11.8%	< 10.0	109%	90%	110%	105%	90%	110%	101%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	99%	90%	110%	108%	90%	110%	99%	70%	130%
Dissolved Mercury	1		< 0.1	< 0.1	0.0%	< 0.1	104%	90%	110%	107%	90%	110%	98%	80%	120%
Zinc	1		< 5.0	< 5.0	0.0%	< 5.0	99%	90%	110%	104%	90%	110%	105%	70%	130%

Comments: Please note that as per the Analytical Protocol, up to 10% of analytes in a multielement scan for lab control standards and matrix spike may exceed the quoted limits by up to 10% absolute and the spike is deemed acceptable.

Certified By:



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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

ATTENTION TO: BAILEY WALTERS

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Napthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1 Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2 - Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

ATTENTION TO: BAILEY WALTERS

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG 5505	EPA SW-846 3510C & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL 5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

ATTENTION TO: BAILEY WALTERS

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE

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Method Summary

CLIENT NAME: GENIVAR

AGAT WORK ORDER: 11T558674

PROJECT NO: Brooks Rd Landfill

ATTENTION TO: BAILEY WALTERS

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

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3x med, ~~1x 5m~~

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 4.0
AGAT WO #: 11T558674
Lab Temperature: 4.4.3.5, ~~3.9~~
Notes:

Client Information:
Company: Genivar
Contact: Bailey Walters
Address: 1425 Cormorant Rd Suite300
Ancaster, ON L9G 4V5
Phone: 2892390100 Fax: 2892390109
Project: Books Rd Landfl. PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ____ *Indicate one*
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture *(check one)* ☐ Coarse ☐ Fine

☐ Sewer Use
Region ____ *Indicate one*
☐ Sanitary ☐ Storm

☐ Regulation 558 ☐ CCME ☐ Other *(specify)* ____
☐ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☐ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply (no surcharge as per agreement)
☑ 3 Working Days
☐ 2 Working Days → except BOD (5-day)
☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
**TAT is exclusive of weekends and statutory holidays*

Invoice To:
Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the *Drinking Water Chain of Custody Form*

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Legend Matrix
GW Ground Water **O** Oil
SW Surface Water **P** Paint
SD Sediment **S** Soil

Report Information – reports to be sent to:
1. Name: Bailey Walters
Email: Bailey.Walters@genivar.com
2. Name: Rachel Bryan
Email: rachel.bryan@genivar.com

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ NO_2/NO_3 ☐ N-Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_2	VOC: ☐ VOC ☐ THM ☐ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	553 Leachate	553 Stormwater
TDS Pond	Dec 12/11	12:57pm	SW	13	49 DBS03																✓	✓
Leachate	"	2:13pm	GW	14	40 DBS03																✓	
Misc pond	"	1:30pm			41 DBS03 add filter additive																	

Samples Relinquished by (print name & sign): Ryan Unrau Ryan Unrau Dec 12/11 Date/Time 3:50pm
Samples Relinquished by (print name & sign): Date/Time
Samples Received by (Print name & sign): [signature] Date/Time Dec 12 3:50
Samples Received by (Print name & sign): [signature] Date/Time Dec 13 9:00

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page 1 of 1
NO: 163190

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

Table I-1 Supplemental Water Quality Sampling Results
Compliance Monitoring Program
Brooks Road Landfill, Haldimand County, Ontario

Parameter			s53 Trigger Parameters		Standard/ Guideline		Sample Location	S2-S	SWc3 (New Cell)	SWc4 (Holding Pond)	SW10	Seep	SW9	S2-N	SWc3	SWC4	SWC4
							Sampling Date	2011/08/02	2011/08/26	2011/08/26	2011/07/07	2011/07/04	2011/07/04	2011/09/26	2011/08/26	2011/08/26	2011/09/26
	Parameter Suite	Units	Value	*Type*	Value	*Type*		s53 Stormwater	s53 Stormwater	s53 Stormwater	s53 Stormwater	s53 Stormwater	s53 Stormwater	s53 Stormwater	s53 Stormwater	s53 Stormwater	s53 Stormwater
General																	
	Alkalinity (CaCO3)	µg/L			Note	PWQO		87000	52200	73200	148000	466000	175000	8000	52200	73200	130000
	Biological Oxygen Demand (BOD5)	µg/L						<5000	14000	13000	<5000	<5000	<5000	8000	14000	13000	<5000
	Chemical Oxygen Demand (COD)	µg/L						17900	36500	72000	30900	17400	24700	49400	36500	72000	57900
	Chloride	µg/L						17700	8580	21600	756	13400	18500	12200	8580	21600	21300
	Conductivity	µS/cm						731	458	691	259	993	807	618	458	691	730
	Hardness (as CaCO3)	µg/L							201000	311000	148000	494000	372000	347000	201000	311000	381000
	Nitrate (as N)	µg/L			2930	CCME		<50	312	<50	<50	249	<50	154	312	<50	<50
	Nitrite (as N)	µg/L			18	CCME		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	pH		6.5-8.5	Limit	6.5-8.5	PWQO		8.45	8	8.4	**9.31**	8.23	8.45	8.28	8	8.4	8.3
	Phenol	µg/L			1	PWQO		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Sulphates	µg/L						294000	185000	289000	7320	99200	258000	326000	185000	289000	332000
	Total Dissolved Solids (TDS)	µg/L						478000	374000	602000	162000	606000	564000	550000	374000	602000	612000
	Total Kjeldahl Nitrogen (TKN)	µg/L						1020	3590	3400				1960	3590	3400	1420
	Total Suspended Solids (TSS)	µg/L	25000	Limit				66000	174	51	17500	50000	10000	86000	174000	51000	35500
Metals																	
	Arsenic	µg/L			5	IPWQO		<3.0	<3.0	4.2	<3.0	<3.0	<3.0	<3.0	<3.0	4.2	<3.0
	Barium	µg/L						43.8	48.8	54.8	11.8	100	75.8	86.8	48.8	54.8	64
	Boron	µg/L	1500	Limit	200	IPWQO		**978**	**278**	**854**	67.5	**1330**	**1310**	**366**	**278**	**854**	**715**
	Cadmium	µg/L			0.5	IPWQO		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chromium	µg/L						<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	Copper	µg/L			5	PWQO		**5.69**	3.93	2.76	1.13	4	4.1	3.96	3.93	2.76	2.93
	Iron	µg/L	4350	Limit	300	PWQO		168	**705**	142	**323**	**7210**	277	**844**	**705**	142	**678**
	Lead	µg/L			5	IPWQO		<1.0	2.1	<1.0	<1.0	3.6	<1.0	1.3	2.1	<1.0	<1.0
	Mercury	µg/L			0.2	PWQO		<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.1
	Zinc	µg/L	110	Limit	20	IPWQO		**223**	**280**	**43.7**	19	**21.8**	7.5	6.7	**280**	**43.7**	**37.8**
VOCs																	
	Ethylbenzene	µg/L			8	IPWQO		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Toluene	µg/L	0.8	Limit	0.8	IPWQO											
PAHs																	
	Naphthalene	µg/L	7	Limit	7	IPWQO		<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12

Notes:

PWQO	Ontario Provincial Water Quality Objective (1999 and updates)
IPWQO	Interim Ontario Provincial Water Quality Objectives
CCME	Canadian Council of Ministers of the Environment Canadian Water Quality Guideline for the Protection of Aquatic Life
<blank>	Not Analysed
<	Parameter concentration is less than laboratory detection limit
25	Highlighting indicates that parameter concentration exceeds referenced standard

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T507455

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Elizabeth Polakowska, MSc (Animal Sci), PhD (Agri Sci), Inorganic Lab Supervisor

DATE REPORTED: Jul 11, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T507455

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

s53 Stormwater (PWQO) - Organics

DATE SAMPLED: Jul 04, 2011 | DATE RECEIVED: Jul 05, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Seep 2520729	SW9 2520735
Ethylbenzene	µg/L		0.10	<0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01
Naphthalene	µg/L		0.12	<0.12	<0.12
Surrogate	**Unit**	**Acceptable Limits**			
Toluene-d8	% Recovery	60-130		93	89
4-Bromofluorobenzene	% Recovery	70-130		88	83
Chrysene-d12	% Recovery	50-130		80	72

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

2520729-2520735 Dilution factor=
The sample was diluted to keep the target compounds in the calibration range of the instrument and avoid contaminating the Purge and Trap system. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 11T507455
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - SW,GW, Leachate & S53 Parameters

DATE SAMPLED: Jul 04, 2011 | DATE RECEIVED: Jul 05, 2011 | DATE REPORTED: Jul 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Seep 2520729	SW9 2520735
Alkalinity (as CaCO3)	µg/L		5000	466000	175000
Ammonia as N	µg/L		20	3350	<20
Ammonia-Un-ionized	µg/L	0.02	20	394	<20
BOD (5)	µg/L		5000	<5000	<5000
Chemical Oxygen Demand	µg/L		5000	17400	24700
Chloride	µg/L		100	13400	18500
Electrical Conductivity	uS/cm		2	993	807
Total Hardness (as CaCO3)	µg/L		500	494000	372000
Nitrate as N	µg/L		50	249	<50
Nitrite as N	µg/L		50	<50	<50
pH	pH Units	6.5-8.5	NA	8.23	8.45
Phenols	µg/L	1.0	1	<1	<1
Sulphate	µg/L		100	99200	258000
Total Dissolved Solids	µg/L		20000	606000	564000
Total Phosphorus	µg/L	20	20	49	195
Total Suspended Solids	µg/L		10000	50000	10000
Arsenic	µg/L	100	3.0	<3.0	<3.0
Barium	µg/L		2.0	100	75.8
Boron	µg/L	200	10.0	1330	1310
Cadmium	µg/L	0.2	0.10	<0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0	<3.0
Copper	µg/L	5	0.80	4.00	4.10
Iron	µg/L	300	10.0	7210	277
Lead	µg/L	5	1.0	3.6	<1.0
Mercury	µg/L	0.2	0.05	<0.05	<0.05
Zinc	µg/L	30	5.0	21.8	7.5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.
2520729-2520735 Note: The calculation of un-ionized ammonia has been done using the pH and temperature measured in the lab at the time of analyses. The field parameters were not provided.

Certified By: Elizabeth Rolokowska

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Guideline Violation

AGAT WORK ORDER: 11T507455

PROJECT NO: 111-53338-00

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ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2520729	Seep	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Ammonia-Un-ionized	0.02	394
2520729	Seep	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Boron	200	1330
2520729	Seep	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Iron	300	7210
2520729	Seep	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Total Phosphorus	20	49
2520735	SW9	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Boron	200	1310
2520735	SW9	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Total Phosphorus	20	195

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507455

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date: Jul 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53 Stormwater (PWQO) - Organics															
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	93%	60%	130%	82%	60%	130%	77%	60%	130%
Benzo(a)pyrene	1					< 0.01	123%	60%	140%	124%	60%	140%		60%	140%
Naphthalene	1					< 0.12	101%	60%	140%	93%	60%	140%		60%	140%

Certified By: Jacky Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507455

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - SW,GW, Leachate & S53 Parameters															
Alkalinity (as CaCO3)	1		557000	561000	0.7%	< 5000	102%	80%	120%						
Ammonia as N	1		134	138	2.9%	< 20	102%	90%	110%	94%	90%	110%	97%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	96%	75%	125%						
Chemical Oxygen Demand	1		28200	26600	5.8%	< 5000	90%	90%	110%	92%	90%	110%	116%	70%	130%
Chloride	1		28300	28300	0.0%	< 100	97%	90%	110%	96%	90%	110%	104%	85%	115%
Electrical Conductivity	1		747	746	0.1%	< 2	102%	80%	120%						
Nitrate as N	1		< 50	< 50	0.0%	< 50	92%	90%	110%	97%	90%	110%	100%	85%	115%
Nitrite as N	1		< 50	< 50	0.0%	< 50	NA	90%	110%	107%	90%	110%	117%	80%	120%
pH	1		7.47	7.25	3.0%	NA	100%	90%	110%						
Phenols	1		< 1	< 1	0.0%	< 1	96%	90%	110%	94%	90%	110%	100%	80%	120%
Sulphate	1		2770	2850	2.8%	< 100	93%	90%	110%	94%	90%	110%	96%	85%	115%
Total Dissolved Solids	1	2520729	606000	564000	7.2%	< 20000	94%	80%	120%						
Total Phosphorus	1		43	43	0.0%	< 20	99%	90%	110%	105%	90%	110%	98%	70%	130%
Total Suspended Solids	1		< 10000	< 10000	0.0%	< 10000	108%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	99%	90%	110%	109%	90%	110%	102%	70%	130%
Barium	1		59.5	59.2	0.5%	< 2.0	102%	90%	110%	107%	90%	110%	103%	70%	130%
Boron	1		303	303	0.0%	< 10.0	100%	90%	110%	101%	90%	110%	95%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	93%	90%	110%	108%	90%	110%	109%	70%	130%
Chromium	1		2.9	3.0	3.4%	< 3.0	103%	90%	110%	111%	80%	120%	112%	70%	130%
Copper	1		1.7	1.6	6.1%	< 0.80	109%	90%	110%	110%	90%	110%	112%	70%	130%
Iron	1		287	294	2.4%	< 10.0	110%	90%	110%	104%	90%	110%	101%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	99%	90%	110%	109%	90%	110%	104%	70%	130%
Mercury	1		< 0.05	< 0.05	0.0%	< 0.05	95%	90%	110%	96%	90%	110%	96%	80%	120%
Zinc	1		18.5	18.1	2.2%	< 5.0	102%	90%	110%	110%	90%	110%	113%	70%	130%

Certified By: Elizabeth Pololowska

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T507455

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Naphthalene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chrysene-d12	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	TITRATION
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

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CHAIN OF CUSTODY RECORD

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LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 5.8 · AGAT WO #: 11T507455
Notes:

Client Information

Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St.
Brantford, ON
Phone: 519-756-9422 Fax:
Project: 111-53338-60 PO: 111-53338-00
AGAT Quotation #:
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? (Yes)/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:

1. Name: Matthew Welsh
Email: Matthew.welsh@genivar.com
2. Name: William Sutton
Email: William.Sutton@brookfieldrandall.com

Regulatory Requirements

☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (Indicate) ____
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (Potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes", please use "Drinking Water Chain of Custody Record")

Report Format

☑ Single Sample per page
☐ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*

Regular TAT:
☐ 5 to 7 Working Days

Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☑ 3 to 5 Working Days
☑ 2 Working Days
☑ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):

*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, CrVI)	CCME Fractions 1 to 4	VOCs Full	PAHs Full	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	S53 Stormwater	LAB SAMPLE ID
TDS Pond	July 4/11		SW	12	2d. TAT				✓	✓						✓	
Seep	↓		↓	12	3-5d TAT											✓	
SW9				12	↓											✓	

Samples Relinquished By (print name & sign): Matthew
Date/Time: July 5/11
Samples Received By (print name & sign): Joe 7/5/11
Date/Time: 2:30P

Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign): Joe 7/5/11
Date/Time: 7:06P

Pink Copy - Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of 1
NO: 155042

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CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: MATTHEW WELSH

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T508737

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 18, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T508737

PROJECT NO: 111-53338-00

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CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

s53 Stormwater (PWQO) - Organics

DATE SAMPLED: Jul 07, 2011 | DATE RECEIVED: Jul 08, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW10 2529798
Ethylbenzene	µg/L	8	0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01
Naphthalene	µg/L	7	0.12	<0.12
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		87
4-Bromofluorobenzene	% Recovery	70-130		79
Chrysene-d12	% Recovery	50-130		103

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

2529798 Dilution factor=
The sample was diluted to keep the target compounds in the calibration range of the instrument and avoid contaminating the Purge and Trap system. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T508737
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

Brooks Landfill - SW,GW, Leachate & S53 Parameters

DATE SAMPLED: Jul 07, 2011 | DATE RECEIVED: Jul 08, 2011 | DATE REPORTED: Jul 18, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SW10 2529798
Alkalinity (as CaCO3)	µg/L		5000	148000
Ammonia as N	µg/L		20	<20
Ammonia-Un-ionized	µg/L	0.02	20	<20
BOD (5)	µg/L		5000	<5000
Chemical Oxygen Demand	µg/L		5000	30900
Chloride	µg/L		100	756
Electrical Conductivity	uS/cm		2	259
Total Hardness (as CaCO3)	µg/L		500	148000
Nitrate as N	µg/L		50	<50
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	9.31
Phenols	µg/L	1.0	1	<1
Sulphate	µg/L		100	7320
Total Dissolved Solids	µg/L		20000	162000
Total Phosphorus	µg/L	20	20	43
Total Suspended Solids	µg/L		10000	17500
Arsenic	µg/L	100	3.0	<3.0
Barium	µg/L		2.0	11.8
Boron	µg/L	200	10.0	67.5
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0
Copper	µg/L	5	0.80	1.13
Iron	µg/L	300	10.0	323
Lead	µg/L	5	1.0	<1.0
Mercury	µg/L	0.2	0.05	<0.05
Zinc	µg/L	30	5.0	19.0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 11T508737

PROJECT NO: 111-53338-00

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CLIENT NAME: GENIVAR INC

ATTENTION TO: MATTHEW WELSH

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2529798	SW10	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Iron	300	323
2529798	SW10	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	Total Phosphorus	20	43
2529798	SW10	PWQO.	Brooks Landfill - SW,GW, Leachate & S53 Parameters	pH	6.5-8.5	9.31

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508737

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Trace Organics Analysis

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53 Stormwater (PWQO) - Organics															
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	74%	60%	130%	73%	60%	130%	78%	60%	130%
Benzo(a)pyrene	1					< 0.01	101%	60%	140%	83%	60%	140%		60%	140%
Naphthalene	1					< 0.12	102%	60%	140%	94%	60%	140%		60%	140%

Certified By: Jacky Takeuchi

AGAT Laboratories

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508737

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

Water Analysis

RPT Date: Jul 18, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - SW,GW, Leachate & S53 Parameters															
Alkalinity (as CaCO3)	1		589	545	7.8%	< 5000	100%	80%	120%						
Ammonia as N	1		< 20	< 20	0.0%	< 20	100%	90%	110%	97%	90%	110%	96%	80%	120%
BOD (5)	1	2529798	< 5000	< 5000	0.0%	< 5000	95%	75%	125%						
Chemical Oxygen Demand	1		< 5000	< 5000	0.0%	< 5000	99%	90%	110%	92%	90%	110%	112%	70%	130%
Chloride	1		11600	11600	0.0%	< 100	97%	90%	110%	97%	90%	110%	100%	80%	120%
Electrical Conductivity	1		4170	4160	0.2%	< 2	98%	80%	120%						
Nitrate as N	1		152	158	3.9%	< 50	90%	90%	110%	97%	90%	110%	95%	80%	120%
Nitrite as N	1		< 50	< 50	0.0%	< 50	NA	90%	110%	90%	90%	110%	90%	80%	120%
pH	1		7.75	7.75	0.0%	NA	102%	90%	110%						
Phenols	1	2529798	< 1	< 1	0.0%	< 1	103%	90%	110%	102%	90%	110%	94%	80%	120%
Sulphate	1		173000	173000	0.0%	< 100	95%	90%	110%	98%	90%	110%	97%	80%	120%
Total Dissolved Solids	1		290000	290000	0.0%	< 20000	94%	80%	120%						
Total Phosphorus	1		< 20	< 20	0.0%	< 20	104%	90%	110%	103%	90%	110%	102%	80%	120%
Total Suspended Solids	1		< 10000	< 10000	0.0%	< 10000	102%	80%	120%						
Arsenic	1	2529798	< 3.0	< 3.0	0.0%	< 3.0	100%	90%	110%	106%	90%	110%	105%	70%	130%
Barium	1	2529798	11.8	11.9	0.8%	< 2.0	97%	90%	110%	111%	80%	120%	103%	70%	130%
Boron	1	2529798	67.5	68.4	1.3%	< 10.0	101%	90%	110%	103%	90%	110%	102%	70%	130%
Cadmium	1	2529798	< 0.10	< 0.10	0.0%	< 0.10	93%	90%	110%	102%	90%	110%	107%	70%	130%
Chromium	1	2529798	< 3.0	< 3.0	0.0%	< 3.0	101%	90%	110%	103%	90%	110%	106%	70%	130%
Copper	1	2529798	1.13	1.14	0.9%	< 0.80	106%	90%	110%	109%	90%	110%	116%	70%	130%
Iron	1	2529798	323	345	6.6%	< 10.0	107%	90%	110%	102%	90%	110%	109%	70%	130%
Lead	1	2529798	< 1.0	< 1.0	0.0%	< 1.0	98%	90%	110%	106%	90%	110%	107%	70%	130%
Mercury	1		< 0.05	< 0.05	0.0%	< 0.05	94%	90%	110%	101%	90%	110%	98%	80%	120%
Zinc	1	2529798	19.0	19.2	1.0%	< 5.0	100%	90%	110%	111%	80%	120%	102%	70%	130%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T508737

PROJECT NO: 111-53338-00

ATTENTION TO: MATTHEW WELSH

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Naphthalene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chrysene-d12	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N		QuikChem 10-107-06-1-J & SM 4500 NH3-H	LACHAT FIA
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

AGAT Laboratories 9.3

CHAIN OF CUSTODY RECORD

5835 Coopers Avenue
Mississauga, Ontario; L4Z 1Y2
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LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 6.7 AGAT WO #: 11T508737
Notes:

Client Information

Company: Genivar Inc.
Contact: Matt Welsh
Address: 110 Colborne St.
Brantford, ON
Phone: 519-756-9422 Fax:
Project: 111-53338-00 PO: 111-53338-00
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:

1. Name: Matt Welsh
Email: Matthew.welsh@genivar.com
2. Name: Bailey Walters
Email: bailey.walters@genivar.com

Regulatory Requirements

☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ____
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*

Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (exclud. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	SS Storm					LABORATORY USE ONLY LAB SAMPLE ID
SW10	July 7/11		Sw	12												✓					

Samples Relinquished By (print name & sign): [signature] Date/Time: July 8/11
Samples Relinquished By (print name & sign): Date/Time:
Samples Received By (print name & sign): Joe 7/8/11 Date/Time: 2:30P
Samples Received By (print name & sign): Joe 7/8/11 Date/Time: 6:03

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE 1 of ____
NO: 155045

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FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: Bailey Walters

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T515849

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Aug 11, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

VERSION 2:Jan 06, 2011: This is a revision of a previous report issued on Aug 11, 2011.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T515849
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

s53 Stormwater (PWQO) - Organics

DATE SAMPLED: Aug 02, 2011 | DATE RECEIVED: Aug 03, 2011 | DATE REPORTED: Aug 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	S2-S 2588721
Ethylbenzene	µg/L	8	0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01
Naphthalene	µg/L	7	0.12	<0.12
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		101
4-Bromofluorobenzene	% Recovery	70-130		86
Chrysene-d12	% Recovery	50-130		76

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T515849
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

Brooks Landfill Storm Water Parameters

DATE SAMPLED: Aug 02, 2011 | DATE RECEIVED: Aug 03, 2011 | DATE REPORTED: Aug 11, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	S2-S 2588721
Alkalinity (as CaCO3)	µg/L		5000	87000
Ammonia as N	µg/L		20	<20
Ammonia-Un-ionized	µg/L	0.02	20	<20
BOD (5)	µg/L		5000	<5000
Chemical Oxygen Demand	µg/L		5000	17900
Chloride	µg/L		100	17700
Electrical Conductivity	uS/cm		2	731
Nitrate as N	µg/L		50	<50
Nitrite as N	µg/L		50	<50
pH	pH Units	6.5-8.5	NA	8.45
Phenols	µg/L	1.0	1	<1
Sulphate	µg/L		100	294000
Total Dissolved Solids	µg/L		20000	478000
Total Kjeldahl Nitrogen	µg/L		100	1020
Total Phosphorus	µg/L		20	70
Total Suspended Solids	µg/L		10000	66000
Arsenic	µg/L	100	3.0	<3.0
Barium	µg/L		2.0	43.8
Boron	µg/L	200	10.0	978
Cadmium	µg/L	0.2	0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0
Copper	µg/L	5	0.80	5.69
Iron	µg/L	300	10.0	168
Lead	µg/L	5	1.0	<1.0
Dissolved Mercury	µg/L		0.1	<0.1
Zinc	µg/L	30	5.0	223
Phenols	mg/L	1	0.001	<0.001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Tony Nash

AGAT Laboratories

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Guideline Violation

AGAT WORK ORDER: 11T515849

PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2588721	S2-S	PWQO.	Brooks Landfill Storm Water Parameters	Boron	200	978
2588721	S2-S	PWQO.	Brooks Landfill Storm Water Parameters	Copper	5	5.69
2588721	S2-S	PWQO.	Brooks Landfill Storm Water Parameters	Zinc	30	223

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T515849

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Trace Organics Analysis

RPT Date: Aug 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53 Stormwater (PWQO) - Organics															
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	100%	60%	130%	95%	60%	130%	108%	60%	130%
Benzo(a)pyrene	1					< 0.01	94%	60%	140%	91%	60%	140%		60%	140%
Naphthalene	1					< 0.12	104%	60%	140%	98%	60%	140%		60%	140%

Certified By:

AGAT Laboratories

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T515849

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date: Aug 11, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill Storm Water Parameters															
Alkalinity (as CaCO3)	1		69	63	9.1%	< 5000	101%	80%	120%						
Ammonia as N	1		0.025	0.026	3.9%	< 20	101%	90%	110%	100%	90%	110%	105%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	95%	75%	125%						
Chemical Oxygen Demand	1		40200	39600	1.5%	< 5000	101%	90%	110%	97%	90%	110%	112%	70%	130%
Chloride	1		85900	86400	0.6%	< 100	98%	90%	110%	101%	90%	110%	111%	80%	120%
Electrical Conductivity	1		2490	2490	0.0%	< 2	102%	80%	120%						
Nitrate as N	1		< 50	< 50	0.0%	< 50	94%	90%	110%	99%	90%	110%	98%	70%	130%
Nitrite as N	1		< 50	< 50	0.0%	< 50	NA	90%	110%	93%	90%	110%	118%	80%	120%
pH	1		7.87	7.90	0.4%	NA	102%	90%	110%						
Phenols	1		< 1	< 1	0.0%	< 1	102%	90%	110%	101%	90%	110%	94%	80%	120%
Sulphate	1		11800	11700	0.9%	< 100	97%	90%	110%	95%	90%	110%	100%	80%	120%
Total Dissolved Solids	1	2588721	478000	472000	1.3%	< 20000	94%	80%	120%						
Total Kjeldahl Nitrogen	1		< 100	< 100	0.0%	< 100	101%	80%	120%	106%	80%	120%	107%	70%	130%
Total Phosphorus	1		< 20	< 20	0.0%	< 20	98%	90%	110%	98%	90%	110%	94%	80%	120%
Total Suspended Solids	1	2588721	66000	69000	4.4%	< 10000	98%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	103%	90%	110%	105%	90%	110%	110%	70%	130%
Barium	1		16.9	17.6	4.1%	< 2.0	97%	90%	110%	97%	80%	120%	99%	70%	130%
Boron	1		18.9	19.4	2.6%	< 10.0	93%	90%	110%	98%	90%	110%	92%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	96%	90%	110%	113%	80%	120%	100%	70%	130%
Chromium	1		< 3.0	< 3.0	0.0%	< 3.0	101%	90%	110%	106%	90%	110%	105%	70%	130%
Copper	1		1.61	1.62	0.6%	< 0.80	100%	90%	110%	104%	90%	110%	104%	70%	130%
Iron	1		< 10.0	< 10.0	0.0%	< 10.0	96%	90%	110%	92%	90%	110%	107%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	95%	90%	110%	102%	90%	110%	100%	70%	130%
Dissolved Mercury	1		< 0.1	< 0.1	0.0%	< 0.1	100%	90%	110%	97%	90%	110%	104%	70%	130%
Zinc	1		< 5.0	< 5.0	0.0%	< 5.0	95%	90%	110%	96%	90%	110%	99%	70%	130%
Phenols	1		< 0.001	< 0.001	0.0%	< 0.001	102%	90%	110%	101%	90%	110%	94%	80%	120%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T515849

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Naphthalene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chrysene-d12	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

8.3. 1 medium cooler

AGAT Laboratories

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Toll free: 800-856-6261
www.agatlabs.com
http://webearth.agatlabs.com

CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 7-8. AGAT WO #: 11T515849
Notes:

Client Information
Company: Genivar Inc.
Contact: Bailey Walters
Address: 110 California St. Brantford, ON
Phone: 519-756-9424 Fax:
Project: 111-53338-00 PO: 111-53338-00 110d
AGAT Quotation #: 11-312 0069014
Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)
Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:
1. Name: Bailey Walters
Email: bailey.walters@genivar.com
2. Name: Bill Sutton
Email: william.sutton@brookscroad.ca

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*
Regular TAT:
☑ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☐ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Regulatory Requirements
☐ Regulation 153 Table ___ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☐ Sewer Use Region ___ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ___
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If "Yes" please use the Drinking Water Chain of Custody Record)

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (excl. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	SS3 Storm				LABORATORY USE ONLY LAB SAMPLE ID
S2-S	2-Aug-11		SW	12												✓				

Samples Relinquished By (print name & sign): [signature]
Date/Time: 3-Aug-11
Samples Relinquished By (print name & sign):
Date/Time:
Samples Received By (print name & sign): Joe 8/3/11
Date/Time: 11:01a
Samples Received By (print name & sign): Joe 8/3/11.
Date/Time: 4:00p

Pink Copy – Client
Yellow + Golden Copy - AGAT
White Copy - AGAT

PAGE ___ of ___
NO:149057

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GENIVAR INC
110 COLBORNE STREET
BRANTFORD, ON N9T2G6

ATTENTION TO: Bailey Walters

PROJECT NO: 111-53338-00-64014

AGAT WORK ORDER: 11T523470

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Sep 02, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T523470

PROJECT NO: 111-53338-00-64014

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

s53 Stormwater (PWQO) - Organics

DATE SAMPLED: Aug 26, 2011 | DATE RECEIVED: Aug 29, 2011 | DATE REPORTED: Sep 02, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SWc3 (New Cell) 2658690	SWc4 (Holding Pond) 2658824
Ethylbenzene	µg/L	8	0.10	<0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01
Naphthalene	µg/L	7	0.12	<0.12	<0.12
Surrogate	**Unit**	**Acceptable Limits**			
Toluene-d8	% Recovery	60-130		101	97
4-Bromofluorobenzene	% Recovery	70-130		89	98
Chrysene-d12	% Recovery	50-130		54	70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

2658690-2658824 Dilution factor=
The sample was diluted to keep the target compounds in the calibration range of the instrument and avoid contaminating the Purge and Trap system. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 11T523470
PROJECT NO: 111-53338-00-64014

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)

DATE SAMPLED: Aug 26, 2011 | DATE RECEIVED: Aug 29, 2011 | DATE REPORTED: Sep 02, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	SWc3 (New Cell) 2658690	SWc4 (Holding Pond) 2658824
Alkalinity (as CaCO3)	µg/L		5000	52200	73200
Ammonia as N	µg/L		20	136	113
BOD (5)	µg/L		5000	14000	13000
Calcium	µg/L		50	37800	45700
Chemical Oxygen Demand	µg/L		5000	36500	72000
Chloride	µg/L		100	8580	21600
Electrical Conductivity	uS/cm		2	458	691
Total Hardness (as CaCO3)	µg/L		500	201000	311000
Nitrate as N	µg/L		50	312	<50
Nitrite as N	µg/L		50	<50	<50
pH	pH Units	6.5-8.5	NA	8.00	8.40
Phenols	µg/L	1.0	1	<1	<1
Sulphate	µg/L		100	185000	289000
Total Dissolved Solids	µg/L		20000	374000	602000
Total Kjeldahl Nitrogen	µg/L		100	3590	3400
Total Phosphorus	µg/L	20	20	270	219
Total Suspended Solids	µg/L		10000	174000	51000
Arsenic	µg/L	100	3.0	<3.0	4.2
Barium	µg/L		2.0	48.8	54.8
Boron	µg/L	200	10.0	278	854
Cadmium	µg/L	0.2	0.10	<0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0	<3.0
Copper	µg/L	5	0.80	3.93	2.76
Iron	µg/L	300	10.0	705	142
Lead	µg/L	5	1.0	2.1	<1.0
Magnesium	µg/L		50	25900	47700
Dissolved Mercury	µg/L		0.1	<0.1	<0.1
Mercury	µg/L	0.2	0.05	<0.05	<0.05
Zinc	µg/L	30	5.0	280	43.7

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 11T523470

PROJECT NO: 111-53338-00-64014

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CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2658690	SWc3 (New Cell)	PWQO.	GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)	Boron	200	278
2658690	SWc3 (New Cell)	PWQO.	GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)	Iron	300	705
2658690	SWc3 (New Cell)	PWQO.	GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	270
2658690	SWc3 (New Cell)	PWQO.	GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)	Zinc	30	280
2658824	SWc4 (Holding Pond)	PWQO.	GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)	Boron	200	854
2658824	SWc4 (Holding Pond)	PWQO.	GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)	Total Phosphorus	20	219
2658824	SWc4 (Holding Pond)	PWQO.	GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)	Zinc	30	43.7

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T523470

PROJECT NO: 111-53338-00-64014

ATTENTION TO: Bailey Walters

Trace Organics Analysis

RPT Date: Sep 02, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53 Stormwater (PWQO) - Organics															
Benzo(a)pyrene	1					< 0.01	105%	60%	130%	97%	60%	130%		60%	130%
Naphthalene	1					< 0.12	95%	60%	130%	94%	60%	130%		60%	130%

Certified By: Jordy Takeuchi

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T523470

PROJECT NO: 111-53338-00-64014

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date: Sep 02, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
GENIVAR - Brooks Landfill - SW S53 Parameters - (PWQO) (µg/L)															
Alkalinity (as CaCO3)	1		287000	287000	0.0%	< 5000	100%	80%	120%						
Ammonia as N	1		< 20	< 20	0.0%	< 20	93%	90%	110%	91%	90%	110%	80%	80%	120%
BOD (5)	1	2658690	14000	14000	0.0%	< 5000	96%	75%	125%						
Calcium	1		69100	69800	1.0%	< 50	97%	90%	110%	97%	90%	110%	97%	70%	130%
Chemical Oxygen Demand	1		33500	33500	0.0%	< 5000	105%	90%	110%	101%	90%	110%	113%	70%	130%
Chloride	1		16400	16500	0.6%	< 100	94%	90%	110%	97%	90%	110%	116%	80%	120%
Electrical Conductivity	1		1310	1330	1.5%	< 2	100%	80%	120%						
Nitrate as N	1		1000	935	6.7%	< 50	90%	90%	110%	100%	90%	110%	97%	80%	120%
Nitrite as N	1		< 50	< 50	0.0%	< 50	NA	90%	110%	105%	90%	110%	114%	80%	120%
pH	1		7.87	7.87	0.0%		100%	90%	110%						
Phenols	1		< 1	< 1	0.0%	< 1	104%	90%	110%	100%	90%	110%	98%	80%	120%
Sulphate	1		45100	45100	0.0%	< 100	92%	90%	110%	99%	90%	110%	91%	80%	120%
Total Dissolved Solids	1	2658690	370000	350000	5.6%	< 20000	102%	80%	120%						
Total Kjeldahl Nitrogen	1		1360	1430	5.0%	< 100	101%	80%	120%	97%	80%	120%	101%	70%	130%
Total Phosphorus	1		507	535	5.4%	< 20	107%	90%	110%	104%	90%	110%	113%	80%	120%
Total Suspended Solids	1		< 10000	< 10000	0.0%	< 10000	98%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	103%	90%	110%	105%	90%	110%	110%	70%	130%
Barium	1		10.2	9.9	3.0%	< 2.0	102%	90%	110%	106%	90%	110%	109%	70%	130%
Boron	1		< 10.0	< 10.0	0.0%	< 10.0	104%	90%	110%	104%	90%	110%	101%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	94%	90%	110%	105%	90%	110%	110%	70%	130%
Chromium	1		< 3.0	< 3.0	0.0%	< 3.0	97%	90%	110%	108%	90%	110%	100%	70%	130%
Copper	1		1.20	1.15	4.3%	< 0.80	98%	90%	110%	99%	90%	110%	102%	70%	130%
Iron	1		286	278	2.8%	< 10.0	102%	90%	110%	93%	90%	110%	101%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	111%	80%	120%	103%	90%	110%	109%	70%	130%
Magnesium	1		33400	33500	0.3%	< 50	98%	90%	110%	98%	90%	110%	98%	70%	130%
Dissolved Mercury	1		< 0.1	< 0.1	0.0%	< 0.1	98%	90%	110%	98%	90%	110%	109%	70%	130%
Zinc	1		9.4	9.3	1.1%	< 5.0	102%	90%	110%	106%	90%	110%	105%	70%	130%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T523470

PROJECT NO: 111-53338-00-64014

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Naphthalene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chrysene-d12	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Magnesium	MET-93-6105	EPA SW 846-6010C & 200.7	ICP/OES
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

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CHAIN OF CUSTODY RECORD

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LABORATORY USE ONLY
Arrival Condition: ☐ Good ☐ Poor (complete "notes")
Arrival Temperature: 5.9 AGAT WO #: 11T523470
Notes:

Client Information

Company: Genivar
Contact: Bailey Walters
Address: 110 Colborne St
Brantford ON
Phone: 289-239-0160 Fax:
Project: 11-53338-00-64014
AGAT Quotation #: 11-312

Please note, if quotation number is not provided, client will be billed full price for analysis.

Invoice To Same as Above? Yes/No (circle)

Company:
Contact:
Address:
Phone: Fax:

Report Information - reports to be sent to:

1. Name: Bailey Walters
Email:
2. Name:
Email:

Regulatory Requirements

☐ Regulation 153 Table ____ (Indicate one) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Med/Fine
☐ Sewer Use Region ____ (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (indicate) ____
☑ Prov. Water Quality Objectives (PWQO)
☐ Nutrient Management Act (NMA)

Is this a drinking water sample (potable water intended for human consumption)? ☐ Yes ☐ No (If Yes, please use the Drinking Water Chain of Custody Record)

Report Format

☐ Single Sample per page
☐ Multiple Samples per page
☐ Results by fax

Turnaround Time (TAT) Required*

Regular TAT: ☐ 5 to 7 Working Days
Rush TAT: (please provide prior notification)
Rush Surcharges Apply
☑ 3 to 5 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
DATE REQUIRED (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/ Sample Information	Metals and Inorganics	Metal Scan (excl. Hg, B, Cr6)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	TCLP Metals/Inorganics	TCLP	Storm Sewer Use	Sanitary Sewer Use	553 Storm water per Quatre				LAB SAMPLE ID
SWC3 (new cell)	26 Aug 11	11 AM	SW													✓				
SWC4 (Holding Pond)	26 Aug 11	11 AM	SW													✓				

LABORATORY USE ONLY

Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time
B. Walters Bailey Walters	29 Aug 11	[signature] 29/11	15:50
Samples Relinquished By (print name & sign)	Date/Time	Samples Received By (print name & sign)	Date/Time
			12:52

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PAGE 1 of 1
NO: 155197

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CLIENT NAME: GENIVAR INC
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: Bailey Walters

PROJECT NO: 111-53338-00

AGAT WORK ORDER: 11T533040

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Oct 04, 2011

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T533040
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

s53 Stormwater (PWQO) - Organics

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Oct 04, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	S2-N 2742694	SWC4 2742751
Ethylbenzene	µg/L	8	0.10	<0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01
Naphthalene	µg/L	7	0.12	<0.12	<0.12
Surrogate	**Unit**	**Acceptable Limits**			
Toluene-d8	% Recovery	60-130		81	81
4-Bromofluorobenzene	% Recovery	70-130		92	88
Chrysene-d12	% Recovery	50-130		98	94

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By: Jordy Takewaki

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T533040
PROJECT NO: 111-53338-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

Brooks Landfill - s53 Storm Water Parameters

DATE SAMPLED: Sep 26, 2011 | DATE RECEIVED: Sep 27, 2011 | DATE REPORTED: Oct 04, 2011 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	S2-N 2742694	SWC4 2742751
Alkalinity (as CaCO3)	µg/L		5000	8000	130000
Ammonia as N	µg/L		20	220	100
Ammonia-Un-ionized	µg/L	0.02	20	20	<20
BOD (5)	µg/L		5000	8000	<5000
Chemical Oxygen Demand	µg/L		5000	49400	57900
Chloride	µg/L		100	12200	21300
Electrical Conductivity	uS/cm		2	618	730
Nitrate as N	µg/L		50	154	<50
Nitrite as N	µg/L		50	<50	<50
pH	pH Units	6.5-8.5	NA	8.28	8.30
Phenols	µg/L	1.0	1	<1	<1
Sulphate	µg/L		100	326000	332000
Total Dissolved Solids	µg/L		20000	550000	612000
Total Hardness (as CaCO3)	µg/L		500	347000	381000
Total Kjeldahl Nitrogen	µg/L		100	1960	1420
Total Phosphorus	µg/L	20	20	230	100
Total Suspended Solids	µg/L		10000	86000	35500
Arsenic	µg/L	100	3.0	<3.0	<3.0
Barium	µg/L		2.0	86.8	64.0
Boron	µg/L	200	10.0	366	715
Cadmium	µg/L	0.2	0.10	<0.10	<0.10
Chromium	µg/L	8.9	3.0	<3.0	<3.0
Copper	µg/L	5	0.80	3.96	2.93
Iron	µg/L	300	10.0	844	678
Lead	µg/L	5	1.0	1.3	<1.0
Dissolved Mercury	µg/L		0.1	<0.1	<0.1
Zinc	µg/L	30	5.0	6.7	37.8

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 11T533040

PROJECT NO: 111-53338-00

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CANADA L4Z 1Y2
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CLIENT NAME: GENIVAR INC

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2742694	S2-N	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Ammonia-Un-ionized	0.02	20
2742694	S2-N	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Boron	200	366
2742694	S2-N	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Iron	300	844
2742694	S2-N	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Total Phosphorus	20	230
2742751	SWC4	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Boron	200	715
2742751	SWC4	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Iron	300	678
2742751	SWC4	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Total Phosphorus	20	100
2742751	SWC4	PWQO.	Brooks Landfill - s53 Storm Water Parameters	Zinc	30	37.8

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T533040

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Trace Organics Analysis

RPT Date: Oct 04, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
s53 Stormwater (PWQO) - Organics															
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	71%	60%	130%	114%	60%	130%	95%	60%	130%
Benzo(a)pyrene	1					< 0.01	100%	60%	140%	100%	60%	140%		60%	140%
Naphthalene	1					< 0.12	103%	60%	140%	100%	60%	140%		60%	140%

Certified By: Jordy Takeuchi

AGAT Laboratories

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T533040

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date: Oct 04, 2011

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill - s53 Storm Water Parameters															
Alkalinity (as CaCO3)	1		25000	25000	0.0%	< 5000	99%	80%	120%						
Ammonia as N	1		80	70	13.3%	< 20	99%	90%	110%	94%	90%	110%	103%	80%	120%
BOD (5)	1		< 5000	< 5000	0.0%	< 5000	90%	75%	125%						
Chemical Oxygen Demand	1		60900	58400	4.2%	< 5000	91%	90%	110%	100%	90%	110%	90%	70%	130%
Chloride	1	2742751	21300	21100	0.9%	< 100	94%	90%	110%	94%	90%	110%	103%	80%	120%
Electrical Conductivity	1		353	352	0.3%	< 2	101%	80%	120%						
Nitrate as N	1	2742751	< 50	< 50	0.0%	< 50	91%	90%	110%	103%	90%	110%	100%	70%	130%
Nitrite as N	1	2742751	< 50	< 50	0.0%	< 50	NA	90%	110%	94%	90%	110%	108%	80%	120%
pH	1		7.52	7.54	0.3%		100%	90%	110%						
Phenols	1	2742751	< 1	< 1	0.0%	< 1	101%	90%	110%	97%	90%	110%	99%	80%	120%
Sulphate	1	2742751	332000	328000	1.2%	< 100	104%	90%	110%	97%	90%	110%	97%	80%	120%
Total Dissolved Solids	1	2742694	550000	550000	0.0%	< 20000	100%	80%	120%						
Total Kjeldahl Nitrogen	1	2742751	1420	1390	2.1%	< 100	103%	80%	120%	102%	80%	120%	106%	70%	130%
Total Phosphorus	1		33	32	3.1%	< 20	100%	90%	110%	96%	90%	110%	104%	80%	120%
Total Suspended Solids	1	2742694	86000	89000	3.4%	< 10000	98%	80%	120%						
Arsenic	1		< 3.0	< 3.0	0.0%	< 3.0	98%	90%	110%	101%	90%	110%	105%	70%	130%
Barium	1		75.4	74.6	1.1%	< 2.0	99%	90%	110%	102%	90%	110%	105%	70%	130%
Boron	1		138	142	2.9%	< 10.0	105%	90%	110%	102%	90%	110%	107%	70%	130%
Cadmium	1		< 0.10	< 0.10	0.0%	< 0.10	95%	90%	110%	97%	90%	110%	110%	70%	130%
Chromium	1		< 3.0	< 3.0	0.0%	< 3.0	106%	90%	110%	108%	90%	110%	105%	70%	130%
Copper	1		2.57	2.54	1.2%	< 0.80	105%	90%	110%	112%	80%	120%	109%	70%	130%
Iron	1		378	368	2.7%	< 10.0	90%	90%	110%	109%	90%	110%	119%	70%	130%
Lead	1		< 1.0	< 1.0	0.0%	< 1.0	103%	90%	110%	111%	80%	120%	105%	70%	130%
Dissolved Mercury	1	2742694	< 0.1	< 0.1	0.0%	< 0.1	99%	90%	110%	97%	90%	110%	94%	70%	130%
Zinc	1		14.8	14.5	2.0%	< 5.0	100%	90%	110%	105%	90%	110%	103%	70%	130%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 11T533040

PROJECT NO: 111-53338-00

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Naphthalene	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chrysene-d12	ORG-91-5106	EPA SW-846 3510 & 8270	GC/MS
Water Analysis			
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Ammonia-Un-ionized		MOE REFERENCE, PWQOs Tab 2	CALCULATION
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
pH	INOR-93-6000	SM 4500 H+ B	PC TITRATE
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7 & SM 2340 B	ICP/OES
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Dissolved Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

2 coolers
1 kit
1 mixed

AGAT Laboratories

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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1.9
AGAT WO #: 11T533040
Lab Temperature: 1.0
Notes:

Client Information:
Company: GENIVAR INC.
Contact: Bailey Walters
Address: 1425 Cormorant Road Ancaster ON
Phone: 289-239-0100 Fax: 289-239-0109
Project: 111-53338-00 PO: 111-53338-00 0064012460
AGAT Quotation #: 11-312
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ____ (Indicate one)
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region ____ (Indicate one)
☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (specify)
☑ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☐ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☑ 3 Working Days ☐ 2 Working Days ☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ____
*TAT is exclusive of weekends and statutory holidays

Invoice To: Same: Yes ☐ No ☐
Company: Bailey Walters
Contact: bailey.walters@genivar.com
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☑ No
If "Yes", please use the *Drinking Water Chain of Custody Form*

Is this submission for a **Record of Site Condition**? ☐ Yes ☐ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: ____ Email: ____
2. Name: ____ Email: ____

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ NO_3/NO_2 ☐ N-Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_2 ☐ NO_3 ☐ NO_3/NO_2	VOC: ☐ VOC ☐ THM ☐ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	✓ 553 Skim
S2-N	Sept 26/11	S	SW	12																	✓
SW C4	Sept 26/11		GW	12																	

Samples Relinquished by (print name & sign): ____ Date/Time ____
Samples Relinquished by (print name & sign): ____ Date/Time ____
Samples Received by (Print name & sign): 09/27/11 Date/Time 1240
Samples Received by (Print name & sign): ____ Date/Time 235

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page ____ of ____
NO: 160969

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

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CLIENT NAME: GENIVAR INC.
1425 Cormorant Road, Suite 300
ANCASTER, ON L9G4V5

ATTENTION TO: Bailey Walters

PROJECT NO: Brooks Landfill

AGAT WORK ORDER: 12T570141

TRACE ORGANICS REVIEWED BY: Inga Kuzmina, Analytical Chemist

WATER ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Feb 02, 2012

PAGES (INCLUDING COVER): 8

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 12T570141

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR INC.

ATTENTION TO: Bailey Walters

Brooks Landfill PAHs

DATE SAMPLED: Jan 30, 2012 | DATE RECEIVED: Jan 31, 2012 | DATE REPORTED: Feb 02, 2012 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Cell 2A 3087633	Cell 2A - 2 3087712
Naphthalene	µg/L	7	0.12	0.28	0.29
Pyrene	µg/L		0.05	<0.05	<0.05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO.

3087633-3087712 Note: The result for Benzo(b)Flouranthene is the total of the Benzo(b)&(j)Flouranthene isomers because the isomers co-elute on the GC column.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 12T570141

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR INC.

ATTENTION TO: Bailey Walters

Brooks Landfill VOCs (water)

DATE SAMPLED: Jan 30, 2012 | DATE RECEIVED: Jan 31, 2012 | DATE REPORTED: Feb 02, 2012 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Cell 2A 3087633	Cell 2A - 2 3087712
1,4-Dichlorobenzene	µg/L	4	0.10	<0.10	<0.10
Benzene	µg/L	100	0.20	<0.20	<0.20
Ethylbenzene	µg/L	8	0.10	<0.10	<0.10
Dichloromethane (Methylene Chloride)	µg/L	100	0.30	<0.30	<0.30
Toluene	µg/L	0.8	0.20	0.22	0.42
Vinyl Chloride	µg/L	600	0.17	<0.17	<0.17
Surrogate	**Unit**	**Acceptable Limits**			
Toluene-d8	% Recovery	60-130		105	107
4-Bromofluorobenzene	% Recovery	70-130		96	82

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO(ug/L)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 12T570141

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR INC.

ATTENTION TO: Bailey Walters

GENIVAR - Brooks Landfill - S53 Leachate Parameters

DATE SAMPLED: Jan 30, 2012 | DATE RECEIVED: Jan 31, 2012 | DATE REPORTED: Feb 02, 2012 | SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	Cell 2A 3087633	Cell 2A - 2 3087712
BOD (5)	mg/L		5	65	63
pH	pH Units	6.5-8.5	NA	8.09	8.06
Electrical Conductivity	uS/cm		2	1180	1090
Total Dissolved Solids	mg/L		20	864	712
Total Suspended Solids	mg/L		10	57	78
Total Hardness (as CaCO3)	mg/L		10	567	494
Alkalinity (as CaCO3)	mg/L		5	239	224
Chloride	mg/L		0.10	27.9	32.8
Nitrate as N	mg/L		0.05	0.26	0.28
Nitrite as N	mg/L		0.05	<0.05	<0.05
Sulphate	mg/L		0.10	344	303
Ammonia as N	mg/L		0.02	0.90	2.00
Chemical Oxygen Demand	mg/L		5	96	100
Dissolved Organic Carbon	mg/L		0.5	46.2	46.3
Phenols	mg/L	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	mg/L		0.10	2.48	3.20
Total Phosphorus	mg/L	0.03	0.02	0.07	0.09
Arsenic	mg/L	0.1	0.003	<0.003	<0.003
Barium	mg/L		0.002	0.039	0.038
Boron	mg/L	0.20	0.010	0.415	0.377
Cadmium	mg/L	0.0002	0.0001	<0.0001	<0.0001
Chromium	mg/L		0.003	<0.003	<0.003
Copper	mg/L	0.005	0.002	0.003	0.003
Iron	mg/L	0.3	0.010	0.393	0.460
Lead	mg/L	0.005	0.001	0.001	0.002
Mercury	mg/L		0.0001	<0.0001	<0.0001
Zinc	mg/L	0.03	0.005	0.085	0.083

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO (mg/L)

Certified By: Tony Yaash

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Guideline Violation

AGAT WORK ORDER: 12T570141

PROJECT NO: Brooks Landfill

CLIENT NAME: GENIVAR INC.

ATTENTION TO: Bailey Walters

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
3087633	Cell 2A	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Boron	0.20	0.415
3087633	Cell 2A	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Iron	0.3	0.393
3087633	Cell 2A	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Total Phosphorus	0.03	0.07
3087633	Cell 2A	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Zinc	0.03	0.085
3087712	Cell 2A - 2	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Boron	0.20	0.377
3087712	Cell 2A - 2	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Iron	0.3	0.460
3087712	Cell 2A - 2	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Total Phosphorus	0.03	0.09
3087712	Cell 2A - 2	PWQO (mg/L)	GENIVAR - Brooks Landfill - S53 Leachate Parameters	Zinc	0.03	0.083

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Quality Assurance

CLIENT NAME: GENIVAR INC.

AGAT WORK ORDER: 12T570141

PROJECT NO: Brooks Landfill

ATTENTION TO: Bailey Walters

Trace Organics Analysis

RPT Date: Feb 02, 2012			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Brooks Landfill PAHs															
Naphthalene	1					< 0.12	116%	60%	140%	105%	60%	140%		60%	140%
Pyrene	1					< 0.05	110%	60%	140%	109%	60%	140%		60%	140%
Brooks Landfill VOCs (water)															
1,4-Dichlorobenzene	1		< 0.10	< 0.10	0.0%	< 0.10	102%	60%	130%	115%	60%	130%	109%	60%	130%
Benzene	1		< 0.20	< 0.20	0.0%	< 0.20	81%	60%	130%	93%	60%	130%	87%	60%	130%
Ethylbenzene	1		< 0.10	< 0.10	0.0%	< 0.10	72%	60%	130%	85%	60%	130%	106%	60%	130%
Dichloromethane (Methylene Chloride)	1		< 0.30	< 0.30	0.0%	< 0.30	96%	60%	130%	114%	60%	130%	121%	60%	130%
Toluene	1		< 0.20	< 0.20	0.0%	< 0.20	104%	60%	130%	118%	60%	130%	123%	60%	130%
Vinyl Chloride	1		< 0.17	< 0.17	0.0%	< 0.17	124%	60%	130%	116%	60%	130%	123%	60%	130%

Certified By:

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Quality Assurance

CLIENT NAME: GENIVAR INC.

AGAT WORK ORDER: 12T570141

PROJECT NO: Brooks Landfill

ATTENTION TO: Bailey Walters

Water Analysis

RPT Date: Feb 02, 2012			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
GENIVAR - Brooks Landfill - S53 Leachate Parameters															
BOD (5)	1	3087633	65	61	6.3%	< 5	108%	75%	125%						
pH	1	3087712	8.06	8.06	0.0%		100%	90%	110%						
Electrical Conductivity	1	3087712	1090	1090	0.0%	< 2	101%	80%	120%						
Total Dissolved Solids	1		3320	3540	6.4%	< 20	98%	80%	120%						
Total Suspended Solids	1		14	12	15.4%	< 10	92%	80%	120%						
Alkalinity (as CaCO3)	1	3087712	224	232	3.5%	< 5	98%	80%	120%						
Chloride	1		413	414	0.2%	< 0.10	94%	90%	110%	95%	90%	110%	98%	80%	120%
Nitrate as N	1		< 0.05	< 0.05	0.0%	< 0.05	93%	90%	110%	94%	90%	110%	97%	80%	120%
Nitrite as N	1		< 0.05	< 0.05	0.0%	< 0.05	NA	90%	110%	99%	90%	110%	89%	80%	120%
Sulphate	1		< 0.10	< 0.10	0.0%	< 0.10	92%	90%	110%	91%	90%	110%	82%	80%	120%
Ammonia as N	1		0.63	0.61	3.2%	< 0.02	101%	90%	110%	94%	90%	110%	96%	80%	120%
Chemical Oxygen Demand	1		21	21	0.0%	< 5	97%	90%	110%	93%	90%	110%	109%	70%	130%
Dissolved Organic Carbon	1	3087633	46.2	42.3	8.8%	< 0.5	98%	90%	110%	109%	90%	110%	107%	80%	120%
Phenols	1		< 0.001	< 0.001	0.0%	< 0.001	101%	90%	110%	98%	90%	110%	99%	80%	120%
Total Kjeldahl Nitrogen	1	3087633	2.48	2.40	3.3%	< 0.10	95%	80%	120%	98%	80%	120%	89%	70%	130%
Total Phosphorus	1		1.42	1.42	0.0%	< 0.02	102%	90%	110%	99%	90%	110%	104%	80%	120%
Arsenic	1	3087633	< 0.003	< 0.003	0.0%	< 0.003	107%	90%	110%	100%	90%	110%	111%	70%	130%
Barium	1	3087633	0.039	0.040	2.5%	< 0.002	100%	90%	110%	101%	90%	110%	99%	70%	130%
Boron	1	3087633	0.415	0.445	7.0%	< 0.010	99%	90%	110%	105%	90%	110%	107%	70%	130%
Cadmium	1	3087633	< 0.0001	< 0.0001	0.0%	< 0.0001	105%	90%	110%	97%	90%	110%	103%	70%	130%
Chromium	1	3087633	< 0.003	< 0.003	0.0%	< 0.003	101%	90%	110%	104%	90%	110%	97%	70%	130%
Copper	1	3087633	0.003	0.003	0.0%	< 0.002	107%	90%	110%	101%	90%	110%	101%	70%	130%
Iron	1	3087633	0.393	0.412	4.7%	< 0.010	100%	90%	110%	100%	90%	110%	96%	70%	130%
Lead	1	3087633	0.001	0.001	0.0%	< 0.001	103%	90%	110%	95%	90%	110%	97%	70%	130%
Mercury	1	3087633	< 0.0001	< 0.0001	0.0%	< 0.0001	100%	90%	110%	98%	90%	110%	102%	80%	120%
Zinc	1	3087633	0.085	0.086	1.2%	< 0.005	105%	90%	110%	102%	90%	110%	104%	70%	130%

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
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Method Summary

CLIENT NAME: GENIVAR INC.

AGAT WORK ORDER: 12T570141

PROJECT NO: Brooks Landfill

ATTENTION TO: Bailey Walters

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dichloromethane (Methylene Chloride)	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Total Hardness (as CaCO3)	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6002	AQ2 EPA-103A & SM 4500 NH3-F	AQ-2 DISCRETE ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

AGAT Laboratories

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Ph.: 905.712.5100 · Fax: 905.712.5122 · Toll Free: 800.856.6261

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1.5
AGAT WO #: 12T570141
Lab Temperature: 4.0
Notes:

Client Information:
Company: GENIVAR
Contact: 1425 Cormorant Rd.
Address: Ancaster, ON
Phone: (905) 902-8882 Fax:
Project: Brooks Landfill PO: 111-53338-00
AGAT Quotation #:
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:
☐ Regulation 153/09 (reg. 511 Amend.)
Table ___ (Indicate one)
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region ___ (Indicate one)
☐ Sanitary ☐ Storm
☐ Regulation 558 ☐ CCME ☐ Other (specify)
☑ Prov. Water Quality Objectives (PWQO) ☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☐ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days
☑ 2 Working Days
☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): ___
*TAT is exclusive of weekends and statutory holidays

Invoice To: Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☐ No
If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☐ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name: Bailey Walters
Email: bailey.walters@genivar.com
2. Name: ~~Bailey Walters~~ Saram Rahmanian
Email: saram.rahmanian@genivar.com

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information
Cell 2A	30/Jan		SW	13	
Cell 2A-2	"		SW	13	

Metals and Inorganics | Metal Scan | Hydride Forming Metals | Client Custom Metals | ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ NO_3/NO_2 ☐ N-Total ☐ Hg ☐ pH | Nutients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_3 | VOC: ☐ VOC ☐ THM ☐ BTEX | CCME Fractions 1 to 4 | ABNs | PAHs | Chlorophenols | PCBs | Organochlorine Pesticides | TCLP Metals/Inorganics | TCLP: | Sewer Use | S53 leache parameters

Samples Relinquished by (print name & sign):	Date/Time	Samples Received by (Print name & sign):	Date/Time
Saram Rahmanian	30/Jan/12 17:00		Jan 30.12 5:08
Samples Relinquished by (print name & sign):	Date/Time	Samples Received by (Print name & sign):	Date/Time

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page 1 of 1
NO: 163191

Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

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TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW1-03*											
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*5/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-19*	*GW-18235-17*	*GW-18235-01*	*GW-18235-11*	*GW-18235-13*	*GW-18235-20*	*GW-18235-18*	*GW-18235-17*	*GW-18235-10*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	**537**	**528**	**509**	483	**520**	**516**	**528**	**534/529**	490/492	**501**	450	453
Ammonia (as Nitrogen)	NV	0.09	0.08	0.05	0.12	0.13	0.08	0.05	0.13	<0.05	0.16J	<0.087 U	<0.050
Hardness (CaCO3)	80NA100	**623**	NA	NA	**655**	NA	NA	**700**	NA	NA	**700**	**717**	NA
Nitrate (N)	10	<1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1.0	<0.10
Nitrite (N)	1	<0.1	NA	NA	<0.3	NA	NA	<0.3	NA	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	1.1 U	NA	NA	0.6	NA	NA	0.3	NA	NA	1.0	<0.15	NA
Chloride (Cl)	250	28.6	16.3	16.1	15.7	16	28	27	21	24	26	51.6	31.9
Sulfates (SO4)	500	188	208	186	204	190	190	184	195	183	179	227	218
Dissolved Organic Carbon (DOC)	5	**9.2 U**	**7**	**6**	**5.3**	**5.5**	**5.3**	4.7	**5.3**	4.7	4.9	**5.7**	4.7 U
Total Dissolved Solids (TDS)	500	**762**	**864**	**859**	**724**	**826**	**800**	**855**	**786**	**712**	**760**	**868**	**856**
Total Suspended Solids (TSS)	NV	203	NA	NA	140	NA	NA	59	NA	NA	76	61	NA
PhenolNA4AAP	4.2[2]	<0.001	NA	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	0.0014	NA
Biological Oxygen Demand (BOD5)	NV	<3	NA	NA	<2	NA	NA	<2	NA	NA	<2/<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	25 U	24	19	22	18	15	15	18	11	<4	<10	31
pH (Standard Units)	6.5NA8.5	7.72	8.00	7.86	8.05	8.11	8.0	7.9	8.1/8.1	7.8/7.8	8.1	7.61	7.68
Total Phosphorus (P)	NV	0.12	NA	NA	0.113	NA	NA	0.043	NA	NA	0.05	0.081	NA
Potassium (K)	NV	4.7	NA	NA	3.5	NA	NA	3	NA	NA	3.2	<10	NA
Conductivity (umhos/cm)	NV	1,180	1,260	1,250	1,130	1,220	1,230	1,270	1,230/1,220	1,210/1,210	1,160	1,270	1,280
Calcium (Ca)	NV	180	210	200	190	200	180	190	190	180	180	186	183
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	**76**	**8.1**	**8.60**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1B-01*						*MW1B-07*			
	Collection Date	*06/07/04*	*11/29/04*	*05/09/05*	*12/01/05*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-18*	*GW-18235-25*	*GW-18235-06*	*GW-18235-06*	*GW-18235-07*	*GW-18235-06*	*GW-18235-11*	*GW-18235-02*	*GW-18235-06*	*GW-18235-31*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Alkalinity (Total as CaCO3)	30NA500	444	395	401	414	440	454	**530**	**576**	**607**	**641**
Ammonia (as Nitrogen)	NV	<0.05	<0.05	<0.05	0.07	0.29	0.13	<0.05	0.15U	0.457	0.222
Hardness (CaCO3)	80NA100	**693**	NA	NA	NA	**730**	NA	NA	**880**	**857**	NA
Nitrate (N)	10	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<1.0	<0.10
Nitrite (N)	1	<0.1	NA	NA	NA	0.02	NA	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	1.4 U	NA	NA	NA	0.6	NA	NA	2	0.56	NA
Chloride (Cl)	250	26.1	7.42	8.8	9	12	9	28	26	<20	13.5
Sulfates (SO4)	500	398	313	321	278	273	362	325	252	271	250
Dissolved Organic Carbon (DOC)	5	2.9 U	3	3.2	3.2	**8.2**	**5.2**	**11.8**	**5.9**	**10.7**	**7.9**
Total Dissolved Solids (TDS)	500	**886**	**943**	**1,180**	**1,400**	**960**	**900**	**935**	**829**	**980**	**1,020**
Total Suspended Solids (TSS)	NV	1220	NA	NA	NA	3,700	NA	NA	2,100	2270	NA
PhenolNA4AAP	4.2[2]	<0.001	NA	NA	NA	<0.001	NA	NA	<0.001	0.0062	NA
Biological Oxygen Demand (BOD5)	NV	<3	NA	NA	NA	<2	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	11 U	19	4.0	51	77	62	33	<4	29	35
pH (Standard Units)	6.5NA8.5	7.84	8.03	7.92	8.08	7.8	8.0	7.9	8.1	7.79	7.79
Total Phosphorus (P)	NV	1.01	NA	NA	NA	2.1	NA	NA	1.6	1.39	NA
Potassium (K)	NV	3.6	NA	NA	NA	2.8	NA	NA	13	<10	NA
Conductivity (umhos/cm)	NV	1,280	1,210	1,270	1,240	1,330	1,320	1,580	1,360	1,480	1,510
Calcium (Ca)	NV	180	190	180	190	190	190	130	190	134	151
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	**840**	**13.2**	**32.0**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification						*MW2-03*						
	Collection Date	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-20*	*GW-18235-19/20*	*GW-18235-02*	*GW-18235-13/14*	*GW-18235-16*	*GW-18235-16*	*GW-18235-16*	*GW-18235-15*	*GW-18235-08*	*GW-18235-19*	*GW-18235-27*	*GW-18235-26*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	429	431 / 413	399	410 / 407	396	408	428/425	442	414	413	410	417
Ammonia (as Nitrogen)	NV	<0.05	0.12 / 0.11	<0.05	0.09 / 0.12	0.11	<0.05	0.09	0.1	<0.05	0.09U	0.253 U	<0.050
Hardness (CaCO3)	80NA100	**720**	NA	NA	**685 / 666**	NA	NA	**700**	NA	NA	**710**	**695**	NA
Nitrate (N)	10	<1	<0.1 / <0.1	<0.1	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.1	0.3	0.3/0.3	<1.0	<0.10
Nitrite (N)	1	<0.1	NA	NA	<0.3 / <0.3	NA	NA	<0.3	NA	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	0.7 U	NA	NA	0.8 / 0.8	NA	NA	0.4	NA	NA	0.7U	<0.15	NA
Chloride (Cl)	250	33.1	21.9 / 18.8	19.9	22.3 / 22.8	52	70	65	57	56	53	116	98.5
Sulfates (SO4)	500	389	335 / 259	351	385 / 381	273	191	189	184	188	187	230	176
Dissolved Organic Carbon (DOC)	5	**8.5 U**	**9.7 / 8**	**6**	**5.6 / 5.3**	**6.4**	**8.5**	**7.8**	**8.2**	**8.2/8.2**	**8.1**	**8.3**	**6.4 U**
Total Dissolved Solids (TDS)	500	**861**	**1,060 / 986**	**1,000**	122 / **934**	**996**	**800**	**879**	**795**	**755**	**740**	**974**	**874**
Total Suspended Solids (TSS)	NV	443	NA	NA	3 / 650	NA	NA	170	NA	NA	150	54	NA
PhenolNA4AAP	4.2[2]	<0.001	NA	NA	<0.001 / <0.001	NA	NA	<0.001	NA	NA	<0.001	<0.0010	NA
Biological Oxygen Demand (BOD5)	NV	<3	NA	NA	<2 / <2	NA	NA	<2	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	28 U	17J / 28J	22	29/30	20	38	25	25	16	9	10	27
pH (Standard Units)	6.5NA8.5	7.7	8.05 / 7.99	7.86	7.94 / 7.97	8.08	8.1	7.9/7.9	8.1	7.8	7.9	7.65	7.74
Total Phosphorus (P)	NV	0.24	NA	NA	0.27 / 0.268	NA	NA	0.075	NA	NA	0.076	0.1	NA
Potassium (K)	NV	4.1	NA	NA	3 / 3	NA	NA	2.6	NA	NA	2.6	<10	NA
Conductivity (umhos/cm)	NV	1,290	1,340 / 1,310	1,350	1,280 / 1,260	1,360	1,230	1,260/1,260	1,210	1,200	1,150	1,320	1,300
Calcium (Ca)	NV	220	250 / 250	240	230 / 230	200	210	210	190	160	210	197	197
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	**99**	**9.1**	**10.6**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW2B-07*		*MW2C-01*								
Collection Date		*05/16/07*	*07/23/09*	*11/29/04*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-01*	*GW-18235-14*	*GW-18235-15*	*GW-18235-02*	*GW-18235-13*	*GW-18235-02*	*GW-18235-02*	*GW-18235-02*	*GW-18235-08*	*GW-18235-15*	*GW-18235-12*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Alkalinity (Total as CaCO3)	30NA500	**746**	243	**747**	**829**	**897**	**910**	**908**	**873**	**872**	**831**	**806**
Ammonia (as Nitrogen)	NV	<0.05	0.144 U	<0.05	0.06	0.07	0.12	<0.05	<0.05	0.09U	0.097	<0.050
Hardness (CaCO3)	80NA100	NA	**730**	NA	NA	NA	**2,700**	NA	NA	**3,000**	**2,930**	NA
Nitrate (N)	10	<0.1	<1.0	<0.1	0.7	3.5	2.6	NA	1.4	1.2	<1.0	<0.50
Nitrite (N)	1	NA	<1.0	NA	NA	NA	ND	<0.1	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	NA	0.55	NA	NA	NA	0.4	NA	NA	0.8U	0.23	NA
Chloride (Cl)	250	10	<20	13.5	14	15	13	13	15	15	20.4	13.0
Sulfates (SO4)	500	**1,590**	**753**	**2,230**	**2,420**	**1,990**	**2,330**	**2,520**	**2,190**	**2,350**	**2,650**	**2,820**
Dissolved Organic Carbon (DOC)	5	**6.2**	**8.1**	**7.9**	**5.2**	**5.1**	**5.1**	**13**	**5.1**	**6.6**	**6.9**	**5.1 U**
Total Dissolved Solids (TDS)	500	**1,750**	**1,200**	**4,560**	**4,340**	**3,100**	**3,110**	**3,960**	**4,080**	**3,070**	**4,290**	**4,460**
Total Suspended Solids (TSS)	NV	NA	14,300	NA	NA	NA	1,200	NA	NA	270	508	NA
PhenolNA4AAP	4.2[2]	NA	0.0081	NA	NA	NA	<0.001	NA	NA	<0.001	0.0038	NA
Biological Oxygen Demand (BOD5)	NV	NA	<6.0	NA	NA	NA	<2	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	15	12	21	22	43	24	20	14	13	<10	18
pH (Standard Units)	6.5NA8.5	7.9	7.86	8.06	8.12	7.9	7.8	8.0	7.7	8.0	7.78	7.80
Total Phosphorus (P)	NV	NA	0.128	NA	NA	NA	0.22	NA	NA	0.2	0.114	NA
Potassium (K)	NV	NA	<10	NA	NA	NA	13	NA	NA	13,000	12	NA
Conductivity (umhos/cm)	NV	3,510	1,490	4,200	4,650	4,760	4,770	4,710	4,740	4,200	4,490	4,540
Calcium (Ca)	NV	120	146	220	200	170	180	170	180	190	177	184
Turbidity (NTU)	5[3]	NA	**13.6**	NA	NA	NA	NA	NA	NA	**390**	**51**	**17.3**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

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TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW3-03*											
	Collection Date	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-14/15*	*GW-18235-22*	*GW-18235-03/04*	*GW-18235-10*	*GW-18235-14*	*GW-18235-18*	*GW-18235-17*	*GW-18235-16*	*GW-18235-09*	*GW-18235-20*	*GW-18235-28*	*GW-18235-20*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	**685 / 686**	**660**	**629/632**	**670**	456	**579**	**580**	**611**	463	466	490	460
Ammonia (as Nitrogen)	NV	<0.05 / <0.05	<0.05	<0.05 / <0.05	<0.05	<0.05	0.09	0.16	0.24	0.11/0.10	0.09U	0.087	<0.050
Hardness (CaCO3)	80NA100	**1,620 / 1,620**	NA	NA/NA	**1,440**	NA	NA	**920**	NA	NA	**880**	**1,020**	NA
Nitrate (N)	10	<1 / <1	<0.1	<1 / <1	<0.2	0.6	0.1	<0.2	<0.1	1.1	1.0	<1.0	<0.10
Nitrite (N)	1	<0.1 / <0.1	NA	NA/NA	<0.3	NA	NA	<0.3	NA	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	1.4J/U / 0.9J/U	NA	NA/NA	0.4	NA	NA	0.5	NA	NA	1.2	0.25	NA
Chloride (Cl)	250	50.2 / 50.1	40.6	35.9/40	39.6	18	25	27	40	44	48	56.3	66.5
Sulfates (SO4)	500	**1,060 / 1,060**	**1,010**	**1,010/1,070**	**921**	198	366	342	484	263	305	429	219
Dissolved Organic Carbon (DOC)	5	**6.6U / 7.2U**	**5.6**	4/4	3.7	**12.4**	**7.7**	**8**	**5.5**	**6.4**	**6.2**	**7.1**	**8.3**
Total Dissolved Solids (TDS)	500	**2,190 / 1,970**	**1,910**	**2,350/2,260**	**1,970**	**882**	**1,050**	**1,120**	**1,140**	**758**	**850/848**	**1,100**	**906**
Total Suspended Solids (TSS)	NV	227 / 211	NA	NA/NA	130	NA	NA	560	NA	NA	260/260	1,130	NA
PhenolNA4AAP	4.2[2]	<0.001 / <0.001	NA	NA/NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.0010	NA
Biological Oxygen Demand (BOD5)	NV	<3 / <3	NA	NA/NA	<2	NA	NA	<2	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	18U / 15U	12	16/14	13	85	74	43	22	15	<4	16	29
pH (Standard Units)	6.5NA8.5	7.81 / 7.88	8.02	7.91/7.86	7.94	8.17	8.1	7.9	8.0	7.9	8.1	7.75	7.68
Total Phosphorus (P)	NV	0.47J / 0.25J	NA	NA/NA	0.099	NA	NA	0.33	NA	NA	0.12	0.411	NA
Potassium (K)	NV	5.8 / 5.4	NA	NA/NA	4.8	NA	NA	3.4	NA	NA	3.0	<10	NA
Conductivity (umhos/cm)	NV	2,350 / 2,450	2,450	2,550/2,560	2,400	1,190	1,560	1,630	1,770	1,380	1,370	1,630	1,360
Calcium (Ca)	NV	190 / 180	200	220/220	190	150	160	150	130	140	150	142	155
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	**216**	**8.0**	**11.1**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

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<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW6B-07*		*OW1B-85*							*OW1B-06*				
Collection Date		*07/23/09*	*11/24/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-04*	*GW-18235-07*	*GW-18235-09*	*GW-18235-11*	*GW-18235-16*	*GW-18235-04*	*GW-18235-10*	*GW-18235-05*	*GW-18235-13*	*GW-18235-10*	*GW-18235-05*	*GW-18235-16*	*GW-18235-21*	*GW-18235-22*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]														
Alkalinity (Total as CaCO3)	30NA500	481	455	342	456	277	325	418	440	**544**	**677**	**768**	**791**	**708**	**762**
Ammonia (as Nitrogen)	NV	0.087	<0.050	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	0.15	0.1	0.07/0.06	0.12	0.065	<0.050
Hardness (CaCO3)	80NA100	**2,060**	NA	**327**	NA	NA	**373**	NA	NA	**570**	NA	NA	**1,400**	**1,170**	NA
Nitrate (N)	10	<1.0	<0.50	<1	0.3	<1	1.7	3.4	1.3	0.1	0.2	0.1	<0.1	<1.0	<0.10
Nitrite (N)	1	<1.0	NA	<0.1	NA	NA	<0.3	NA	NA	<0.3	NA	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	<0.15	NA	0.9 U	NA	NA	2	NA	NA	0.3	NA	NA	1.2	<0.15	NA
Chloride (Cl)	250	36.8	51.8	19.4	6.55	7.9	4	7	10	12	44	28	27	27.1	19.5
Sulfates (SO4)	500	**1,700**	**1,720**	43.9	264	48	92.3	150	194	176	**751**	**596**	**683**	**553**	**596**
Dissolved Organic Carbon (DOC)	5	**5.3**	**6.4**	**5.5 U**	4.3	2.6	**5.2**	3.1	3.2	3.2	**10**	**7.8**	0.5	**6.8**	4.9 U
Total Dissolved Solids (TDS)	500	**2,720**	**2,830**	320	**786**	**595**	**768**	**770**	**701**	**812**	**1,830**	**1,330**	**1,340**	**1,370**	**1,580**
Total Suspended Solids (TSS)	NV	1,350	NA	1,110	NA	NA	680	NA	NA	500	NA	NA	1,500	405	NA
PhenolNA4AAP	4.2[2]	<0.0010	NA	<0.001	NA	NA	<0.001	NA	NA	8	NA	NA	<0.001	0.0019	NA
Biological Oxygen Demand (BOD5)	NV	<6.0	NA	<3	NA	NA	<2	NA	NA	<2	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	<10	23	16 U	56	11	25	13	12	<4	52	18	4	18	18
pH (Standard Units)	6.5NA8.5	7.87	7.74	8.01	8.04	8.11	8.23	8.23	8.0	8.0	8.0	7.8	8.0	7.86	7.91
Total Phosphorus (P)	NV	0.355	NA	0.39	NA	NA	1.2	NA	NA	0.36	NA	NA	0.27	0.192	NA
Potassium (K)	NV	<10	NA	1.8	NA	NA	1.5	NA	NA	1.9	NA	NA	7.0	<10	NA
Conductivity (umhos/cm)	NV	2,800	2,980	621	1,220	613	712	1,010	1,080	1,260	2,370	2,250	2,060	1,960	2,120
Calcium (Ca)	NV	212	248	66	103	110	67	110	100	120	140	100	88	77.3	78.9
Turbidity (NTU)	5[3]	**12**	**7.30**	NA	NA	NA	NA	NA	NA	NA	NA	NA	**368**	**8.9**	**14.5**

Notes:

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(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

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TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW3B-85*						*OW3B-07*			
Collection Date		*06/07/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-13*	*GW-18235-09*	*GW-18235-09*	*GW-18235-05*	*GW-18235-15*	*GW-18235-05*	*GW-18235-04*	*GW-18235-04*	*GW-18235-10*	*GW-18235-04*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Alkalinity (Total as CaCO3)	30NA500	395	375	420	231	388	484	402	423	438	428
Ammonia (as Nitrogen)	NV	<0.05	<0.05	<0.05	<0.05	0.54	0.17	0.53	0.58	0.083 U	0.190
Hardness (CaCO3)	80NA100	**382**	NA	**438**	NA	NA	**460**	NA	**770**	**612**	NA
Nitrate (N)	10	<1	<1	<0.2	0.1	<0.2	<0.2	<0.1	<0.1	<1.0	<0.10
Nitrite (N)	1	<0.1	NA	<0.3	NA	NA	<0.3	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	0.7 U	NA	0.6	NA	NA	0.2	NA	2	0.74	NA
Chloride (Cl)	250	22.1	8.2	10.3	5	6	13	19	19	<20	14.1
Sulfates (SO4)	500	45.1	51	48.6	34	31	41	251	256	194	183
Dissolved Organic Carbon (DOC)	5	3.5 U	1.9	3	**6.3**	3.4	**5.4**	**17.5**	**13.4**	**15**	**10.1**
Total Dissolved Solids (TDS)	500	439	**738**	**514**	370	460	**557**	**745**	**728**	**750**	**754**
Total Suspended Solids (TSS)	NV	274	NA	270	NA	NA	250	NA	840	377	NA
PhenolNA4AAP	4.2[2]	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	0.0013	NA
Biological Oxygen Demand (BOD5)	NV	<3	NA	<2	NA	NA	4	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	5 U	8	9	22	23	18	48	29	33	44
pH (Standard Units)	6.5NA8.5	7.92	8.02	8.08	8.23	8.2	7.8	7.8	7.7	7.52	7.55
Total Phosphorus (P)	NV	0.13	NA	0.156	NA	NA	0.17	NA	0.45	0.22	NA
Potassium (K)	NV	1.4	NA	0.84	NA	NA	0.79	NA	4.9	<10	NA
Conductivity (umhos/cm)	NV	727	785	804	492	710	899	1,230	1,170	1,080	1,070
Calcium (Ca)	NV	130	120	130	71	110	140	240	270	209	198
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	**450**	**60**	**38.0**

Notes:
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NV No value
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TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW4B-91*								*OW5C-91*		
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/11/06*	*06/07/04*	*05/29/06*	*07/19/06*
Sample Identification		*GW-18235-23*	*LW-18235-29*	*GW-18235-20*	*GW-18235-17*	*GW-18235-19/20*	*GW-18235-21*	*GW-18235-24*	*GW-18235-20*	*GW-18235-07*	*GW-18235-10*	*GW-18235-11*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Alkalinity (Total as CaCO3)	30NA500	**1,220**	**840**	**1,110**	**1,140**	**1,210/1,220**	**1,280**	**1,220**	**1,130**	**757**	**753**	**760**
Ammonia (as Nitrogen)	NV	2.22	1.42	0.89	1.9	2.86/2.86	1.17	2.2	3.37	<0.05	<0.05	0.08
Hardness (CaCO3)	80NA100	**1,080**	NA	NA	**1,200**	NA/NA	NA	**1,200**	NA	**1,320**	NA	**1,300**
Nitrate (N)	10	<5	<0.1	<0.1	<0.2	<0.1/<0.1	<0.1	<0.1	<0.1	<1	0.2	0.3
Nitrite (N)	1	**<2**	NA	NA	<0.3	NA/NA	NA	<0.3	NA	<0.1	NA	<0.1
Total Kjeldahl Nitrogen (TKN)	NV	12.5	NA	NA	2.7	NA/NA	NA	3.5	NA	0.4 U	NA	0.2
Chloride (Cl)	250	243	161	149	159	149/148	150	155	150/150	17.9	24	23
Sulfates (SO4)	500	<25	<0.5	<5	8	<5/<5	<5	<5	<10/<10	**922**	**780**	**812**
Dissolved Organic Carbon (DOC)	5	**72.9**	**78.4**	**55**	**57.3**	**54.4/56.6**	**69**	**60.4**	**65**	**7.6 U**	**5.2**	**5**
Total Dissolved Solids (TDS)	500	**1,320**	**1,490**	**1,880**	**1,530**	**1,310/1,500**	**1,470**	**1,440**	**1,210**	**1,910**	**1,650**	**1,750**
Total Suspended Solids (TSS)	NV	2,600	NA	NA	700	NA/NA	NA	1,300	NA	81	NA	43
PhenolNA4AAP	4.2[2]	0.054	NA	NA	0.007	NA/NA	NA	0.04	NA	<0.001	NA	<0.001
Biological Oxygen Demand (BOD5)	NV	238	NA	NA	170	NA/NA	NA	500	NA	<3	NA	<3
Chemical Oxygen Demand (COD)	NV	1,280	12,200	1,200	550	280/380	290	1,100	1,100	17 U	20	14
pH (Standard Units)	6.5NA8.5	7.25	7.02	7.52	7.45	7.41/7.33	7	7.5	7.7	8.03	8.2	8.1
Total Phosphorus (P)	NV	0.5	NA	NA	0.27	NA/NA	NA	0.38	NA	0.04	NA	0.009
Potassium (K)	NV	5.5	NA	NA	4.6	NA/NA	NA	4.7	NA	6	NA	6.1
Conductivity (umhos/cm)	NV	2,180	2,520	2,350	2,150	2,340/2,340	2,260	2,270	2,150	2,430	2,540	2,570
Calcium (Ca)	NV	340	320	330	300	310/310	320	310	330	64	71	71
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

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(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

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(3) Applicable at point of consumption.

NV No value

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TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW5B-06*					*OW6B-92*							
Collection Date		*12/11/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*
Sample Identification		*GW-18235-08*	*GW-18235-06*	*GW-18235-09*	*GW-18235-18*	*GW-18235-16*	*GW-18235-22*	*GW-18235-27*	*GW-18235-18*	*GW-18235-16*	*GW-18235-18*	*GW-18235-11*	*GW-18235-23*	*GW-18235-19*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]													
Alkalinity (Total as CaCO3)	30NA500	**740**	**722**	**816**	**738**	**766**	**764**	**757**	**733**	**761**	**807**	**828**	**820/816**	**822**
Ammonia (as Nitrogen)	NV	0.11	<0.05	0.14U	0.226 U	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.34	<0.05
Hardness (CaCO3)	80NA100	NA	NA	**1,300**	**893**	NA	**1,220**	NA	NA	**1,050**	NA	NA	**1,200**	NA
Nitrate (N)	10	<0.1	<0.1	<0.1	<1.0	<0.10	<1	<0.1	<1	<0.2	0.2	0.2	0.5/0.5	0.3
Nitrite (N)	1	NA	NA	0.02	<1.0	NA	<0.1	NA	NA	<0.3	NA	NA	0.1/0.09	NA
Total Kjeldahl Nitrogen (TKN)	NV	NA	NA	0.8U	<0.15	NA	0.7 U	NA	NA	0.4	NA	NA	0.6	NA
Chloride (Cl)	250	11	18	20	22.5	13.8	96.5	92.2	88.1	90	105	99	106	110
Sulfates (SO4)	500	**876**	408	443	282	290	**597**	**580**	**572**	**615**	**583**	453	473	**565**
Dissolved Organic Carbon (DOC)	5	**8**	**7.6/7.6**	**7.4**	**6.6**	**5.8 U**	**6.8 U**	4.6	3.9	3.7	**5.2**	3.8	4.2	3.8
Total Dissolved Solids (TDS)	500	**1,360**	**1,050**	**1,030/1,160**	**1,090**	**1,150**	**1,350**	**1,450**	**1,680**	**1,660**	**1,570**	**1,550**	**1,670**	**1,240**
Total Suspended Solids (TSS)	NV	NA	NA	380/390	237	NA	153	NA	NA	66	NA	NA	31	NA
PhenolNA4AAP	4.2[2]	NA	NA	<0.001	0.0034	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	NA
Biological Oxygen Demand (BOD5)	NV	NA	NA	<2	<6.0	NA	<3	NA	NA	<3	NA	NA	<3	NA
Chemical Oxygen Demand (COD)	NV	38	19	10	<10	18	15 U	11	15	19	21	22	18	18
pH (Standard Units)	6.5NA8.5	8.1	7.9	8.0	7.87	7.88	8.12	8.2	8.17	8.24	8.27	8.3	8.1/8.1	8.2
Total Phosphorus (P)	NV	NA	NA	0.16	0.159	NA	0.23	NA	NA	0.138	NA	NA	0.17	NA
Potassium (K)	NV	NA	NA	6.4	<10	NA	7.4	NA	NA	6.6	NA	NA	6.7	NA
Conductivity (umhos/cm)	NV	2,490	1,910	1,860	1,690	1,720	2,110	2,260	2,380	2,190	2,450	2,380	2,400/2,400	2,400
Calcium (Ca)	NV	170	72	84	58.7	60.2	44	53	58	50	50	47	48	48
Turbidity (NTU)	5[3]	NA	NA	**140**	**11.5**	**13.5**	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW8B-92*							*OW8B-06*				
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-11*	*GW-18235-09*	*GW-18235-12*	*GW-18235-02*	*GW-18235-12*	*GW-18235-06*	*GW-18235-15*	*GW-18235-14*	*GW-18235-07*	*GW-18235-18*	*GW-18235-23*	*GW-18235-15*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	**739**	**679**	**674**	**711**	**735**	**758**	**844**	376	**633**	**726**	**704**	**666**
Ammonia (as Nitrogen)	NV	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	0.09	0.06	<0.05	0.13U	<0.050	<0.050
Hardness (CaCO3)	80NA100	**869**	NA	NA	**760**	NA	NA	**740**	NA	NA	**1,100**	**1,060**	NA
Nitrate (N)	10	<1	0.4	<1	0.5	0.6	0.3	0.1	<0.1	<0.1	<0.1	<1.0	<0.10
Nitrite (N)	1	<0.1	NA	NA	<0.3	NA	NA	<0.3	NA	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	1.3 U	NA	NA	0.4	NA	NA	0.2	NA	NA	0.7U	<0.15	NA
Chloride (Cl)	250	22.5	6.37	8	7	8	9	8	50	45	42	42.1	34.7
Sulfates (SO4)	500	316	201	269	284	262	287	381	**827**	367	383	363	385
Dissolved Organic Carbon (DOC)	5	**5.7 U**	3	2.3	2.2	2.5	2.2	2.3	**12.9**	**6.5**	**7.1**	**6.3**	4.8
Total Dissolved Solids (TDS)	500	**1,000**	**840**	**1,050**	**1,170**	**974**	**1,060**	**1,270**	**1,690**	**1,170/1,130**	**1,070**	**1,180**	**1,170**
Total Suspended Solids (TSS)	NV	400	NA	NA	420	NA	NA	49	NA	NA	260	230	NA
PhenolNA4AAP	4.2[2]	<0.001	NA	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	0.0024	NA
Biological Oxygen Demand (BOD5)	NV	<3	NA	NA	<3	NA	NA	<3	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	9 U	6	5	9	4	5	6	140	19	4	<10	23
pH (Standard Units)	6.5NA8.5	8.09	8.25	8.06	8.47	8.35	8.2	8.0	7.8	8.0	8.1	7.96	7.83
Total Phosphorus (P)	NV	0.62	NA	NA	0.176	NA	NA	0.068	NA	NA	0.095	0.097	NA
Potassium (K)	NV	6.8	NA	NA	6.1	NA	NA	6	NA	NA	5.5	<10	NA
Conductivity (umhos/cm)	NV	1,550	1,520	1,630	1,510	1,630	1,630	1,960	2,120	1,920	1,760	1,780	1,800
Calcium (Ca)	NV	44	48	52	46	49	45	44	170	89	90	67.3	75.5
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	**101**	**17.2**	**9.20**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW9B-92*							*OW9B-06*				
	Collection Date	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-04*	*GW-18235-21*	*GW-18235-08*	*GW-18235-08*	*GW-18235-03*	*GW-18235-16*	*GW-18235-03*	*GW-18235-04*	*GW-18235-03*	*GW-18235-06*	*GW-18235-12*	*GW-18235-13*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	**724**	**707**	**687**	**711**	**761**	**757**	**768**	390	**611**	**641**	**544**	**543**
Ammonia (as Nitrogen)	NV	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.12	<0.05	<0.05	0.11U	0.211 U	<0.050
Hardness (CaCO3)	80NA100	**4,140**	NA	NA	**4,510**	NA	NA	**5,000**	NA	NA	**1,000**	**818**	NA
Nitrate (N)	10	<1	<0.1	<1	<0.2	<0.1	0.2	0.3	<0.1	<0.1	<0.1	<1.0	<0.10
Nitrite (N)	1	<0.1	NA	NA	<0.3	NA	NA	<0.3	NA	NA	0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	0.9 U	NA	NA	0.4	NA	NA	0.4	NA	NA	0.7U	<0.15	NA
Chloride (Cl)	250	36.8	24.4	24	30	25	28	27	23	27	29	26.5	24.8
Sulfates (SO4)	500	**3,830**	**3,930**	**4,060**	**3,380**	**4,120**	**3,440**	**4,040**	**561**	338	323J	453	341
Dissolved Organic Carbon (DOC)	5	8.4 U	**6.8**	**5.8**	**5.8**	**6.2**	**6.1**	**7.1**	**11**	**9.4**	**5.2**	**5.6**	4.2 U
Total Dissolved Solids (TDS)	500	**6,320**	**6,060**	**6,720**	**6,840**	**6,630**	**4,080**	**4,200**	**1,050/1,020**	**999**	**932**	**1,180**	**1,040**
Total Suspended Solids (TSS)	NV	129	NA	NA	56	NA	NA	77	NA	NA	91	111	NA
PhenolNA4AAP	4.2[2]	<0.001	NA	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.0010	NA
Biological Oxygen Demand (BOD5)	NV	<3	NA	NA	<3	NA	NA	<3	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	14 U	17	7	19	16	14	35	35	16	<4	<10	27
pH (Standard Units)	6.5NA8.5	7.78	8.04	7.9	8.12	7.98	8	7.9	7.8	7.9	8.2	7.94	7.95
Total Phosphorus (P)	NV	0.08	NA	NA	0.036	NA	NA	0.055	NA	NA	0.027U	0.13	NA
Potassium (K)	NV	16	NA	NA	16	NA	NA	17	NA	NA	6.4	<10	NA
Conductivity (umhos/cm)	NV	5,280	5,640	6,110	5,740	6,400	6,280	6,400	1,590	1,670	1,520	1,730	1,560
Calcium (Ca)	NV	220	270	290	270	260	270	270	150	82	85	63.6	68.5
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	**25.2**	**16.5**	**17.5**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification						*Field Blank*							
	Collection Date	*07/06/04*	*07/06/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-03*	*GW-18235-16*	*GW-18235-05*	*GW-18235-12*	*GW-18235-15*	*GW-18235-08*	*GW-18235-21*	*GW-18235-13*	*GW-18235-14*	*GW-18235-14*	*GW-18235-15*	*GW-18235-30*	*GW-18235-27*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]													
Alkalinity (Total as CaCO3)	30NA500	<1	1	<1	2	3	3	2	2	<1	<1	3	< 10	< 10
Ammonia (as Nitrogen)	NV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	0.06	0.079	< 0.05
Hardness (CaCO3)	80NA100	0.058	0.273	NA	0.323	NA	NA	2/1	NA	NA	NA	2	NA	NA
Nitrate (N)	10	<0.1	<0.1	<1	<0.2	<0.1	<0.1	<0.1	0.3	<0.1/<0.1	<0.1/<0.1	<0.1	< 0.1	<0.10
Nitrite (N)	1	<0.1	<0.1	NA	<0.3	NA	NA	<0.01	NA	NA	NA	<0.01	< 0.1	NA
Total Kjeldahl Nitrogen (TKN)	NV	0.3	0.3	NA	0.1	NA	NA	0.1/0.1	NA	NA	NA	<0.2/<0.2	< 0.15	NA
Chloride (Cl)	250	0.41	0.4	<1.5	<1	1	<1	<1	<1	<1	<1	<1	< 2.0	< 2.0
Sulfates (SO4)	500	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	< 2.0	< 2.0
Dissolved Organic Carbon (DOC)	5	**12.4**	0.2	0.2	0.3	0.2	0.5	0.4	0.3	0.3	0.3	0.1	< 1.0	1.3
Total Dissolved Solids (TDS)	500	1	<1	232	13	18	1	<1/<1	<1	<1	<1	7	< 20	< 20
Total Suspended Solids (TSS)	NV	<1	1	NA	<1	NA	NA	<1/<1	NA	NA	NA	<10	< 3.0	NA
PhenolNA4AAP	4.2[2]	<0.001	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	NA	<0.001	< 0.0010	NA
Biological Oxygen Demand (BOD5)	NV	23	<3	NA	<3	NA	NA	<2/<2	NA	NA	NA	<2	< 6.0	NA
Chemical Oxygen Demand (COD)	NV	28	6	<4	<4	<4	7/7	<4/<4	<4	<4	<4	<4	NA	< 10
pH (Standard Units)	6.5NA8.5	6.66	6.84	**4.95**	6.8	6.67	6.8	6.7	6.9	6.1	6.1	7.4	6.49	7.2
Total Phosphorus (P)	NV	<0.02	<0.02	NA	0.004	NA	NA	<0.002/<0.002	NA	NA	NA	0.006	NA	NA
Potassium (K)	NV	<0.06	<0.06	NA	<0.2	NA	NA	<0.2	NA	NA	NA	<0.2	< 1.0	NA
Conductivity (umhos/cm)	NV	1.8	2.3	<2	<2	<2	<2	<2	<2	<2	<2	4	2.38	1.85
Calcium (Ca)	NV	0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	210	210	0.63	< 0.50	4.42
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2	< 0.1	< 0.1

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

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559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW1-03*											
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-19*	*GW-18235-17*	*GW-18235-01*	*GW-18235-11*	*GW-18235-13*	*GW-18235-20*	*GW-18235-20*	*GW-18235-17*	*GW-18235-10*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	<0.005	NA	NA	NA	0.007U	<0.10	NA
Arsenic (As)	0.025	<0.0014	0.0032	NA	0.0017	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Barium (Ba)	1	0.073	0.068	0.091	0.090	0.092	0.082	0.077	0.01	0.089	0.099	<0.10	<0.1
Beryllium (Be)	0.004[2]	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.061U	0.065	0.05	0.053	0.069	0.052	0.05	0.061	0.045	0.054	<0.50	0.061
Cadmium (Cd)	0.005	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016	0.0018 U	NA	<0.005	NA	NA	<0.005	NA	NA	<0.0005	<0.010	NA
Cobalt (Co)	0.1[2]	0.002	0.002	NA	0.0021	NA	NA	<0.0005	NA	NA	0.0005	<0.0080	NA
Copper (Cu)	1	<0.003	<0.003	NA	<0.001	NA	NA	<0.004	NA	NA	0.001	<0.010	NA
Iron (Fe)	0.3	**3.4**	**2.1**	**0.6**	**0.56**	<0.05	<0.05	<0.05	0.23	<0.05	<0.05	**<0.50**	<0.050
Lead (Pb)	0.01	<0.0022	<0.0022	NA	0.0005	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	59	66	60	56	63	110	58	NA	53	59	61.2	57.1
Manganese (Mn)	0.05	**0.33**	**0.39**	NA	**0.31**	NA	NA	0.035	NA	NA	**0.11**	**0.080**	NA
Mercury (Hg)	0.001	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3[2]	0.0035	0.004	NA	0.0028	NA	NA	0.002	NA	NA	0.002	<0.010	NA
Nickel (Ni)	0.1[2]	0.002	0.002	NA	0.0036	NA	NA	<0.002	NA	NA	0.002	<0.020	NA
Silver (Ag)	0.0012[2]	<0.0006	<0.0006	NA	<0.0005	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	28	31	30	27	34	72	30	34	29	31	35.8	32.5
Thallium (Tl)	0.002[2]	<0.001	<0.001	NA	<0.00005	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2[2]	<0.001	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	<0.0001	<0.010	NA
Zinc (Zn)	5	0.073 U	<0.005	NA	0.0097	NA	NA	0.005	NA	NA	0.008	<0.030	NA

Notes:

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(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW1B-01*						*MW1B-07*			
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*12/01/05*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-18*	*GW-18235-25*	*GW-18235-06*	*GW-18235-06*	*GW-18235-07*	*GW-18235-06*	*GW-18235-11*	*GW-18235-02*	*GW-18235-06*	*GW-18235-31*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	<0.005	NA	0.008U	<0.10	NA
Arsenic (As)	0.025	<0.0014	<0.0014	NA	NA	0.001	NA	NA	0.004	<0.010	NA
Barium (Ba)	1	0.017	0.018	0.017	0.020	0.043	0.027	0.027	0.026	<0.10	0.076
Beryllium (Be)	0.004 [2]	<0.0014	<0.0014	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.049 U	0.053	0.04	0.042	0.25	0.06	0.027	0.026	<0.50	0.062
Cadmium (Cd)	0.005	<0.001	<0.001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016	0.006 U	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1 [2]	0.001	0.001	NA	NA	0.0013	NA	NA	0.0012	<0.0080	NA
Copper (Cu)	1	<0.003	0.003	NA	NA	0.003	NA	NA	<0.001	<0.010	NA
Iron (Fe)	0.3	**1**	**0.96**	0.18	<0.050	**1.7**	0.11	0.088	**1.5**	**<0.50**	<0.050
Lead (Pb)	0.01	0.0026 U	<0.0022	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	75	76	65	71	64	73	140	140	127	117
Manganese (Mn)	0.05	**0.2**	**0.14**	NA	NA	**0.51**	NA	NA	**0.35**	**0.267**	NA
Mercury (Hg)	0.001	<0.0001	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	<0.0014	<0.0014	NA	NA	<0.001	NA	NA	0.011	<0.010	NA
Nickel (Ni)	0.1 [2]	<0.001	0.002	NA	NA	0.002	NA	NA	0.001	<0.020	NA
Silver (Ag)	0.0012 [2]	<0.0006	<0.0006	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	32	25	34	32	37	43	48	50	71.5	60.7
Thallium (Tl)	0.002 [2]	<0.001	<0.001	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2 [2]	<0.001	0.002	NA	NA	<0.001	NA	NA	0.001	<0.010	NA
Zinc (Zn)	5	0.02 U	<0.005	NA	NA	0.011	NA	NA	<0.005	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW2-03*											
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-20*	*GW-18235-19/20*	*GW-18235-02*	*GW-18235-13/14*	*GW-18235-16*	*GW-18235-19*	*GW-18235-16*	*GW-18235-15*	*GW-18235-08*	*GW-18235-19*	*GW-18235-27*	*GW-18235-26*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	0.005	NA	NA	NA	<0.005	<0.10	NA
Arsenic (As)	0.025	<0.0014	0.0049 / 0.0052	NA	0.0017 / 0.0016	NA	NA	0.002	NA	NA	<0.001	<0.010	NA
Barium (Ba)	1	0.033	0.038 / 0.04	0.035	0.042 / 0.034	0.040	0.032	0.037	0.041	0.04	0.041	<0.10	0.058
Beryllium (Be)	0.004[2]	<0.0014	<0.0014 / <0.0014	NA	<0.0005 / <0.0005	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.04 U	0.056 / 0.056	0.04	0.036 / 0.032	0.060	0.035	0.031	0.043	0.033	0.044	<0.50	0.057
Cadmium (Cd)	0.005	<0.001	<0.001 / <0.001	NA	<0.0001 / <0.0001	NA	NA	<0.0001	NA	NA	0.0001	<0.0010	NA
Chromium (Cr)	0.05	0.0018	0.005U / 0.0055U	NA	<0.005 / <0.005	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1[2]	0.002	0.002 / 0.003	NA	0.0017 / 0.0017	NA	NA	0.0018	NA	NA	<0.003	<0.0080	NA
Copper (Cu)	1	<0.003	<0.003 / <0.003	NA	<0.001 / <0.001	NA	NA	0.002	NA	NA	0.002	<0.010	NA
Iron (Fe)	0.3	**2.9**	**4.6 / 5.3**	**1.9**	**1.2 / 1.4**	<0.05	**0.32**	**1.7**	<0.05	<0.05	<0.05	**<0.50**	**0.640**
Lead (Pb)	0.01	<0.0022	<0.0022 / <0.0022	NA	<0.0002 / <0.0002	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	54	53 / 56	52	52 / 52	47	48	44	45	36	47	49.4	42.8
Manganese (Mn)	0.05	**0.4**	**0.39 / 0.4**	NA	**0.31 / 0.3**	NA	NA	**0.22**	NA	NA	**0.12**	<0.010	NA
Mercury (Hg)	0.001	<0.0001	<0.0001 / <0.0001	NA	<0.0001 / <0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3[2]	0.0073	0.0059 / 0.0067	NA	0.004 / 0.0042	NA	NA	0.003	NA	NA	0.003	<0.010	NA
Nickel (Ni)	0.1[2]	<0.001	0.001 / 0.002	NA	0.005 / 0.0042	NA	NA	0.002	NA	NA	<0.005	<0.020	NA
Silver (Ag)	0.0012[2]	<0.0006	<0.0006 / <0.0006	NA	<0.0005 / <0.0005	NA	NA	0.0002	NA	NA	<0.001	<0.0010	NA
Sodium (Na)	200	20	20 / 21	19	21 / 20	23	24	22	32	22	26	31.4	26.0
Thallium (Tl)	0.002[2]	<0.001	<0.001 / <0.001	NA	<0.00005 / <0.00005	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2[2]	<0.001	<0.001 / <0.001	NA	<0.001 / <0.001	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Zinc (Zn)	5	0.012 U	0.014U/J / 0.019U/J	NA	0.012 / <0.005	NA	NA	0.007	NA	NA	<0.005	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW2B-07*		*MW2C-01*								
	Collection Date	*05/16/07*	*07/23/09*	*11/29/04*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-01*	*GW-18235-14*	*GW-18235-15*	*GW-18235-02*	*GW-18235-13*	*GW-18235-02*	*GW-18235-02*	*GW-18235-02*	*GW-18235-08*	*GW-18235-15*	*GW-18235-12*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Aluminum (Al)	0.1	NA	<0.10	NA	NA	NA	NA	NA	NA	<0.005	<0.10	NA
Arsenic (As)	0.025	NA	<0.010	0.002	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Barium (Ba)	1	0.019	<0.10	0.018	0.014	<0.03	0.012	<0.03	<0.03	0.011	<0.10	0.014
Beryllium (Be)	0.004 [2]	NA	**<0.010**	<0.0014	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.21	<0.50	0.36	0.33	0.35	0.31	0.36	0.35	0.31	<0.50	0.326
Cadmium (Cd)	0.005	NA	<0.0010	<0.001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	NA	<0.010	<0.0016	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1 [2]	NA	<0.0080	0.005	NA	NA	<0.0005	NA	NA	<0.0005	<0.0080	NA
Copper (Cu)	1	NA	<0.010	0.006	NA	NA	0.005	NA	NA	<0.005	<0.010	NA
Iron (Fe)	0.3	<0.05	**<0.50**	**2**	<0.050	<0.05	<0.05	<0.05	<0.3	<0.05	**<0.50**	<0.050
Lead (Pb)	0.01	NA	<0.010	<0.0022	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	400	88.8	650	590	510	550	550	570	610	603	511
Manganese (Mn)	0.05	NA	**0.319**	**0.15**	NA	NA	0.011	NA	NA	0.012	0.017	NA
Mercury (Hg)	0.001	NA	<0.00010	<0.0001	NA	NA	<0.0001	NA	NA	0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	NA	<0.010	0.011	NA	NA	0.009	NA	NA	0.008	<0.010	NA
Nickel (Ni)	0.1 [2]	NA	<0.020	0.005	NA	NA	0.002	NA	NA	0.003	<0.020	NA
Silver (Ag)	0.0012 [2]	NA	<0.0010	<0.0006	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	**220**	57.5	**300**	**240**	**460**	**400**	**440**	**400**	**450**	**375**	**310**
Thallium (Tl)	0.002 [2]	NA	**<0.0030**	<0.001	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2 [2]	NA	<0.010	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Zinc (Zn)	5	NA	<0.030	0.024 U	NA	NA	<0.05	NA	NA	<0.03	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW3-03*											
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-14/15*	*GW-18235-22*	*GW-18235-03/04*	*GW-18235-10*	*GW-18235-14*	*GW-18235-18*	*GW-18235-17*	*GW-18235-16*	*GW-18235-09*	*GW-18235-20*	*GW-18235-28*	*GW-18235-20*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	<0.009	NA	NA	NA	<0.005	<0.10	NA
Arsenic (As)	0.025	0.0064 / 0.0057	0.0029	NA/NA	<0.001	NA	NA	0.001	NA	NA	<0.001	<0.010	NA
Barium (Ba)	1	0.014 / 0.014	0.015	0.013/0.013	0.023	0.02	0.026	0.023	0.03	0.035	0.035	<0.10	0.045
Beryllium (Be)	0.004[2]	<0.0014 / <0.0014	<0.0014	NA/NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.075 / 0.075	0.11	0.07/0.07	0.076	0.061	0.031	0.047	0.048	0.04	0.058	<0.50	0.064
Cadmium (Cd)	0.005	<0.001 / <0.001	<0.001	NA/NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016 / <0.0016	0.0054 U	NA/NA	<0.005	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1[2]	<0.001 / <0.001	<0.001	NA/NA	0.0005	NA	NA	0.001	NA	NA	0.0005	<0.0080	NA
Copper (Cu)	1	<0.003 / <0.003	0.003	NA/NA	<0.001	NA	NA	0.001	NA	NA	0.001	<0.010	NA
Iron (Fe)	0.3	**1.7 / 1.6**	**2.4**	**2.2/2.4**	**1.8**	<0.05	0.11	**0.9**	0.25	**0.56**	0.23	**2.04**	0.117
Lead (Pb)	0.01	<0.0022 / <0.0022	<0.0022	NA/NA	<0.0002	NA	NA	<0.0005	NA	NA	0.0009	<0.010	NA
Magnesium (Mg)	NV	260 / 280	290	270/270	280	85	66	130	74	110	120	161	70.1
Manganese (Mn)	0.05	**0.49 / 0.48**	**0.51**	NA/NA	**0.43**	NA	NA	**0.15**	NA	NA	**0.11**	**0.188**	NA
Mercury (Hg)	0.001	<0.0001 / <0.0001	<0.0001	NA/NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3[2]	0.0035 / 0.0033	0.0026	NA/NA	0.0018	NA	NA	0.003	NA	NA	0.002	<0.010	NA
Nickel (Ni)	0.1[2]	<0.001 / <0.001	<0.001	NA/NA	0.0013	NA	NA	0.001	NA	NA	0.002	<0.020	NA
Silver (Ag)	0.0012[2]	<0.0006 / <0.0006	<0.0006	NA/NA	<0.0005	NA	NA	<0.0001	NA	NA	<0.001	<0.0010	NA
Sodium (Na)	200	97 / 98	110	100/99	99	51	66	60	35	50	56	67.6	47.9
Thallium (Tl)	0.002[2]	<0.001 / <0.001	<0.001	NA/NA	<0.00005	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2[2]	0.003 / 0.003	<0.001	NA/NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Zinc (Zn)	5	<0.005 / <0.005	0.008 U	NA/NA	<0.050	NA	NA	0.01	NA	NA	0.007	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

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559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW6B-07*		*OW1B-85*							*OW1B-06*				
	Collection Date	*07/23/09*	*11/24/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-04*	*GW-18235-07*	*GW-18235-09*	*GW-18235-11*	*GW-18235-16*	*GW-18235-04*	*GW-18235-10*	*GW-18235-05*	*GW-18235-13*	*GW-18235-10*	*GW-18235-05*	*GW-18235-16*	*GW-18235-21*	*GW-18235-22*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]														
Aluminum (Al)	0.1	<0.10	NA	NA	NA	NA	NA	NA	<0.005	NA	NA	NA	0.012U	<0.10	NA
Arsenic (As)	0.025	<0.010	NA	<0.0014	<0.0002	NA	<0.001	NA	NA	<0.001	NA	NA	0.001	<0.010	NA
Barium (Ba)	1	<0.10	0.013	0.056	0.318	0.05	0.045	0.087	0.085	0.095	0.008	0.01	0.005	<0.10	0.013
Beryllium (Be)	0.004[2]	**<0.010**	NA	<0.0014	<0.0002	NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	<0.50	0.072	0.027 U	0.249	0.02	0.018	0.027	0.013	0.017	0.097	0.069	0.087	<0.50	0.114
Cadmium (Cd)	0.005	<0.0010	NA	<0.001	<0.0002	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.010	NA	<0.0016	<0.0004	NA	<0.005	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1[2]	<0.0080	NA	<0.001	0.0006	NA	<0.0005	NA	NA	<0.0005	NA	NA	0.0013	<0.0080	NA
Copper (Cu)	1	<0.010	NA	<0.003	0.0041	NA	0.0023	NA	NA	0.002	NA	NA	0.002	<0.010	NA
Iron (Fe)	0.3	**<0.50**	<0.050	0.041	0.212	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	**1.70**	0.14	**<0.50**	0.231
Lead (Pb)	0.01	<0.010	NA	0.0028 U	<0.0004	NA	<0.0002	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	372	330	43	104	40	22	74	66	68	250	260	300	238	256
Manganese (Mn)	0.05	**0.169**	NA	0.013	**0.139**	NA	<0.002	NA	NA	0.003	NA	NA	**0.085**	0.017	NA
Mercury (Hg)	0.001	<0.00010	NA	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3[2]	<0.010	NA	<0.0014	0.0014	NA	<0.001	NA	NA	<0.001	NA	NA	0.012	<0.010	NA
Nickel (Ni)	0.1[2]	<0.020	NA	<0.001	<0.0002	NA	<0.001	NA	NA	<0.001	NA	NA	0.001	<0.020	NA
Silver (Ag)	0.0012[2]	<0.0010	NA	<0.0006	<0.0002	NA	<0.0005	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	95.9	88.5	14	57.8	12	8.4	30	32	34	140	93	110	82.4	89.6
Thallium (Tl)	0.002[2]	**<0.0030**	NA	<0.001	<0.0002	NA	<0.00005	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2[2]	<0.010	NA	<0.001	0.0014	NA	<0.001	NA	NA	<0.001	NA	NA	0.002	<0.010	NA
Zinc (Zn)	5	<0.030	NA	0.021 U	0.501	NA	<0.005	NA	NA	<0.005	NA	NA	<0.005	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW3B-85*						*OW3B-07*			
Collection Date		*06/07/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-13*	*GW-18235-09*	*GW-18235-09*	*GW-18235-05*	*GW-18235-15*	*GW-18235-05*	*GW-18235-04*	*GW-18235-04*	*GW-18235-10*	*GW-18235-04*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Aluminum (Al)	0.1	NA	NA	NA	NA	<0.005	NA	NA	0.008U	<0.10	NA
Arsenic (As)	0.025	<0.0014	NA	<0.001	NA	NA	0.001	NA	0.004	<0.010	NA
Barium (Ba)	1	0.049	0.058	0.054	0.034	0.048	0.056	0.053	0.028	0.10	0.142
Beryllium (Be)	0.004 [2]	<0.0014	NA	<0.0005	NA	NA	<0.0005	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.02 U	0.01	<0.01	0.01	<0.01	<0.01	0.042	0.032	<0.50	<0.050
Cadmium (Cd)	0.005	<0.001	NA	<0.0001	NA	NA	<0.0001	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016	NA	<0.005	NA	NA	<0.005	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1 [2]	<0.001	NA	0.0008	NA	NA	<0.0005	NA	0.0026	<0.0080	NA
Copper (Cu)	1	<0.003	NA	0.0014	NA	NA	0.001	NA	<0.001	<0.010	NA
Iron (Fe)	0.3	**1.5**	<0.05	**1**	<0.05	**0.64**	**1.3**	<0.05	**6.00**	**4.22**	**1.70**
Lead (Pb)	0.01	0.0023 U	NA	0.0006	NA	NA	<0.0005	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	30	25	29	12	24	29	23	24	22.3	19.8
Manganese (Mn)	0.05	**0.17**	NA	**0.12**	NA	NA	**0.11**	NA	**0.82**	**0.600**	NA
Mercury (Hg)	0.001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	<0.0014	NA	<0.001	NA	NA	<0.001	NA	0.023	<0.010	NA
Nickel (Ni)	0.1 [2]	<0.001	NA	<0.001	NA	NA	<0.001	NA	0.006	<0.020	NA
Silver (Ag)	0.0012 [2]	<0.0006	NA	<0.0005	NA	NA	<0.0001	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	16	14	13	6.1	9.3	11	18	18	17.6	16.5
Thallium (Tl)	0.002 [2]	<0.001	NA	<0.00005	NA	NA	<0.00005	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2 [2]	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	<0.010	NA
Zinc (Zn)	5	0.03 U	NA	0.01	NA	NA	0.006	NA	0.007	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		OW4B-91								OW5C-91		
Well Identification												
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*06/07/04*	*05/29/06*	*7/19/06*
Sample Identification		*GW-18235-23*	*LW-18235-29*	*GW-18235-20*	*GW-18235-17*	*GW-18235-19/20*	*GW-18235-21*	*GW-18235-24*	*GW-18235-20*	*GW-18235-07*	*GW-18235-10*	*GW-18235-11*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	0.013	NA	NA	NA	<0.005	NA
Arsenic (As)	0.025	<0.0014	0.0015	NA	0.0015	NA/NA	NA	0.002	NA	<0.0014	NA	<0.001
Barium (Ba)	1	0.18	0.17	0.16	0.17	0.15/0.12	0.16	0.16	0.18	0.027	0.024	0.02
Beryllium (Be)	0.004 [2]	<0.0014	<0.0014	NA	<0.0005	NA/NA	NA	<0.0005	NA	<0.0014	NA	<0.0005
Boron (B)	5	0.1	0.1	0.09	0.1	0.12/0.094	0.092	0.13	0.13	0.044 U	0.037	0.032
Cadmium (Cd)	0.005	<0.001	<0.001	NA	<0.0001	NA/NA	NA	<0.0001	NA	<0.001	NA	<0.0001
Chromium (Cr)	0.05	<0.0016	0.0063	NA	0.0056	NA/NA	NA	<0.005	NA	<0.0016	NA	<0.005
Cobalt (Co)	0.1 [2]	0.002	0.002	NA	0.0016	NA/NA	NA	0.0015	NA	<0.001	NA	<0.0005
Copper (Cu)	1	<0.003	0.006	NA	<0.001	NA/NA	NA	0.002	NA	<0.003	NA	<0.002
Iron (Fe)	0.3	**26**	**26**	**25**	**26**	**10/0.61**	**23**	**24**	**25**	<0.011	<0.05	<0.05
Lead (Pb)	0.01	0.0027 U	<0.0022	NA	0.0002	NA/NA	NA	<0.0005	NA	0.0024 U	NA	<0.0005
Magnesium (Mg)	NV	130	120	110	110	110/110	110	100	110	270	280	280
Manganese (Mn)	0.05	**3.3**	**2**	NA	**2.2**	NA/NA	NA	**2.2**	NA	<0.0014	NA	<0.002
Mercury (Hg)	0.001	0.0002	<0.0001	NA	<0.0001	NA/NA	NA	<0.0001	NA	<0.0001	NA	<0.0001
Molybdenum (Mo)	7.3 [2]	<0.0014	<0.0014	NA	<0.001	NA/NA	NA	0.002	NA	0.0016	NA	0.003
Nickel (Ni)	0.1 [2]	0.007	<0.001	NA	0.0012	NA/NA	NA	<0.001	NA	<0.001	NA	<0.001
Silver (Ag)	0.0012 [2]	<0.0006	<0.0006	NA	<0.0005	NA/NA	NA	<0.0001	NA	<0.0006	NA	<0.0001
Sodium (Na)	200	85	79	78	71	75/73	72	71	76	**200**	180	180
Thallium (Tl)	0.002 [2]	<0.001	<0.001	NA	<0.001	NA/NA	NA	<0.00005	NA	<0.001	NA	<0.00005
Vanadium (V)	0.2 [2]	0.003	0.005	NA	0.0041	NA/NA	NA	0.003	NA	<0.001	NA	<0.001
Zinc (Zn)	5	0.009 U	0.028	NA	0.072	NA/NA	NA	0.01	NA	0.005 U	NA	<0.03

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW5B-06*					*OW6B-92*							
Collection Date		*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*
Sample Identification		*GW-18235-08*	*GW-18235-06*	*GW-18235-09*	*GW-18235-18*	*GW-18235-16*	*GW-18235-22*	*GW-18235-27*	*GW-18235-18*	*GW-18235-16*	*GW-18235-18*	*GW-18235-11*	*GW-18235-23*	*GW-18235-19*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]													
Aluminum (Al)	0.1	NA	NA	0.009U	<0.10	NA	NA	NA	NA	NA	NA	<0.005	NA	NA
Arsenic (As)	0.025	NA	NA	0.003	<0.010	NA	<0.0014	<0.0014	NA	<0.001	NA	NA	<0.001	NA
Barium (Ba)	1	0.02	0.015	0.016	<0.10	0.026	0.016	0.017	0.019	0.026	0.017	0.016	0.015	0.017
Beryllium (Be)	0.004 [2]	NA	NA	<0.0005	**<0.010**	NA	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005	NA
Boron (B)	5	0.31	0.046	0.055	<0.50	0.067	0.87	0.93	0.85	0.64	0.84	0.64	0.53	0.62
Cadmium (Cd)	0.005	NA	NA	<0.0001	<0.0010	NA	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001	NA
Chromium (Cr)	0.05	NA	NA	<0.005	<0.010	NA	<0.0016	0.0056 U	NA	<0.005	NA	NA	<0.005	NA
Cobalt (Co)	0.1 [2]	NA	NA	0.0008	<0.0080	NA	<0.001	<0.001	NA	<0.0005	NA	NA	<0.0005	NA
Copper (Cu)	1	NA	NA	<0.001	<0.010	NA	<0.003	0.004	NA	<0.001	NA	NA	0.002	NA
Iron (Fe)	0.3	<0.05	<0.05	**1.9**	**<0.50**	<0.050	<0.011	0.054 U	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead (Pb)	0.01	NA	NA	<0.0005	<0.010	NA	<0.0022	<0.0022	NA	<0.0002	NA	NA	<0.0005	NA
Magnesium (Mg)	NV	280	230	270	181	133	270	270	260	250	230	260	260	270
Manganese (Mn)	0.05	NA	NA	**0.19**	0.021	NA	<0.0014	<0.0014	NA	<0.002	NA	NA	<0.002	NA
Mercury (Hg)	0.001	NA	NA	<0.0001	<0.00010	NA	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA
Molybdenum (Mo)	7.3 [2]	NA	NA	0.01	<0.010	NA	0.0044	0.006	NA	0.0052	NA	NA	0.005	NA
Nickel (Ni)	0.1 [2]	NA	NA	0.001	<0.020	NA	<0.001	<0.001	NA	0.0049	NA	NA	<0.001	NA
Silver (Ag)	0.0012 [2]	NA	NA	<0.0001	<0.0010	NA	<0.0006	<0.0006	NA	<0.0005	NA	NA	<0.0001	NA
Sodium (Na)	200	100	98	120	110	72.0	190	190	**200**	190	180	180	180	**210**
Thallium (Tl)	0.002 [2]	NA	NA	<0.00005	**<0.0030**	NA	<0.001	<0.001	NA	<0.00005	NA	NA	<0.00005	NA
Vanadium (V)	0.2 [2]	NA	NA	<0.001	<0.010	NA	<0.001	0.001	NA	0.0015	NA	NA	<0.001	NA
Zinc (Zn)	5	NA	NA	<0.005	<0.030	NA	<0.005	0.008	NA	0.013	NA	NA	0.01	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW8B-92*							*OW8B-06*				
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-11*	*GW-18235-09*	*GW-18235-12*	*GW-18235-02*	*GW-18235-12*	*GW-18235-06*	*GW-18235-15*	*GW-18235-14*	*GW-18235-07*	*GW-18235-18*	*GW-18235-23*	*GW-18235-15*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	<0.005	NA	NA	NA	0.007U	<0.10	NA
Arsenic (As)	0.025	<0.0014	<0.0014	NA	<0.001	NA	NA	<0.001	NA	NA	0.004	<0.010	NA
Barium (Ba)	1	0.02	0.022	0.021	0.022	0.022	0.02	0.019	0.007	0.006	0.006	<0.10	0.018
Beryllium (Be)	0.004 [2]	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.16	0.13	0.16	0.13	0.16	0.14	0.12	0.095	0.66	0.55	0.80	1.15
Cadmium (Cd)	0.005	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016	<0.0016	NA	<0.005	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1 [2]	<0.001	<0.001	NA	<0.0005	NA	NA	<0.003	NA	NA	0.001	<0.0080	NA
Copper (Cu)	1	<0.003	<0.003	NA	0.0015	NA	NA	0.003	NA	NA	<0.001	<0.010	NA
Iron (Fe)	0.3	<0.011	0.18 U	0.2	<0.05	<0.05	<0.05	<0.05	**1.3**	**1.3**	**3.0**	**<0.50**	<0.050
Lead (Pb)	0.01	0.0025 U	0.0022	NA	0.0003	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	170	150	170	140	180	150	150	190	180	220	216	172
Manganese (Mn)	0.05	0.0081	**0.068**	NA	<0.002	NA	NA	<0.002	NA	NA	**0.16**	**0.074**	NA
Mercury (Hg)	0.001	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	0.0027	0.0034	NA	0.0039	NA	NA	0.004	NA	NA	0.013	<0.010	NA
Nickel (Ni)	0.1 [2]	<0.001	<0.001	NA	<0.001	NA	NA	<0.005	NA	NA	0.002	<0.020	NA
Silver (Ag)	0.0012 [2]	<0.0006	<0.0006	NA	<0.0005	NA	NA	0.0005	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	110	120	120	110	130	120	120	100	82	96	90.1	91.1
Thallium (Tl)	0.002 [2]	<0.001	<0.001	NA	<0.00005	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2 [2]	<0.001	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Zinc (Zn)	5	0.012 U	0.02 U	NA	0.0098	NA	NA	0.005	NA	NA	<0.005	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW9B-92*							*OW9B-06*				
Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-04*	*GW-18235-21*	*GW-18235-08*	*GW-18235-08*	*GW-18235-03*	*GW-18235-16*	*GW-18235-03*	*GW-18235-04*	*GW-18235-03*	*GW-18235-06*	*GW-18235-12*	*GW-18235-13*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	<0.05	NA	NA	NA	0.009U	<0.10	NA
Arsenic (As)	0.025	<0.0014	<0.0014	NA	<0.001	NA	NA	<0.001	NA	NA	0.002	<0.010	NA
Barium (Ba)	1	0.0086	0.0081	<0.05	<0.005	0.008	<0.03	0.007	0.009	<0.005	0.006	<0.10	0.016
Beryllium (Be)	0.004[2]	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.24	0.3	0.3	0.24	0.28	0.23	0.24	0.10	0.10	0.11	<0.50	0.119
Cadmium (Cd)	0.005	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016	0.0025 U	NA	<0.005	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1[2]	<0.001	<0.001	NA	<0.0005	NA	NA	<0.0005	NA	NA	0.0022	<0.0080	NA
Copper (Cu)	1	<0.003	0.01	NA	<0.001	NA	NA	0.005	NA	NA	<0.001	<0.010	NA
Iron (Fe)	0.3	<0.011	**0.36 U**	**<0.5**	**0.73**	<0.05	<0.05	0.11	**0.37**	**1.1**	**0.7**	**<0.50**	<0.050
Lead (Pb)	0.01	0.003 U	<0.0022	NA	<0.0002	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	880	1,000	1,000	970	1,000	950	1,000	140	160	190	160	140
Manganese (Mn)	0.05	<0.0014	<0.0014	NA	<0.002	NA	NA	<0.002	NA	NA	**0.18**	0.026	NA
Mercury (Hg)	0.001	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3[2]	0.0016	0.0023	NA	<0.001	NA	NA	0.002	NA	NA	0.011	<0.010	NA
Nickel (Ni)	0.1[2]	<0.001	<0.001	NA	<0.001	NA	NA	0.003	NA	NA	0.002	<0.020	NA
Silver (Ag)	0.0012[2]	<0.0006	<0.0006	NA	<0.0005	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	**310**	**340**	**360**	**310**	**340**	**320**	**310**	43	83	80	164	84.4
Thallium (Tl)	0.002[2]	<0.001	<0.001	NA	<0.00005	NA	NA	<0.00005	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2[2]	<0.001	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Zinc (Zn)	5	<0.005	0.086 U	NA	<0.005	NA	NA	<0.05	NA	NA	0.005	0.041	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

							Field Blank				
	Well Identification										
	Collection Date	*05/09/05*	*07/28/05*	*12/01/05*	*5/29/06*	*7/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-05*	*GW-18235-12*	*GW-18235-15*	*GW-18235-08*	*GW-18235-21*	*GW-18235-13*	*GW-18235-14*	*GW-18235-15*	*GW-18235-30*	*GW-18235-27*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Aluminum (Al)	0.1	NA	NA	NA	<0.005	NA	NA	NA	0.059	< 0.01	NA
Arsenic (As)	0.025	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	< 0.01	NA
Barium (Ba)	1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.01	< 0.01
Beryllium (Be)	0.004 [2]	NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	< 0.01	NA
Boron (B)	5	<0.01	<0.01	0.026	<0.1	<0.01	<0.01	<0.01	<0.01	< 0.50	< 0.50
Cadmium (Cd)	0.005	NA	<0.0001	NA	NA	0.0002	NA	NA	<0.0001	<0.00010	NA
Chromium (Cr)	0.05	NA	<0.005	NA	NA	<0.005	NA	NA	<0.005	0.0017	NA
Cobalt (Co)	0.1 [2]	NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	<0.00080	NA
Copper (Cu)	1	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.0010	NA
Iron (Fe)	0.3	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050
Lead (Pb)	0.01	NA	<0.0002	NA	NA	<0.0005	NA	NA	<0.0005	<0.0010	NA
Magnesium (Mg)	NV	<0.05	<0.05	<0.05	0.054	<0.05	55	0.063	<0.05	<0.50	<0.50
Manganese (Mn)	0.05	NA	<0.002	NA	NA	<0.002	NA	NA	<0.002	<0.0010	NA
Mercury (Hg)	0.001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001/<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.0010	NA
Nickel (Ni)	0.1 [2]	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.0020	NA
Silver (Ag)	0.0012 [2]	NA	<0.0005	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Sodium (Na)	200	<0.1	<0.1	0.25	<0.1	<0.1	<0.1	0.13	1.10	<0.50	<0.50
Thallium (Tl)	0.002 [2]	NA	<0.00005	NA	NA	<0.00005	NA	NA	<0.00005	<0.00030	NA
Vanadium (V)	0.2 [2]	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001	<0.0010	NA
Zinc (Zn)	5	NA	0.0078	NA	NA	<0.005	NA	NA	<0.005	<0.0030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*MW1B-01*			*MW1B-07*		
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-18*	*GW-18235-06*	*GW-18235-07*	*GW-18235-02*	*GW-18235-06*	*GW-18235-31*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]													
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	<0.020	<0.020
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	<0.020	<0.020
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.05	0.07	<0.05	0.07U	<0.020	<0.020
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Phenanthrene	63[2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	<0.05	0.1	0.05	0.5	0.086	0.028
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Fluoranthene	130[2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	0.07	0.022	<0.020
Pyrene	40[2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	0.05	<0.020	<0.020
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.035	0.021
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	<0.05	NA	NA
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	<0.020	<0.020
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	<0.01	<0.01	0.01	0.01	<0.0050	<0.0050
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	NA	<100	<100	<100	NA
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	NA	<100	<100	<100	NA
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	<200	NA	<200	<100	NA	NA	NA	NA	<200	<100	NA	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	NA	<100	<100	<250	NA
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	NA	<100	<100	<250	NA
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	<200	NA	<200	<100	NA	NA	NA	NA	<200	<100	NA	NA

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*MW2-03*							*MW2B-07*	*MW2C-01*	
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*07/23/09*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-20*	*GW-18235-13/14*	*GW-18235-16*	*GW-18235-16*	*GW-18235-19*	*GW-18235-27*	*GW-18235-26*	*GW-18235-14*	*GW-18235-08*	*GW-18235-15*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]																	
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020	<0.020	NA	<0.020
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020	<0.020	NA	<0.020
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.05	<0.05 / 0.06	<0.05	<0.05	0.06U	<0.020	<0.020	<0.020	0.1U	<0.020
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020	<0.05	<0.020
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020	<0.05	0.032
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020	<0.05	<0.020
Phenanthrene	63[2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	0.23	0.08 / 0.11	0.05	<0.05	0.05	<0.020	0.040	<0.020	<0.05	<0.020
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020	<0.05	<0.035
Fluoranthene	130[2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	0.038	<0.020	<0.05	<0.020
Pyrene	40[2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	0.030	<0.020	<0.05	<0.020
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / 0.08	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020	<0.05	<0.020
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	0.027	<0.020	<0.05	<0.020
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05 / <0.05	NA	<0.05	<0.05	NA	NA	NA	<0.05	NA
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020	<0.020	NA	<0.020
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020	<0.05	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	<0.01	0.01 / 0.01	<0.01	<0.01	0.01	<0.0050	0.0126	<0.0050	**0.02**	<0.006
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.020	<0.1	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.020	<0.1	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.020	<0.1	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100 / <100	NA	<100 / <100	<100	<100	NA	<100	<100	<100
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100 / <100	NA	<100 / <100	<100	<100	NA	<100	<100	<100
F1+F2 (C6-C16 Hydrocarbons)	1000[2][a]	NA	<200	NA	<200	<100	NA	NA	NA	<200 / <200	NA	<200 / <200	<100	NA	NA	NA	<100	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100 / <100	NA	<100 / <100	<100	<250	NA	<250	<100	<250
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100 / <100	NA	<100 / <100	<100	<250	NA	<250	<100	<250
F3+F4 (C16-C50 Hydrocarbons)	1000[2][b]	NA	<200	NA	<200	<100	NA	NA	NA	<200 / <200	NA	<200 / <200	<100	NA	NA	NA	<100	NA

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*MW3-03*							*MW6B-07*
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*07/23/09*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-14 / 15*	*GW-18235-10*	*GW-18235-14*	*GW-18235-17*	*GW-18235-20*	*GW-18235-28*	*GW-18235-20*	*GW-18235-04*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]															
1-Methylnaphthalene	10 [2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020	<0.020
2-Methylnaphthalene	10 [2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020	<0.020
Naphthalene	21 [2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	0.06	0.07U	<0.020	<0.020	<0.020
Acenaphthylene	310 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.023	<0.020	<0.020
Acenaphthene	20 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020
Fluorene	280 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.020
Phenanthrene	63 [2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	0.48 / 0.49	<0.05	0.08	0.1	0.07	0.099	0.029	<0.020
Anthracene	12 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.027	<0.020	<0.020
Fluoranthene	130 [2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.059	<0.020	<0.020
Pyrene	40 [2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.049	<0.020	<0.020
Benzo(a)anthracene	0.2 [2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	0.07	<0.05	<0.05	0.026	<0.020	<0.020
Chrysene	0.5 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.048	<0.020	<0.020
Benzo(b/j)fluoranthene	0.2 [2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.05 / <0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA
Benzo(b)fluoranthene [4]	0.2 [2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	0.040	<0.020	<0.020
Benzo(k)fluoranthene	21 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.036	<0.020	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	<0.01 / <0.01	<0.01	0.01	0.01	**0.02**	**0.0421**	0.0072	<0.0050
Indeno(1,2,3-cd)pyrene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.1	0.035	<0.020	<0.020
Dibenzo(a,h)anthracene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.020
Benzo(g,h,i)perylene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.1	0.041	<0.020	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA / NA	<100	NA	<100	<100	<100	NA	<100
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA / NA	<100	NA	<100	<100	<100	NA	<100
F1+F2 (C6-C16 Hydrocarbons)	1000 [2][a]	NA	<200	NA	<200	<100	NA	NA	NA / NA	<200	NA	<200	<100	NA	NA	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA / NA	<100	NA	<100	<100	<250	NA	<250
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA / NA	<100	NA	<100	<100	<250	NA	<250
F3+F4 (C16-C50 Hydrocarbons)	1000 [2][b]	NA	<200	NA	<200	<100	NA	NA	NA / NA	<200	NA	<200	<100	NA	NA	NA

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*OW1B-85*				*OW1B-06*		
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-09*	*GW-18235-04*	*GW-18235-10*	*GW-18235-13*	*GW-18235-16*	*GW-18235-21*	*GW-18235-22*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]														
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	0.022	<0.020
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.05	<0.05	<0.05	0.07	0.1U	<0.020	<0.020
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Phenanthrene	63[2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	<0.05	0.05	<0.05	<0.05	0.1	0.053	0.023
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	0.023	<0.020
Fluoranthene	130[2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.1	0.039	0.022
Pyrene	40[2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.1	0.038	0.021
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.1U	0.031	<0.020
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.1	0.050	0.024
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	<0.05	0.1	NA	NA
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	0.028	<0.020
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	<0.01	0.01	<0.01	<0.01	**0.06**	**0.0296**	**0.0110**
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	0.024	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100	NA
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100	NA
F1+F2 (C6-C16 Hydrocarbons)	1000[2][a]	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250	NA
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250	NA
F3+F4 (C16-C50 Hydrocarbons)	1000[2][b]	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/l

(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*OW3B-85*				*OW3B-07*		
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-13*	*GW-18235-09*	*GW-18235-05*	*GW-18235-09*	*GW-18235-04*	*GW-18235-10*	*GW-18235-04*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]														
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.2U	<0.020	<0.020
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Phenanthrene	63[2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.2	0.033	0.093
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Fluoranthene	130[2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.1	<0.020	0.043
Pyrene	40[2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.1	<0.020	0.049
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.05U	<0.020	<0.020
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	0.07	<0.020	0.048
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	<0.05	0.07	NA	NA
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020	<0.020
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	<0.01	<0.01	<0.01	<0.01	**0.04**	<0.0050	0.0098
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100	NA
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100	NA
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250	NA
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250	NA
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/1

(b) The sum of F1 and F2 must be below 1000 µg/1

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*OW4B-91*			
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-23*	*GW-18235-17*	*GW-18235-19/20*	*GW-18235-24*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]											
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	**145,000**	**57,000**	**15,000/18,000**	**140,000**
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	**<500**	<5	160/<3	**2,900**
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	**<500**	**579**	<3/<3	**<50**
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	**<500**	**2,100**	**710/1,000**	<50
Phenanthrene	63[2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	**18,000**	**7,060**	**1,200/1,500**	**25,000**
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	**<500**	<5	**480/630**	**8,800**
Fluoranthene	130[2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	**<500**	**975**	**280/420**	**3,800**
Pyrene	40[2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	**3,020**	**2,180**	**570/940**	**6,000**
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	**2,790**	**878**	**230/330**	**3,400**
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	**<500**	**641**	**82/140**	**1,700**
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	**<500**	**340**	NA	**840**
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	**<500**	**51.3**	10/15	**140**
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	**<100**	**361**	**94/130**	**1,100**
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	**<1000**	**76**	**23/29**	**250**
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	**<1000**	**46**	**12/16**	**120**
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	**<1000**	**331**	**96/110**	**1,200**
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	15,000	NA	17,000
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	230,000	NA	900,000
F1+F2 (C6-C16 Hydrocarbons)	1000[2][a]	NA	<200	NA	<200	<100	NA	NA	NA	**245,000**	NA	**917,000**
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	420,000	NA	1,100,000
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	77,000	NA	190,000
F3+F4 (C16-C50 Hydrocarbons)	1000[2][b]	NA	<200	NA	<200	<100	NA	NA	NA	**497,000**	NA	**1,290,000**

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/l

(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*OW5C-91*		*OW5B-06*		*OW6B-92*			
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/19/06*	*07/31/07*	*07/23/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-07*	*GW-18235-11*	*GW-18235-09*	*GW-18235-18*	*GW-18235-22*	*GW-18235-16*	*GW-18235-18*	*GW-18235-23*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]															
1-Methylnaphthalene	10 [2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	<0.020	NA	NA	NA	NA
2-Methylnaphthalene	10 [2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	<0.020	NA	NA	NA	NA
Naphthalene	21 [2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.05	0.13	0.06U	<0.020	<0.05	0.06	0.05	5.5
Acenaphthylene	310 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Acenaphthene	20 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Fluorene	280 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Phenanthrene	63 [2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Anthracene	12 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Fluoranthene	130 [2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Pyrene	40 [2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	0.2 [2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Chrysene	0.5 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Benzo(b/j)fluoranthene	0.2 [2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	<0.05	<0.05	NA	<0.05
Benzo(b)fluoranthene [4]	0.2 [2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	<0.020	NA	NA	NA	NA
Benzo(k)fluoranthene	21 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.020	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	<0.01	<0.01	<0.01	<0.0050	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.020	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.020	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.020	<0.1	<0.1	<0.1	<0.1
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	<100	<100	NA	<100	NA	<100
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	<100	<100	NA	<100	NA	<100
F1+F2 (C6-C16 Hydrocarbons)	1000 [2][a]	NA	<200	NA	<200	<100	NA	NA	NA	<200	<100	NA	NA	<200	NA	<200
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	<100	<250	NA	<100	NA	<100
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	<100	<250	NA	<100	NA	<100
F3+F4 (C16-C50 Hydrocarbons)	1000 [2][b]	NA	<200	NA	<200	<100	NA	NA	NA	<200	<100	NA	NA	<200	NA	<200

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*							*OW8B-92*				*OW8B-06*	
	Collection Date	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-13*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-11*	*GW-18235-02*	*GW-18235-12*	*GW-18235-15*	*GW-18235-18*	*GW-18235-23*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]													
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.05	2.3	0.07	0.09	0.07U	<0.020
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020
Phenanthrene	63[2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	<0.05	0.05	<0.05	<0.05	<0.05	<0.020
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	0.042
Fluoranthene	130[2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020
Pyrene	40[2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	0.025
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	0.06	<0.05	<0.05	<0.05	NA
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	<0.01	0.01	<0.01	<0.01	0.01	<0.0050
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		MW1-03							OW9B-92				OW9B-06	
Collection Date		06/07/04	07/28/05	12/01/05	07/19/06	07/31/07	07/23/09	11/25/09	06/07/04	07/28/05	12/01/05	07/19/06	07/31/07	07/23/09
Sample Identification		GW-18235-19	GW-18235-11	GW-18235-13	GW-18235-18	GW-18235-21	GW-18235-29	GW-18235-29	GW-18235-04	GW-18235-08	GW-18235-03	GW-18235-03	GW-18235-06	GW-18235-12
Parameter (ug/L)	Ontario Drinking Water Standards[1]													
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.18	0.05U	<0.020	<0.020	<0.1	<0.05	0.06	<0.05	0.2u	<0.020
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.3	<0.020
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Phenanthrene	63[2]	0.15	<0.05	0.07	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	0.06	<0.020
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Fluoranthene	130[2]	0.14	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Pyrene	40[2]	<0.05	<0.05	0.08	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.1	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	<0.1	<0.05	<0.05	<0.05	<0.05	NA
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	<0.020
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1	<0.05	<0.05	<0.05	<0.05	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.04**	<0.01	0.01	<0.0050	<0.0050	**<0.02**	<0.01	<0.01	<0.01	0.01	<0.0050
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.2	<0.1	<0.1	<0.1	<0.1	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.2	<0.1	<0.1	<0.1	<0.1	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.2	<0.1	<0.1	<0.1	<0.1	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<100	NA	NA	<100	NA	<100	<100	<100
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	<100	<100	<250	NA	NA	<100	NA	<100	<100	<250
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	<200	NA	<200	<100	NA	NA	NA	<200	NA	<200	<100	NA

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1-03*					*MW1B-01*		*MW1B-07*	
	Collection Date	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*06/07/04*	*07/19/06*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-19*	*GW-18235-11*	*GW-18235-18*	*GW-18235-21*	*GW-18235-29*	*GW-18235-18*	*GW-18235-07*	*GW-18235-02*	*GW-18235-06*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]									
1,1-Dichloroethane	70[2]	<0.4	<0.1	<0.1	<0.1	<0.50	<0.4	<0.1	<0.1	<0.50
1,1-Dichloroethylene	14	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
1,1,1-Trichloroethane	200[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
1,1,2-Trichloroethane	5[2]	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.2	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.50
1,2-Dichlorobenzene	3	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.50
1,2-Dichloroethane	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
cis-1,2-Dichloroethylene	70[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1	<0.50
trans-1,2-Dichloroethylene	100[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1	<0.50
1,2-Dichloropropane	5[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
1,3-Dichlorobenzene	630[2]	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.50
cis-1,3-Dichloropropene	1.4[2(3)]	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.2	<0.2	<0.50
trans-1,3-Dichloropropene	1.4[2(3)]	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.2	<0.2	<0.50
1,4-Dichlorobenzene	5	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.50
2-Hexanone	NV	<10	<5	<5	<5	<20	<10	<5	<5	<20
Acetone	3,000[2]	<10	<10	<10	<10	<20	<10	<10	18	<20
Benzene	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
Bromodichloromethane	5[2]	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	<0.1	<0.1	<0.50
Bromoform	5[2]	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.50
Bromomethane	10[2(a)]	<3	<0.5	<0.5	<0.5	3.41 U	<3	<0.5	<0.5	1.73 U
Carbon Disulfide	NV	NA	NA	NA	NA	<0.50	NA	NA	NA	<0.50
Carbon Tetrachloride	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
Chlorobenzene	30[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
Chloroethane	NV	<1	<0.2	<0.2	<0.2	<1.0	<1	<0.2	<0.2	<1.0
Chloroform	5[2]	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	0.1	<0.1	<0.50
Chloromethane	NV	<2	<0.5	<0.5	<0.5	<1.0	<2	<0.5	<0.5	<1.0
Dibromochloromethane	5[2]	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.50
Dichlorodifluoromethane	NV	NA	NA	NA	NA	<1.0	NA	NA	NA	<1.0
Dichloromethane(Methylene Chloride)	50[2]	<1	<0.5	<0.5	<0.5	<0.50	<1	<0.5	<0.5	<0.50
Ethylbenzene	2.4	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<15	<5	<5	<5	<20	<15	<5	<5	<20
Methyl t-butyl ether (MTBE)	700[2]	<2	<0.2	<0.2	<0.2	<0.50	<2	<0.2	<0.2	<0.50
Methyl isobutyl ketone - (MIBK)	350[2]	<10	<5	<5	<5	<20	<10	<5	<5	<20
Styrene	100[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
Tetrachloroethylene	30	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
Toluene	24	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.50
Trichloroethylene	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
Trichlorofluoromethane (FREON 11)	NV	<2	<0.2	NA	<0.2	<1.0	<2	NA	<0.2	<1.0
Trihalomethanes (total)	NV	NA	NA	NA	NA	<2.0	NA	NA	NA	<2.0
Vinyl Chloride	2	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.50
o-Xylene	300	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.50
p+m-Xylene	300	<0.5	<0.1	<0.1	<0.1	<1.0	<0.5	<0.1	<0.1	<1.0
Total Xylene	300	<1	<0.1	<0.1	<0.1	<1.5	<1	<0.1	<0.1	<1.5

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Criteria for 1,3-dichloropropene

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U	Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

TABLE 5.7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW2-03*					*MW2B-07*	*MW2C-01*		*MW3-03*				
	Collection Date	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*07/23/09*	*07/31/07*	*07/23/09*	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-20*	*GW-18235-13/14*	*GW-18235-16*	*GW-18235-19*	*GW-18235-27*	*GW-18235-14*	*GW-18235-08*	*GW-18235-15*	*GW-18235-14/15*	*GW-18235-10*	*GW-18235-17*	*GW-18235-20*	*GW-18235-28*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]													
1,1-Dichloroethane	70[2]	<0.4	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.4 / <0.4	<0.1	<0.1	<0.1	<0.50
1,1-Dichloroethylene	14	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
1,1,1-Trichloroethane	200[2]	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
1,1,2-Trichloroethane	5[2]	<0.5	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<1	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<1 / <1	<0.1	<0.1	<0.1	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.5	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50
1,2-Dichlorobenzene	3	<0.5	<0.1 / <0.1	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.5 / <0.5	<0.1	<0.2	<0.2	<0.50
1,2-Dichloroethane	5	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
cis-1,2-Dichloroethylene	70[2]	<1	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<1 / <1	<0.1	<0.1	<0.1	<0.50
trans-1,2-Dichloroethylene	100[2]	<1	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<1 / <1	<0.1	<0.1	<0.1	<0.50
1,2-Dichloropropane	5[2]	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
1,3-Dichlorobenzene	630[2]	<0.5	<0.1 / <0.1	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.5 / <0.5	<0.1	<0.2	<0.2	<0.50
cis-1,3-Dichloropropene	1.4[2](3)	<0.14	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.14 / <0.14	<0.2	<0.2	<0.2	<0.50
trans-1,3-Dichloropropene	1.4[2](3)	<0.14	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.14 / <0.14	<0.2	<0.2	<0.2	<0.50
1,4-Dichlorobenzene	5	<0.5	<0.1 / <0.1	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.5 / <0.5	<0.1	<0.2	<0.2	<0.50
2-Hexanone	NV	<10	<5 / <5	<5	<5	<20	<20	<5	<20	<10 / <10	<5	<5	<5	<20
Acetone	3,000[2]	<10	<10 / <10	<10	<10	<20	<20	<10	<20	<10 / <10	<10	<10	<10	<20
Benzene	5	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
Bromodichloromethane	5[2]	<0.2	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.50
Bromoform	5[2]	<0.2	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.2 / <0.2	<0.2	<0.2	<0.2	<0.50
Bromomethane	10[2](a)	<3	<0.5 / <0.5	<0.5	<0.5	1.79 U	1.67 U	<0.5	1.63 U	<3 / <3	<0.5	<0.5	<0.5	1.76 U
Carbon Disulfide	NV	NA	NA	NA	NA	<0.50	<0.50	NA	<0.50	NA	NA	NA	NA	<0.50
Carbon Tetrachloride	5	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	0.50 UJ	<0.1	0.50 UJ	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
Chlorobenzene	30[2]	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
Chloroethane	NV	<1	<0.2 / <0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<1.0	<1 / <1	<0.2	<0.2	<0.2	<1.0
Chloroform	5[2]	<0.2	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.50
Chloromethane	NV	<2	<0.5 / <0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<1.0	<2 / <2	<0.5	<0.5	<0.5	<1.0
Dibromochloromethane	5[2]	<0.2	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.2 / <0.2	<0.2	<0.2	<0.2	<0.50
Dichlorodifluoromethane	NV	NA	NA	NA	NA	<1.0	<1.0	NA	<1.0	NA	NA	NA	NA	<1.0
Dichloromethane(Methylene Chloride)	50[2]	<1	<0.5 / <0.5	<0.5	<0.5	<0.50	<0.50	<0.5	<0.50	<1 / <1	<0.5	<0.5	<0.5	<0.50
Ethylbenzene	2.4	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<15	<5 / <5	<5	<5	<20	<20	<5	<20	<15 / <15	<5	<5	<5	<20
Methyl t-butyl ether (MTBE)	700[2]	<2	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<2 / <2	<0.2	<0.2	<0.2	<0.50
Methyl isobutyl ketone - (MIBK)	350[2]	<10	<5 / <5	<5	<5	<20	<20	<5	<20	<10 / <10	<5	<5	<5	<20
Styrene	100[2]	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
Tetrachloroethylene	30	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
Toluene	24	<0.5	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50
Trichloroethylene	5	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
Trichlorofluoromethane (FREON 11)	NV	<2	<0.2 / <0.2	NA	<0.2	<1.0	<1.0	<0.2	<1.0	<2 / <2	<0.2	NA	<0.2	<1.0
Trihalomethanes (total)	NV	NA	NA	NA	NA	<2.0	<2.0	NA	<2.0	NA	NA	NA	NA	<2.0
Vinyl Chloride	2	<0.2	<0.2 / <0.2	<0.2	<0.2	<0.50	<0.50	<0.2	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50
o-Xylene	300	<0.5	<0.1 / <0.1	<0.1	<0.1	<0.50	<0.50	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50
p+m-Xylene	300	<0.5	<0.1 / <0.1	<0.1	<0.1	<1.0	<1.0	<0.1	<1.0	<0.5 / <0.5	<0.1	<0.1	<0.1	<1.0
Total Xylene	300	<1	<0.1 / <0.1	<0.1	<0.1	<1.5	<1.5	<0.1	<1.5	<1 / <1	<0.1	<0.1	<0.1	<1.5

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Criteria for 1,3-dichloropropene
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criter
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW6B-07*	*OW1B-85*			*OW1B-06*		*OW3B-85*			*OW3B-07*	
	Collection Date	*07/23/09*	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-04*	*GW-18235-09*	*GW-18235-04*	*GW-18235-13*	*GW-18235-16*	*GW-18235-21*	*GW-18235-13*	*GW-18235-09*	*GW-18235-05*	*GW-18235-04*	*GW-18235-10*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]											
1,1-Dichloroethane	70[2]	<0.50	<0.4	<0.1	<0.1	<0.1	<0.50	<0.4	<0.1	<0.1	<0.1	<0.50
1,1-Dichloroethylene	14	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
1,1,1-Trichloroethane	200[2]	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
1,1,2-Trichloroethane	5[2]	<0.50	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.2	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<0.50	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1	<0.1	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.50	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.2	<0.50
1,2-Dichlorobenzene	3	<0.50	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.1	<0.2	<0.2	<0.50
1,2-Dichloroethane	5	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
cis-1,2-Dichloroethylene	70[2]	<0.50	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1	<0.1	<0.50
trans-1,2-Dichloroethylene	100[2]	<0.50	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1	<0.1	<0.50
1,2-Dichloropropane	5[2]	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
1,3-Dichlorobenzene	630[2]	<0.50	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.1	<0.2	<0.2	<0.50
cis-1,3-Dichloropropene	1.4[2][3]	<0.50	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.2	<0.2	<0.2	<0.50
trans-1,3-Dichloropropene	1.4[2][3]	<0.50	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.2	<0.2	<0.2	<0.50
1,4-Dichlorobenzene	5	<0.50	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.1	<0.2	<0.2	<0.50
2-Hexanone	NV	<20	<10	<5	<5	<5	<20	<10	<5	<5	<5	<20
Acetone	3,000[2]	<20	<10	<10	<10	<10	<20	<10	<10	<10	<10	<20
Benzene	5	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
Bromodichloromethane	5[2]	<0.50	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	<0.1	<0.1	<0.1	<0.50
Bromoform	5[2]	<0.50	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.2	<0.50
Bromomethane	10[2][a]	1.81 U	<3	<0.5	<0.5	<0.5	3.21 U	<3	<0.5	<0.5	<0.5	2.09 U
Carbon Disulfide	NV	<0.50	NA	NA	NA	NA	<0.50	NA	NA	NA	NA	<0.50
Carbon Tetrachloride	5	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
Chlorobenzene	30[2]	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
Chloroethane	NV	<1.0	<1	<0.2	<0.2	<0.2	<1.0	<1	<0.2	<0.2	<0.2	<1.0
Chloroform	5[2]	<0.50	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	<0.1	<0.1	<0.1	<0.50
Chloromethane	NV	<1.0	<2	<0.5	<0.5	<0.5	<1.0	<2	<0.5	<0.5	<0.5	<1.0
Dibromochloromethane	5[2]	<0.50	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.2	<0.50
Dichlorodifluoromethane	NV	<1.0	NA	NA	NA	NA	<1.0	NA	NA	NA	NA	<1.0
Dichloromethane(Methylene Chloride)	50[2]	<0.50	<1	<0.5	<0.5	<0.5	<0.50	<1	<0.5	<0.5	<0.5	<0.50
Ethylbenzene	2.4	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<20	<15	<5	<5	<5	<20	<15	<5	<5	<5	<20
Methyl t-butyl ether (MTBE)	700[2]	<0.50	<2	<0.2	<0.2	<0.2	<0.50	<2	<0.2	<0.2	<0.2	0.50 UJ
Methyl isobutyl ketone - (MIBK)	350[2]	<20	<10	<5	<5	<5	<20	<10	<5	<5	<5	<20
Styrene	100[2]	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
Tetrachloroethylene	30	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
Toluene	24	6.49	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2	<0.2	<0.50
Trichloroethylene	5	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
Trichlorofluoromethane (FREON 11)	NV	<1.0	<2	<0.2	NA	<0.2	<1.0	<2	<0.2	NA	<0.2	<1.0
Trihalomethanes (total)	NV	<2.0	NA	NA	NA	NA	<2.0	NA	NA	NA	NA	<2.0
Vinyl Chloride	2	<0.50	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.2	<0.50
o-Xylene	300	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1	<0.1	<0.50
p+m-Xylene	300	<1.0	<0.5	<0.1	<0.1	<0.1	<1.0	<0.5	<0.1	<0.1	<0.1	<1.0
Total Xylene	300	<1.5	<1	<0.1	<0.1	<0.1	<1.5	<1	<0.1	<0.1	<0.1	<1.5

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Criteria for 1,3-dichloropropene
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criter
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW4B-91*			*OW5C-91*		*OW5B-06*	
	Collection Date	*06/07/04*	*07/28/05*	*07/19/06*	*06/07/04*	*07/19/06*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-23*	*GW-18235-17*	*GW-18235-24*	*GW-18235-07*	*GW-18235-07*	*GW-18235-09*	*GW-18235-18*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]							
1,1-Dichloroethane	70[2]	<40	<20	<50	<0.4	<0.1	<0.1	<0.50
1,1-Dichloroethylene	14	**<50**	**<20**	**<50**	<0.5	<0.1	<0.1	<0.50
1,1,1-Trichloroethane	200[2]	<50	<20	<50	<0.5	<0.1	<0.1	<0.50
1,1,1,2-Tetrachloroethane	5[2]	**<50**	**<20**	**<50**	<0.5	<0.1	<0.1	<0.50
1,1,2-Trichloroethane	5[2]	**<50**	**<40**	**<100**	<0.5	<0.2	<0.2	<0.50
1,1,2,2-Tetrachloroethane	1[2]	**<100**	**<20**	**<50**	<1	<0.1	<0.1	<0.50
1,2-Dibromoethane (EDB)	1[2]	<50	<40	**<100**	<0.5	<0.2	<0.2	<0.50
1,2-Dichlorobenzene	3	**<50**	**<20**	**<100**	<0.5	<0.2	<0.2	<0.50
1,2-Dichloroethane	5	**<50**	**<20**	**<50**	<0.5	<0.1	<0.1	<0.50
cis-1,2-Dichloroethylene	70[2]	**<100**	<20	<50	<1	<0.1	<0.1	<0.50
trans-1,2-Dichloroethylene	100[2]	<100	<20	<50	<1	<0.1	<0.1	<0.50
1,2-Dichloropropane	5[2]	**<50**	**<20**	**<50**	<0.5	<0.1	<0.1	<0.50
1,3-Dichlorobenzene	630[2]	<50	<20	<100	<0.5	<0.2	<0.2	<0.50
cis-1,3-Dichloropropene	1.4[2][3]	**<14**	**<40**	**<100**	<0.14	<0.2	<0.2	<0.50
trans-1,3-Dichloropropene	1.4[2][3]	**<14**	**<40**	**<100**	<0.14	<0.2	<0.2	<0.50
1,4-Dichlorobenzene	5	**<50**	**<20**	**<100**	<0.5	<0.2	<0.2	<0.50
2-Hexanone	NV	<1000	<1,000	<3,000	<10	<5	<5	<20
Acetone	3,000[2]	<1000	<2,000	**<5,000**	<10	<10	<10	<20
Benzene	5	**390**	**391**	**510**	<0.5	<0.1	<0.1	<0.50
Bromodichloromethane	5[2]	**<20**	**<20**	**<50**	<0.2	<0.1	<0.1	<0.50
Bromoform	5[2]	**<20**	**<40**	**<100**	<0.2	<0.2	<0.2	<0.50
Bromomethane	10[2][a]	**<300**	**<100**	**<300**	<3	<0.5	<0.5	2.35 U
Carbon Disulfide	NV	NA	NA	NA	NA	NA	NA	<0.50
Carbon Tetrachloride	5	**<50**	**<20**	**<50**	<0.5	<0.1	<0.1	<0.50
Chlorobenzene	30[2]	**<50**	<20	**<50**	<0.5	<0.1	<0.1	<0.50
Chloroethane	NV	<100	<40	<100	<1	<0.2	<0.2	<1.0
Chloroform	5[2]	**<20**	**<20**	**<50**	<0.2	<0.1	<0.1	<0.50
Chloromethane	NV	<200	<100	<300	<2	<0.5	<0.5	<1.0
Dibromochloromethane	5[2]	**<20**	**<40**	**<100**	<0.2	<0.2	<0.2	<0.50
Dichlorodifluoromethane	NV	NA	NA	NA	NA	NA	NA	<1.0
Dichloromethane(Methylene Chloride)	50[2]	**<100**	**<100**	**<300**	<1	<0.5	<0.5	<0.50
Ethylbenzene	2.4	**1,300**	**1,800**	**1,800**	<0.5	<0.1	<0.1	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	**<1500**	**<1,000**	**<3,000**	<15	<5	<5	<20
Methyl t-butyl ether (MTBE)	700[2]	<200	<40	<100	<2	<0.2	<0.2	0.50 UJ
Methyl isobutyl ketone - (MIBK)	350[2]	**<1000**	**<1,000**	**<3,000**	<10	<5	<5	<20
Styrene	100[2]	<50	89	<90	<0.5	<0.1	<0.1	<0.50
Tetrachloroethylene	30	**<50**	<20	**<50**	<0.5	<0.1	<0.1	<0.50
Toluene	24	**<50**	**60**	**<100**	<0.5	<0.2	<0.2	<0.50
Trichloroethylene	5	**<50**	**<20**	**<50**	<0.5	<0.1	<0.1	<0.50
Trichlorofluoromethane (FREON 11)	NV	<200	<40	NA	<2	NA	<0.2	<1.0
Trihalomethanes (total)	NV	NA	NA	NA	NA	NA	NA	<2.0
Vinyl Chloride	2	**<20**	**<40**	**<100**	<0.2	<0.2	<0.2	<0.50
o-Xylene	300	**2,000**	**2,590**	**2,900**	<0.5	<0.1	<0.1	<0.50
p+m-Xylene	300	**2,000**	**2,390**	**3,200**	<0.5	<0.1	<0.1	<1.0
Total Xylene	300	**4,000**	**4,980**	**6,100**	<1	<0.1	<0.1	<1.5

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Criteria for 1,3-dichloropropene
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criter
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW6B-92*			*OW8B-92*			*OW8B-06*	
	Collection Date	*06/07/04*	*07/28/05*	*07/19/06*	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-22*	*GW-18235-11*	*GW-18235-23*	*GW-18235-11*	*GW-18235-02*	*GW-18235-15*	*GW-18235-18*	*GW-18235-23*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]								
1,1-Dichloroethane	70[2]	<0.4	<0.1	0.1	<0.4	<0.1	<0.1	<0.1	<0.50
1,1-Dichloroethylene	14	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
1,1,1-Trichloroethane	200[2]	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
1,1,2-Trichloroethane	5[2]	<0.5	<0.2	0.2	<0.5	<0.2	<0.2	<0.2	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<1	<0.1	0.1	<1	<0.1	<0.1	<0.1	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.5	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.50
1,2-Dichlorobenzene	3	<0.5	<0.1	0.2	<0.5	<0.1	<0.2	<0.2	<0.50
1,2-Dichloroethane	5	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
cis-1,2-Dichloroethylene	70[2]	<1	<0.1	0.1	<1	<0.1	<0.1	<0.1	<0.50
trans-1,2-Dichloroethylene	100[2]	<1	<0.1	0.1	<1	<0.1	<0.1	<0.1	<0.50
1,2-Dichloropropane	5[2]	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
1,3-Dichlorobenzene	630[2]	<0.5	<0.1	0.2	<0.5	<0.1	<0.2	<0.2	<0.50
cis-1,3-Dichloropropene	1.4[2](3)	<0.14	<0.2	0.2	<0.14	<0.2	<0.2	<0.2	<0.50
trans-1,3-Dichloropropene	1.4[2](3)	<0.14	<0.2	0.2	<0.14	<0.2	<0.2	<0.2	<0.50
1,4-Dichlorobenzene	5	<0.5	<0.1	0.2	<0.5	<0.1	<0.2	<0.2	<0.50
2-Hexanone	NV	<10	<5	5	<10	<5	<5	<5	<20
Acetone	3,000[2]	<10	<10	10	<10	<10	<10	<10	<20
Benzene	5	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
Bromodichloromethane	5[2]	<0.2	<0.1	0.1	<0.2	<0.1	<0.1	<0.1	<0.50
Bromoform	5[2]	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.50
Bromomethane	10[2](a)	<3	<0.5	0.5	<3	<0.5	<0.5	<0.5	3.08 U
Carbon Disulfide	NV	NA	NA	NA	NA	NA	NA	NA	<0.50
Carbon Tetrachloride	5	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
Chlorobenzene	30[2]	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
Chloroethane	NV	<1	<0.2	0.2	<1	<0.2	<0.2	<0.2	<1.0
Chloroform	5[2]	<0.2	<0.1	0.1	<0.2	<0.1	<0.1	<0.1	<0.50
Chloromethane	NV	<2	<0.5	0.5	<2	<0.5	<0.5	<0.5	<1.0
Dibromochloromethane	5[2]	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.50
Dichlorodifluoromethane	NV	NA	NA	NA	NA	NA	NA	NA	<1.0
Dichloromethane(Methylene Chloride)	50[2]	<1	<0.5	0.5	<1	<0.5	<0.5	<0.5	<0.50
Ethylbenzene	2.4	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<15	<5	5	<15	<5	<5	<5	<20
Methyl t-butyl ether (MTBE)	700[2]	<2	<0.2	0.2	<2	<0.2	<0.2	<0.2	<0.50
Methyl isobutyl ketone - (MIBK)	350[2]	<10	<5	5	<10	<5	<5	<5	<20
Styrene	100[2]	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
Tetrachloroethylene	30	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
Toluene	24	<0.5	<0.2	0.2	<0.5	<0.2	<0.2	<0.2	<0.50
Trichloroethylene	5	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
Trichlorofluoromethane (FREON 11)	NV	<2	<0.2	NA	<2	<0.2	NA	<0.2	<1.0
Trihalomethanes (total)	NV	NA	NA	NA	NA	NA	NA	NA	<2.0
Vinyl Chloride	2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.50
o-Xylene	300	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<0.50
p+m-Xylene	300	<0.5	<0.1	0.1	<0.5	<0.1	<0.1	<0.1	<1.0
Total Xylene	300	<1	<0.1	0.1	<1	<0.1	<0.1	<0.1	<1.5

Notes:
All concentrations are in ug/L unless otherwise noted.

(1)	Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2)	Table 2, Ontario Regulation 153/04, March 2004
(3)	Criteria for 1,3-dichloropropene
NV	No value
NA	Not Analyzed
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O.Reg 153/04 criter
559 U	Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

TABLE 5.7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW9B-92*			*OW9B-06*		*Field Blank*					
	Collection Date	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*07/07/04*	*07/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-04*	*GW-18235-08*	*GW-18235-03*	*GW-18235-06*	*GW-18235-12*	*GW-18235-03*	*GW-18235-16*	*GW-18235-12*	*GW-18235-21*	*GW-18235-15*	*GW-18235-30*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]											
1,1-Dichloroethane	70[2]	<0.4	<0.1	<0.1	<0.1	<0.50	<0.4	<0.4	<0.1	<0.1	<0.1	< 0.50
1,1-Dichloroethylene	14	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
1,1,1-Trichloroethane	200[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
1,1,2-Trichloroethane	5[2]	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.5	<0.2	<0.2	<0.2	< 0.50
1,1,2,2-Tetrachloroethane	1[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<1	<0.1	<0.1	<0.1	< 0.50
1,2-Dibromoethane (EDB)	1[2]	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.5	<0.2	<0.2	<0.2	< 0.50
1,2-Dichlorobenzene	3	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.5	<0.1	<0.2	<0.2	< 0.50
1,2-Dichloroethane	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
cis-1,2-Dichloroethylene	70[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<1	<0.1	<0.1	<0.1	< 0.50
trans-1,2-Dichloroethylene	100[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<1	<0.1	<0.1	<0.1	< 0.50
1,2-Dichloropropane	5[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
1,3-Dichlorobenzene	630[2]	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.5	<0.1	<0.2	<0.2	< 0.50
cis-1,3-Dichloropropene	1.4[2(3)]	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.14	<0.2	<0.2	<0.2	< 0.50
trans-1,3-Dichloropropene	1.4[2(3)]	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.14	<0.2	<0.2	<0.2	< 0.50
1,4-Dichlorobenzene	5	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.5	<0.1	<0.2	<0.2	< 0.50
2-Hexanone	NV	<10	<5	<5	<5	<20	<10	<10	<5	<5	<5	< 20
Acetone	3,000[2]	<10	<10	<10	<10	<20	<10	<10	<10	<10	<10	< 20
Benzene	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	0.3	< 0.50
Bromodichloromethane	5[2]	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	<0.2	<0.1	<0.1	<0.1	< 0.50
Bromoform	5[2]	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	< 0.50
Bromomethane	10[2(a)]	<3	<0.5	<0.5	<0.5	2.80 U	<3	<3	<0.5	<0.5	<0.5	3.49
Carbon Disulfide	NV	NA	NA	NA	NA	<0.50						< 0.50
Carbon Tetrachloride	5	<0.5	<0.1	<0.1	<0.1	0.50 UJ	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
Chlorobenzene	30[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
Chloroethane	NV	<1	<0.2	<0.2	<0.2	<1.0	<1	<1	<0.2	<0.2	<0.2	< 1.0
Chloroform	5[2]	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	<0.2	0.6	0.2	0.2	< 0.50
Chloromethane	NV	<2	<0.5	<0.5	<0.5	<1.0	<2	<2	<0.5	<0.5	<0.5	< 1.0
Dibromochloromethane	5[2]	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.2	1.6	< 0.50
Dichlorodifluoromethane	NV	NA	NA	NA	NA	<1.0						< 1.0
Dichloromethane(Methylene Chloride)	50[2]	<1	<0.5	<0.5	<0.5	<0.50	<1	<1	22.1	1.4	<0.5	0.85
Ethylbenzene	2.4	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	0.3	< 0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<15	<5	<5	<5	<20	<15	<15	<5	<5	<5	< 20
Methyl t-butyl ether (MTBE)	700[2]	<2	<0.2	<0.2	<0.2	<0.50	<2	<2	<0.2	<0.2	<0.2	< 0.50
Methyl isobutyl ketone - (MIBK)	350[2]	<10	<5	<5	<5	<20	<10	<10	<5	<5	<5	< 20
Styrene	100[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
Tetrachloroethylene	30	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
Toluene	24	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.5	0.3	0.6	**5.4**	< 0.50
Trichloroethylene	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
Trichlorofluoromethane (FREON 11)	NV	<2	<0.2	NA	<0.2	<1.0	<2	<2	<0.2	NA	<0.2	< 1.0
Trihalomethanes (total)	NV	NA	NA	NA	NA	<2.0						< 2.0
Vinyl Chloride	2	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	< 0.50
o-Xylene	300	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.5	<0.1	<0.1	<0.1	< 0.50
p+m-Xylene	300	<0.5	<0.1	<0.1	<0.1	<1.0	<0.5	<0.5	<0.1	<0.1	1.2	< 1.0
Total Xylene	300	<1	<0.1	<0.1	<0.1	<1.5	<1	<1	<0.1	<0.1	<0.1	< 1.5

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Criteria for 1,3-dichloropropene

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criter

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1A-01*						*MW1A-07*			
	Collection Date	*06/07/04*	*11/29/04*	*12/02/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-17*	*GW-18235-24*	*GW-18235-21*	*GW-18235-17*	*GW-18235-06*	*GW-18235-05*	*GW-18235-20*	*GW-18235-01*	*GW-18235-05*	*GW-18235-24*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Alkalinity (Total as CaCO3)	30NA500	417	326	291	256	149	238	118	202	151	140
Ammonia (as Nitrogen)	NV	<0.05	<0.05	0.1	0.11	0.19	0.12	0.84	3.73	0.087 U	0.571
Hardness (CaCO3)	80NA100	**2,020**	NA	**1,900**	NA	**1,800**	NA	NA	**9 J**	**129**	NA
Nitrate (N)	10	<1	0.1	0.4	0.6	1.5	3.2	<0.1	<0.1	0.58	<0.10
Nitrite (N)	1	<0.1	NA	0.4	NA	<0.1	NA	NA	0.1	<0.10	NA
Total Kjeldahl Nitrogen (TKN)	NV	1 U	NA	18	NA	0.4	NA	NA	33	1.06	NA
Chloride (Cl)	250	28.1	18.8	23	30	40	25	13	6	30	23.7
Sulfates (SO4)	500	**2,140**	**2,240**	**1,860**	**1,870**	**2,000**	**1,630**	223	135 J	65	74.9
Dissolved Organic Carbon (DOC)	5	3.1 U	3.7	**7.6**	4.7	4.1	3.2	4.8	**6.4**	2.6	2.9 U
Total Dissolved Solids (TDS)	500	**2,490**	**3,540**	**4,720**	**2,310**	**2,460**	**3,080**	440	**655**	298	324
Total Suspended Solids (TSS)	NV	11,400	NA	38,000	NA	60,000	NA	NA	79,000	4,170	NA
PhenolNA4AAP	4.2[2]	<0.001	NA	<0.001	NA	<0.001	NA	NA	<0.001/<0.001	0.0124	NA
Biological Oxygen Demand (BOD5)	NV	<3	NA	7	NA	<2	NA	NA	7	<6.0	NA
Chemical Oxygen Demand (COD)	NV	10 U	<4	440	260	350	50	34	17	<10	25
pH (Standard Units)	6.5NA8.5	7.75	7.83	7.83	7.8	7.8	8.0	8.1	**11**	**11.51**	**11.39**
Total Phosphorus (P)	NV	1.43	NA	15	NA	0.76	NA	NA	19	0.888	NA
Potassium (K)	NV	13	NA	NA	NA	6.1	NA	NA	5.8	<10	NA
Conductivity (umhos/cm)	NV	3,620	3,710	2,970	3,550	3,730	3,650	772	942	921	857
Calcium (Ca)	NV	450	530	580	500	510	510	13	3.7	49.3	65.4
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	**34,500**	**9.7**	**11.3**

Notes:
All concentrations are in mg/L unless otherwise noted.

(1)	Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2)	Table 2, Ontario Regulation 153/04, March 2004
(3)	Applicable at point of consumption.
NV	No value
NA	Not Analyzed
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U	Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW2A-01*											
	Collection Date	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-01/02*	*GW-18235-14*	*GW-18235-07*	*GW-18235-07*	*GW-18235-01*	*GW-18235-12*	*GW-18235-01*	*GW-18235-01*	*GW-18235-12/13*	*GW-18235-07*	*GW-18235-13*	*GW-18235-01*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	392 / 391	381	375	391	416	455	427	426	404/404	299	438	406
Ammonia (as Nitrogen)	NV	0.12 / 0.12	<0.05	0.21	0.16	0.16	0.08	0.19	0.11	0.13/0.13	0.17U	0.144	0.087
Hardness (CaCO3)	80NA100	**2,750 / 2,770**	NA	NA	**2,640**	NA	NA	**3,200**	NA	NA/NA	**3,300**	**3,260**	NA
Nitrate (N)	10	<0.1 / <1	<0.1	<1	<0.2	<0.1	1.1	0.2	0.1	<0.1/<0.1	<0.1	<1.0	<0.50
Nitrite (N)	1	<0.1 / <0.1	NA	NA	<0.3	NA	NA	0.01	NA	NA/NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	0.7U / 0.6U	NA	NA	0.6	NA	NA	0.4	NA	NA/NA	1.6	<0.15	NA
Chloride (Cl)	250	12.5 / 12.6	10.8	11.8	11.8	11	18	14	12	12/13	23	21.4	11.6
Sulfates (SO4)	500	**2,470 / 2,500**	**2,320**	**2,480**	**2,540**	**2,430**	**2,800**	**2,440**	**2,430**	**2,670/2,270**	**2,800 J**	**3,240**	**3,050**
Dissolved Organic Carbon (DOC)	5	4.3U **/ 5.1U**	2.1	1.6	1.5	1.3	2	1.8	1.6	1.6/1.6	1.7	**7.5**	2.6 U
Total Dissolved Solids (TDS)	500	**4,020 / 3,820**	**3,760**	**4,210**	**4,470**	**4,120**	**3,000**	**2,790**	**4,020**	**3,220/3,240/3,910**	**1,870**	**4,630**	**4,390**
Total Suspended Solids (TSS)	NV	467 / 479	NA	NA	160	NA	NA	55	NA	NA/NA	2,300	474	NA
PhenolNA4AAP	4.2[2]	0.001 / <0.001	NA	NA	<0.001	NA	NA	<0.001	NA	NA/NA	<0.001	0.0015	NA
Biological Oxygen Demand (BOD5)	NV	<3 / <3	NA	NA	<2	NA	NA	<2	NA	NA/NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	6U / 8U	7	<4	6	5	8	<4	<4	<4/<4	<4	<10	<10
pH (Standard Units)	6.5NA8.5	7.27 / 7.44	7.92	7.73	8.01	7.95	7.8	7.6	7.9	7.7/7.8	8.0	7.55	7.56
Total Phosphorus (P)	NV	0.08J / 0.12J	NA	NA	0.152	NA	NA	0.059	NA	NA/NA	1.1	0.188	NA
Potassium (K)	NV	5.8 / 5.3	NA	NA	5.9	NA	NA	7.3	NA	NA/NA	9.5	<10	NA
Conductivity (umhos/cm)	NV	3,560 / 3,560	3,800	4,090	3,780	4,090	4,610	4,170	4,170	4,050/4,060	3,890	4,200	4,080
Calcium (Ca)	NV	420 / 380	530	510	500	530	450	510	190	540/530	550	500	473
Turbidity (NTU)	5[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1,950**	**9.4**	**11.6**

Notes:
All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW4A-09*		*MW5A-09*		*MW6A-07*		*OW1A-85*						
Collection Date		*07/23/09*	*11/25/09*	*07/23/09*	*11/24/09*	*07/23/09*	*11/24/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*
Sample Identification		*GW-18235-26*	*GW-18235-30*	*GW-18235-01/02*	*GW-18235-09*	*GW-18235-03*	*GW-18235-08*	*GW-18235-08*	*GW-18235-10*	*GW-18235-15*	*GW-18235-03*	*GW-18235-09*	*GW-18235-01*	*GW-18235-12*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]													
Alkalinity (Total as CaCO3)	30NA500	500	358	418/424	412	451	434	358	352	335	373	389	374	381
Ammonia (as Nitrogen)	NV	0.342 U	0.069	0.755/0.78	0.442	0.564	0.235	0.53	0.25	0.12	0.42	28.7	0.54	0.74
Hardness (CaCO3)	80NA100	**2,540**	NA	**3,100/3,120**	NA	**2,710**	NA	**1,670**	NA	NA	**1,980**	NA	NA	**2,000**
Nitrate (N)	10	<1.0	<0.50	<1.0/<1.0	0.5	<1.0	0.5	<1	0.3	<1	<0.2	<0.1	<0.1	<0.1
Nitrite (N)	1	<1.0	NA	<1.0/<1.0	NA	<1.0	NA	<0.1	NA	NA	<0.3	NA	NA	0.01
Total Kjeldahl Nitrogen (TKN)	NV	0.404	NA	0.9/0.997	NA	0.61	NA	1.2 U	NA	NA	0.9	NA	NA	0.8
Chloride (Cl)	250	<20	17.1	<20/<20	13.3	<20	10	22.1	5.39	9.4	8	7	6	7
Sulfates (SO4)	500	**2,470**	**2,960**	**3,200/3,190**	**2,910**	**2,600**	**2,550**	**1,810**	**1,650**	**1,770**	**1,870**	**1,920**	**1,440**	**1,630**
Dissolved Organic Carbon (DOC)	5	**5.4**	4.5 U	4.7/4.5	5.4	4.1	4.3	3.2 U	2.5	1.8	2	**130**	3.1	1.9
Total Dissolved Solids (TDS)	500	**3,830**	**3,960**	**4,510/4,520**	**4,450**	**3,790**	**4,000**	**2,650**	**2,980**	**3,810**	**3,150**	**3,390**	**1,950**	**2,010**
Total Suspended Solids (TSS)	NV	6,230	NA	4,670/7,460	NA	5,620	NA	5,520	NA	NA	2,000	NA	NA	2,700
PhenolNA4AAP	4.2[2]	0.0033	NA	0.0011 J/0.0091 J	NA	0.0064	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001
Biological Oxygen Demand (BOD5)	NV	<6.0	NA	<6.0/<6.0	NA	<6.0	NA	<3	NA	NA	<2	NA	NA	<2
Chemical Oxygen Demand (COD)	NV	10	20	<10/<10	14	10	20	11 U	<4	42	17	1,000	69	27
pH (Standard Units)	6.5NA8.5	7.66	7.77	7.6/7.6	7.5	7.51	7.51	7.67	7.89	7.81	7.82	7.97	7.7	7.7
Total Phosphorus (P)	NV	0.304	NA	0.508/0.638	NA	0.183	NA	2.9	NA	NA	0.76	NA	NA	1.6
Potassium (K)	NV	20	NA	<10/<10	NA	<10	NA	4.3	NA	NA	2.8	NA	NA	3.5
Conductivity (umhos/cm)	NV	3,890	3,870	4,200/4,180	4,180	3,700	3,760	2,660	2,870	2,950	2,910	3,190	3,010	3,080
Calcium (Ca)	NV	531	504	502/508	504	541	521	510	590	560	580	610	570	580
Turbidity (NTU)	5[3]	**11.4**	**12.7**	**119/74**	**6.7**	**35**	**11.8**	NA	NA	NA	NA	NA	NA	NA

Notes:
All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW1A-06*					*OW3A-85*					
Collection Date		*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*12/01/05*	*05/29/06*	*07/19/06*
Sample Identification		*GW-18235-09*	*GW-18235-17*	*GW-18235-13/14*	*GW-18235-20*	*GW-18235-06*	*GW-18235-12*	*GW-18235-23*	*GW-18235-10*	*GW-18235-04*	*GW-18235-14*	*GW-18235-04*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Alkalinity (Total as CaCO3)	30NA500	374	351	379/377	459	516	**660**	**554**	**626**	**649**	**733**	**613**
Ammonia (as Nitrogen)	NV	0.71	0.56	0.72/0.70	0.438	0.283	0.24	0.21	0.22	0.28	0.26	0.52
Hardness (CaCO3)	80NA100	NA	NA	**3,100/3,100**	**2,860**	NA	**1,110**	NA	NA	NA	NA	**790**
Nitrate (N)	10	<0.1	<0.1	<0.1/<0.1	<1.0	<0.50	<1	<0.1	ND	<0.1	<0.1	<0.1
Nitrite (N)	1	NA	NA	<0.01<0.01	<1.0	NA	<0.1	NA	NA	NA	NA	<0.01
Total Kjeldahl Nitrogen (TKN)	NV	NA	NA	3/4	0.465	NA	1.7	NA	NA	NA	NA	0.8
Chloride (Cl)	250	12	12	12/13	<20	10.6	21.5	4.9	7	6	7	7
Sulfates (SO4)	500	**2,680**	**2,400**	**2,800 J/2,690**	**2,800**	**2,680**	**660**	**807**	**549**	**615**	260	**995**
Dissolved Organic Carbon (DOC)	5	**5.7**	2.7	2.0/2.2	3.8	3 U	3.4 U	2.8	1.9	**5**	2.6	1.9
Total Dissolved Solids (TDS)	500	**4,320**	**4,240**	**1,810/1,930**	**4,120**	**4,070**	**1,010**	**1,500**	**1,960**	**1,320**	**1,040**	**1,630**
Total Suspended Solids (TSS)	NV	NA	NA	5,500/5,100	710	NA	4,190	NA	NA	NA	NA	2,100
PhenolNA4AAP	4.2[2]	NA	NA	<0.001/<0.001	0.0018	NA	<0.001	NA	NA	NA	NA	<0.001
Biological Oxygen Demand (BOD5)	NV	NA	NA	<2/<2	<6.0	NA	<3	NA	NA	NA	NA	<2
Chemical Oxygen Demand (COD)	NV	420	9	<4/<4	<10	27	<4	<4	63	110	5	12
pH (Standard Units)	6.5NA8.5	7.8	7.8	8.0/7.9	7.72	7.74	7.92	8.13	8.02	8.16	8.2	7.8
Total Phosphorus (P)	NV	NA	NA	3.4/2.4	0.406	NA	1.89	NA	NA	NA	NA	1.3
Potassium (K)	NV	NA	NA	6.0/5.7	<10	NA	4	NA	NA	NA	NA	3.3
Conductivity (umhos/cm)	NV	4,450	4,330	3,840/3,820	4,010	4,030	1,830	2,050	1,870	2,030	1,600	2,550
Calcium (Ca)	NV	500	480	550/550	419	384	78	210	110	240	220	67
Turbidity (NTU)	5[3]	NA	NA	**2,770/2,750**	**10**	**13.8**	NA	NA	NA	NA	NA	NA

Notes:
All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW3A-07*				*OW5A-91*						
Collection Date		*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*
Sample Identification		*GW-18235-16*	*GW-18235-03*	*GW-18235-09*	*GW-18235-03*	*GW-18235-05*	*GW-18235-12*	*GW-18235-13*	*GW-18235-05*	*GW-18235-07*	*GW-18235-03*	*GW-18235-08/09*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Alkalinity (Total as CaCO3)	30NA500	409	390	423	446	417	406	395	406	424	437	437/442
Ammonia (as Nitrogen)	NV	0.19	0.27U	0.083	<0.050	0.25	0.31	0.12	0.28	0.28	0.27	0.39/0.38
Hardness (CaCO3)	80NA100	NA	**1,800**	**1,210**	NA	**2,730**	NA	NA	**2,750**	NA	NA	**2,700/2,900**
Nitrate (N)	10	<0.1	<0.1	<1.0	<0.10	<1	<0.1	ND	<0.2	<0.1	<0.1	<0.1/<0.1
Nitrite (N)	1	NA	<0.01	<1.0	NA	<0.1	NA	NA	<0.3	NA	NA	<0.01/<0.01
Total Kjeldahl Nitrogen (TKN)	NV	NA	1.3	<0.15	NA	0.8 U	NA	NA	0.5	NA	NA	0.5/0.5
Chloride (Cl)	250	6	5	<20	2.7	12.2	10.9	11.8	13.2	13	13	13/13
Sulfates (SO4)	500	**852**	**1,190**	**1,270**	**717**	**2,420**	**2,390**	**2,490**	**1,590**	**2,530**	**1,880**	**2,310/2,350**
Dissolved Organic Carbon (DOC)	5	**10.3**	4.6/4.7	**6.0**	**6.8**	3.2 U	2	1.5	1.5	1.6	2.2	1.7/1.7
Total Dissolved Solids (TDS)	500	**1,280**	**1,310**	**1,880**	**1,450**	**4,210**	**3,860**	**4,070**	**3,980**	**4,160**	**2,600**	**2,630/2,660**
Total Suspended Solids (TSS)	NV	NA	3,100	1,570	NA	165	NA	NA	40	NA	NA	180/220
PhenolNA4AAP	4.2[2]	NA	<0.001	0.001	NA	<0.001	NA	NA	0.001	NA	NA	<0.001/<0.001
Biological Oxygen Demand (BOD5)	NV	NA	<2	<6.0	NA	<3	NA	NA	<2	NA	NA	<2/<2
Chemical Oxygen Demand (COD)	NV	32	<4	10	16	10 U	<4	7	<4	9	8	9/<4
pH (Standard Units)	6.5NA8.5	7.9	7.9	7.74	7.75	7.63	7.89	7.76	7.85	7.99	7.8	7.7/7.8
Total Phosphorus (P)	NV	NA	1.5	0.97	NA	0.07	NA	NA	0.027	NA	NA	0.094/0.09
Potassium (K)	NV	NA	4.6	<10	NA	5.1	NA	NA	5.2	NA	NA	5.4/5.3
Conductivity (umhos/cm)	NV	2,130	2,300	2,230	1,770	3,480	3,780	4,000	3,680	4,090	4,000	4,010/4,020
Calcium (Ca)	NV	280	440	277	188	410	500	540	490	550	510	510/520
Turbidity (NTU)	5[3]	NA	**2,300**	**11.5**	**54.0**	NA	NA	NA	NA	NA	NA	NA

Notes:
All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW5A-06*					*OW5B-91*						
Collection Date		*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*
Sample Identification		*GW-18235-07*	*GW-18235-18*	*GW-18235-10*	*GW-18235-19*	*GW-18235-10*	*GW-18235-06*	*GW-18235-13*	*GW-18235-14*	*GW-18235-06*	*GW-18235-08*	*GW-18235-09*	*GW-18235-10*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	399	413	411	447	421	325	284	278	292	300	312	307
Ammonia (as Nitrogen)	NV	0.67	0.47	0.78	0.555	0.456	0.59	0.57	0.7	0.76	0.71	0.67	0.82
Hardness (CaCO3)	80NA100	NA	NA	**2,600**	**2,410**	NA	**2,330**	NA	NA	**2,110**	NA	NA	**2,300**
Nitrate (N)	10	<0.1	<0.1	<0.1	<1.0	<0.50	<1	<0.1	<1	<0.2	<0.1	<0.1	<0.1
Nitrite (N)	1	NA	NA	<0.01	<1.0	NA	<0.1	NA	NA	<0.3	NA	NA	<0.01
Total Kjeldahl Nitrogen (TKN)	NV	NA	NA	5	0.56	NA	1.8	NA	NA	1	NA	NA	0.9
Chloride (Cl)	250	61	21	16	<20	<10	11	11.9	8.8	8	9	10	10
Sulfates (SO4)	500	**1,640**	**2,170**	**2,030**	**2,440**	**2,550**	**2,090**	**1,640**	**2,160**	**1,340**	**2,100**	**1,970**	**2,020**
Dissolved Organic Carbon (DOC)	5	**16.7**	3.0/3.0	4.2	4.1	3.6 U	3.7 U	2.7	2.5	2.5	2.1	2.6	2.5
Total Dissolved Solids (TDS)	500	**3,280**	**2,670**	**1,660**	**3,520**	**3,530**	**4,990**	**3,270**	**3,990**	**3,490**	**3,530**	**2,340**	**2,490**
Total Suspended Solids (TSS)	NV	NA	NA	13,000	2,630	NA	5,060	NA	NA	910	NA	NA	450
PhenolNA4AAP	4.2[2]	NA	NA	<0.001	0.0022	NA	<0.001	NA	NA	0.002	NA	NA	<0.001
Biological Oxygen Demand (BOD5)	NV	NA	NA	<2	<6.0	NA	<3	NA	NA	<2	NA	NA	<2
Chemical Oxygen Demand (COD)	NV	100	6	<4	<10	50	9 U	8	13	18	13	14	11
pH (Standard Units)	6.5NA8.5	7.8	7.8	7.8	7.6	7.57	7.73	7.97	7.93	8.07	7.92	8.1	7.9
Total Phosphorus (P)	NV	NA	NA	3.8	0.575	NA	1.13	NA	NA	0.387	NA	NA	0.12
Potassium (K)	NV	NA	NA	6.3	<10	NA	4.1	NA	NA	4.0	NA	NA	3.8
Conductivity (umhos/cm)	NV	3,430	3,790	3,280	3,470	3,400	3,240	3,420	3,560	3,350	3,700	3,600	3,610
Calcium (Ca)	NV	580	550	620	555	550	390	380	340	330	380	320	380
Turbidity (NTU)	5[3]	NA	NA	**9,150**	**9.8**	**14.2**	NA	NA	NA	NA	NA	NA	NA

Notes:
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(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Parameter (mg/L)	*Well Identification*	*Ontario Drinking Water Standards* [1]	*OW6A-92*								*OW8A-92*						
	Collection Date		*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*
	Sample Identification		*GW-18235-21*	*GW-18235-26*	*GW-18235-17*	*GW-18235-15*	*GW-18235-17*	*GW-18235-04*	*GW-18235-22*	*GW-18235-18*	*GW-18235-10*	*GW-18235-18*	*GW-18235-11*	*GW-18235-01*	*GW-18235-11*	*GW-18235-07*	*GW-18235-14*
Alkalinity (Total as CaCO3)	30NA500		**940**	**899**	**764**	**514**	**751**	**608**	**595**	**699**	445	418	411	432	447	459	453
Ammonia (as Nitrogen)	NV		<0.05	<0.05	<0.05	0.29	0.33	0.28	0.37	0.18	0.51	0.59	0.52	0.4	0.58	0.58	0.65
Hardness (CaCO3)	80NA100		**2,020**	NA	NA	**2,420**	NA	NA	**2,800**	NA	**2,350**	NA	NA	**2,330**	NA	NA	**2,600**
Nitrate (N)	10		<1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.2	<0.1	<0.1	<0.1
Nitrite (N)	1		<0.1	NA	NA	<0.3	NA	NA	<0.01	NA	<0.1	NA	NA	<0.3	NA	NA	0.02
Total Kjeldahl Nitrogen (TKN)	NV		1.7	NA	NA	0.8	NA	NA	0.6	NA	1.1 U	NA	NA	0.8	NA	NA	0.8
Chloride (Cl)	250		242	223	20.5	71.5	184	103	99	150	25.2	10.7	8.7	8	9	10	10
Sulfates (SO4)	500		**1,010**	**934**	175	**2,320**	**2,050**	**2,070**	**1,820**	**1,580**	**2,010**	**2,210**	**2,370**	**2,310**	**2,240**	**1,850**	**2,150**
Dissolved Organic Carbon (DOC)	5		**11.1 U**	**10.9**	**8.5**	4.4	**5.5**	**5**	4.8	**6.8**	3.7 U	3.2	2.1	2.2	2.4	2.3	2.2
Total Dissolved Solids (TDS)	500		**2,060**	**2,360**	**4,390**	**4,430**	**4,090**	**2,700**	**3,060**	**3,420**	**3,710**	**3,670**	**4,200**	**3,780**	**4,010**	**2,530**	**2,580**
Total Suspended Solids (TSS)	NV		11,200	NA	NA	750	NA	NA	420	NA	547	NA	NA	860	NA	NA	37
PhenolNA4AAP	4.2[2]		<0.001	NA	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	<0.001
Biological Oxygen Demand (BOD5)	NV		<3	NA	NA	<2	NA	NA	ND	NA	<3	NA	NA	<2	NA	NA	<2
Chemical Oxygen Demand (COD)	NV		27 U	20	100	23	43	13	23	20	9 U	<4	<4	8	10	<4	6
pH (Standard Units)	6.5NA8.5		7.85	8.09	7.76	7.89	7.8	8.0	7.7	8.0	7.7	7.92	7.77	7.71	8.02	7.9	7.8
Total Phosphorus (P)	NV		3.7	NA	NA	0.81	NA	NA	0.38	NA	0.52	NA	NA	0.25	NA	NA	0.026
Potassium (K)	NV		4.6	NA	NA	5.6	NA	NA	5.2	NA	5.7	NA	NA	4.9	NA	NA	4.7
Conductivity (umhos/cm)	NV		3,010	3,160	4,080	3,780	4,170	4,170	4,180	3,780	3,240	3,730	3,960	3,460	3,960	3,890	3,900
Calcium (Ca)	NV		250	150	350	490	580	410	530	400	420	550	510	490	550	430	510
Turbidity (NTU)	5[3]		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW8A-06*					*OW9A-06*				
	Collection Date	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-11/12*	*GW-18235-19*	*GW-18235-17*	*GW-18235-22*	*GW-18235-25/28*	*GW-18235-03*	*GW-18235-15*	*GW-18235-05*	*GW-18235-11*	*GW-18235-11*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Alkalinity (Total as CaCO3)	30NA500	377/382	404	398	431	418/488	442	403	406	417	393
Ammonia (as Nitrogen)	NV	0.69/0.56	0.41	0.62	0.065 U	0.256/0.251	0.33	0.21	0.36	0.319 U	0.127
Hardness (CaCO3)	80NA100	NA	NA	**2,700**	**2,780**	NA	NA	NA	**3,200**	**2,850**	NA
Nitrate (N)	10	<0.1/<0.1	<0.1	<0.1	<1.0	<0.50/<0.50	<0.1	<0.1	<0.1	<1.0	<0.50
Nitrite (N)	1	NA	NA	<0.01	<1.0	NA	NA	NA	<0.01	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	NA	NA	2	0.592	NA	NA	NA	1	0.239	NA
Chloride (Cl)	250	48/48	16	14	<20	10.9/10.9	24	13	16	<20	10.9
Sulfates (SO4)	500	**2,010/2,270**	**2,230**	**2,280 J**	**2,680**	**2,670/2,510**	**2,520**	**2,290**	**2,450 J**	**2,600**	**2,720**
Dissolved Organic Carbon (DOC)	5	4.3/4	2.3	2.7	5.1	2.8 U/3.2 U	4.2	1.9	2.4	2.8	2.9 U
Total Dissolved Solids (TDS)	500	**3,630/3,580**	**3,160**	**1,730**	**4,040**	**4,130/4,000**	**3,410**	**3,890**	**1,740**	**4,000**	**4,110**
Total Suspended Solids (TSS)	NV	NA	NA	8,600	7,920	NA	NA	NA	1,100	650	NA
PhenolNA4AAP	4.2[2]	NA	NA	<0.001	0.004	NA	NA	NA	<0.001	<0.0010	NA
Biological Oxygen Demand (BOD5)	NV	NA	NA	<2	<6.0	NA	NA	NA	<2	<6.0	NA
Chemical Oxygen Demand (COD)	NV	160/10	5	<4	<10	14/27	520	10	<4	<10	33
pH (Standard Units)	6.5NA8.5	7.9/7.9	7.6	7.9	7.51	7.59/7.63	7.9	7.8	7.9	7.54	7.53
Total Phosphorus (P)	NV	NA	NA	2.9	0.154	NA	NA	NA	0.56	0.204	NA
Potassium (K)	NV	NA	NA	6.1	<10	NA	NA	NA	7	<10	NA
Conductivity (umhos/cm)	NV	3,720/3,690	3,970	3,580	3,810	3,890/3,870	3,950	4,020	3,610	3,810	3,830
Calcium (Ca)	NV	540/550	540	540	521	523/521	570	540	600	506	516
Turbidity (NTU)	5[3]	NA	NA	**3,200**	**37**	**13.0/13.4**	NA	NA	**855**	**8.1**	**12.7**

Notes:
All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
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<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1A-01*						*MW1A-07*			
	Collection Date	*06/07/04*	*11/29/04*	*12/02/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-17*	*GW-18235-24*	*GW-18235-21*	*GW-18235-17*	*GW-18235-06*	*GW-18235-05*	*GW-18235-20*	*GW-18235-01*	*GW-18235-05*	*GW-18235-24*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	NA	NA	**0.63**	**0.59**	NA
Arsenic (As)	0.025	<0.0014	<0.0014	NA	NA	<0.005	NA	NA	0.004	<0.010	NA
Barium (Ba)	1	0.013	0.013	0.043	0.026	<0.03	NA	0.008	0.010	0.17	0.211
Beryllium (Be)	0.004 [2]	<0.0014	<0.0014	NA	NA	<0.003	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.28	0.41	0.17	0.20	0.23	0.25	0.091	0.050	<0.50	<0.050
Cadmium (Cd)	0.005	<0.001	<0.001	NA	NA	0.0005	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016	0.0042 U	NA	NA	<0.03	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1 [2]	0.002	0.003	NA	NA	<0.003	NA	NA	<0.0005	<0.0080	NA
Copper (Cu)	1	<0.003	0.007	NA	NA	0.006	NA	NA	0.017	0.01	NA
Iron (Fe)	0.3	**1.1**	**2.3**	<0.05	<0.05	<0.03	<0.05	<0.05	0.26	**<0.50**	0.240
Lead (Pb)	0.01	0.0023 U	<0.0022	NA	NA	<0.003	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	200	280	97	130	140	150	8.9	<0.05	<5.0	0.96
Manganese (Mn)	0.05	**0.055**	**0.093**	**0.061**	NA	<0.01	NA	NA	<0.002	<0.010	NA
Mercury (Hg)	0.001	<0.0001	<0.0001	NA	NA	<0.0003	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	0.021	0.026	NA	NA	0.028	NA	NA	0.026	0.011	NA
Nickel (Ni)	0.1 [2]	0.005	0.008	NA	NA	0.006	NA	NA	0.005	<0.020	NA
Silver (Ag)	0.0012 [2]	<0.0006	<0.0006	NA	NA	**0.0015**	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	**290**	**300**	190	**210**	**320**	**280**	130	180	74.2	64.6
Thallium (Tl)	0.002 [2]	<0.001	<0.001	NA	NA	<0.0003	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2 [2]	<0.001	<0.001	NA	NA	<0.005	NA	NA	0.063	0.02	NA
Zinc (Zn)	5	<0.005	<0.005	NA	NA	<0.03	NA	NA	<0.005	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW2A-01*											
	Collection Date	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-01/02*	*GW-18235-14*	*GW-18235-07*	*GW-18235-07*	*GW-18235-01*	*GW-18235-12*	*GW-18235-01*	*GW-18235-01*	*GW-18235-12/13*	*GW-18235-07*	*GW-18235-13*	*GW-18235-01*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.007U	<0.10	NA
Arsenic (As)	0.025	<0.0014 / <0.0014	<0.0014	NA	0.0057	NA	NA	<0.001	NA	NA	<0.001	<0.010	NA
Barium (Ba)	1	0.0046 / 0.004	0.0047	<0.005	0.009	<0.005	<0.005	<0.005	<0.03	<0.03/<0.03	0.01	<0.10	<0.010
Beryllium (Be)	0.004 [2]	<0.0014 / <0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.46 / 0.42	0.45	0.49	0.49	0.45	0.37	0.38	0.44	0.49/0.47	0.24	0.51	0.365
Cadmium (Cd)	0.005	<0.001 / <0.001	<0.001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	<0.0016 / <0.0016	<0.0016	NA	<0.005	NA	NA	<0.005	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1 [2]	0.004 / <0.004	0.005	NA	0.0029	NA	NA	<0.003	NA	NA	0.0016	<0.0080	NA
Copper (Cu)	1	<0.003 / <0.003	0.005	NA	<0.001	NA	NA	0.003	NA	NA	<0.005	<0.010	NA
Iron (Fe)	0.3	**0.86 / 0.92**	**1.8**	<0.05	**3.9**	<0.05	<0.05	<0.05	<0.3	<0.3/<0.3	<0.05	**<0.50**	<0.050
Lead (Pb)	0.01	0.0024U / <0.0022	<0.0022	NA	<0.0002	NA	NA	<0.0005	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	370 / 330	410	380	380	420	460	460	480	400/400	470	489	370
Manganese (Mn)	0.05	**0.22 / 0.20**	**0.23**	NA	**0.12**	NA	NA	**0.14**	NA	NA	**0.10**	**0.246**	NA
Mercury (Hg)	0.001	<0.0001 / <0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	0.0051 / 0.0045	0.0072	NA	0.0052	NA	NA	0.006	NA	NA	0.008	<0.010	NA
Nickel (Ni)	0.1 [2]	<0.001 / 0.002	0.011	NA	0.006	NA	NA	0.016	NA	NA	0.021	0.039	NA
Silver (Ag)	0.0012 [2]	<0.0006 / <0.0006	<0.0006	NA	<0.0005	NA	NA	<0.0001	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	110 / 100	130	130	120	130	160	140	150	120/120	140	151	112
Thallium (Tl)	0.002 [2]	<0.001 / <0.001	<0.001	NA	<0.00005	NA	NA	<0.00005	NA	NA	0.00011	**<0.0030**	NA
Vanadium (V)	0.2 [2]	<0.001 / <0.001	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	<0.0001	<0.010	NA
Zinc (Zn)	5	<0.005 / <0.005	0.015 U	NA	<0.05	NA	NA	<0.05	NA	NA	<0.03	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW4A-09*		*MW5A-09*		*MW6A-07*		*OW1A-85*						
Collection Date		*07/23/09*	*11/25/09*	*07/23/09*	*11/24/09*	*07/23/09*	*11/24/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*
Sample Identification		*GW-18235-26*	*GW-18235-30*	*GW-18235-01/02*	*GW-18235-09*	*GW-18235-03*	*GW-18235-08*	*GW-18235-08*	*GW-18235-10*	*GW-18235-15*	*GW-18235-03*	*GW-18235-09*	*GW-18235-01*	*GW-18235-12*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]													
Aluminum (Al)	0.1	<0.10	NA	<0.10/<0.10	NA	<0.10	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (As)	0.025	<0.010	NA	<0.010/<0.010	NA	<0.010	NA	0.014	0.011	NA	<0.01	NA	NA	0.007
Barium (Ba)	1	<0.10	0.017	<0.10/<0.10	<0.010	<0.10	<0.010	0.008	0.0081	0.008	<0.05	<0.05	0.008	0.008
Beryllium (Be)	0.004 [2]	**<0.010**	NA	**<0.010/<0.010**	NA	**<0.010**	NA	<0.0014	<0.0014	NA	**<0.005**	NA	NA	<0.0005
Boron (B)	5	0.51	0.302	0.81/0.82	0.577	0.65	0.455	0.31	0.22	0.22	0.28	0.29	0.22	0.19
Cadmium (Cd)	0.005	<0.0010	NA	<0.0010/<0.0010	NA	<0.0010	NA	<0.001	<0.001	NA	<0.001	NA	NA	<0.0001
Chromium (Cr)	0.05	<0.010	NA	<0.010/<0.010	NA	<0.010	NA	<0.0016	0.0029 U	NA	<0.05	NA	NA	<0.005
Cobalt (Co)	0.1 [2]	<0.0080	NA	<0.0080/<0.0080	NA	<0.0080	NA	<0.001	<0.001	NA	<0.005	NA	NA	<0.003
Copper (Cu)	1	<0.010	NA	<0.010/<0.010	NA	<0.010	NA	<0.003	0.003	NA	<0.01	NA	NA	0.003
Iron (Fe)	0.3	**<0.50**	<0.050	**4.2/4.16**	**2.87**	**7.67**	**6.47**	**5.5**	**4.5**	<0.05	**<0.5**	**<0.5**	**3.7**	**1.8**
Lead (Pb)	0.01	<0.010	NA	<0.010/<0.010	NA	<0.010	NA	0.0033 U	<0.0022	NA	<0.002	NA	NA	<0.0005
Magnesium (Mg)	NV	295	222	448/449	418	331	318	170	140	150	170	180	140	130
Manganese (Mn)	0.05	**0.190**	NA	**0.089/0.088**	NA	**0.103**	NA	0.036	0.043	NA	<0.02	NA	NA	0.037
Mercury (Hg)	0.001	<0.00010	NA	<0.00010/<0.00010	NA	<0.00010	NA	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001
Molybdenum (Mo)	7.3 [2]	0.012	NA	<0.010/<0.010	NA	<0.010	NA	0.0026	0.0037	NA	<0.01	NA	NA	0.003
Nickel (Ni)	0.1 [2]	0.025	NA	<0.020/<0.020	NA	<0.020	NA	<0.001	<0.001	NA	<0.01	NA	NA	<0.005
Silver (Ag)	0.0012 [2]	<0.0010	NA	<0.0010/<0.0010	NA	<0.0010	NA	<0.0006	<0.0006	NA	**<0.005**	NA	NA	<0.0001
Sodium (Na)	200	171	172	166/164	155	150	133	77	66	76	73	76	61	58
Thallium (Tl)	0.002 [2]	**<0.0030**	NA	**<0.0030/<0.0030**	NA	**<0.0030**	NA	<0.001	<0.001	NA	<0.0005	NA	NA	<0.00005
Vanadium (V)	0.2 [2]	<0.010	NA	<0.010/<0.010	NA	<0.010	NA	<0.001	<0.001	NA	<0.01	NA	NA	<0.001
Zinc (Zn)	5	<0.030	NA	<0.030/<0.030	NA	<0.030	NA	<0.005	0.008 U	NA	<0.05	NA	NA	<0.03

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*OW1A-06*					*OW3A-85*					
Collection Date		*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*12/01/05*	*05/29/06*	*07/19/06*
Sample Identification		*GW-18235-09*	*GW-18235-17*	*GW-18235-13/14*	*GW-18235-20*	*GW-18235-06*	*GW-18235-12*	*GW-18235-23*	*GW-18235-10*	*GW-18235-04*	*GW-18235-14*	*GW-18235-04*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Aluminum (Al)	0.1	NA	NA	<0.005/0.005	<0.10	NA	NA	NA	NA	NA	NA	NA
Arsenic (As)	0.025	NA	NA	0.008/0.007	<0.010	NA	<0.0014	0.0021	NA	NA	NA	0.003
Barium (Ba)	1	<0.005	<0.03	0.005/0.005	<0.10	<0.010	0.025	0.028	0.032	0.025	<0.03	0.036
Beryllium (Be)	0.004 [2]	NA	NA	<0.0005/<0.0005	**<0.010**	NA	<0.0014	<0.0014	NA	NA	NA	<0.0005
Boron (B)	5	0.54	0.62	0.53/0.52	0.73	0.546	0.32	0.47	0.29	0.4	0.34	0.27
Cadmium (Cd)	0.005	NA	NA	<0.0001/<0.0001	<0.0010	NA	<0.001	<0.001	NA	NA	NA	<0.0001
Chromium (Cr)	0.05	NA	NA	<0.005/<0.005	<0.010	NA	<0.0016	0.0031 U	NA	NA	NA	<0.005
Cobalt (Co)	0.1 [2]	NA	NA	<0.0005/<0.0005	<0.0080	NA	<0.001	<0.001	NA	NA	NA	<0.0005
Copper (Cu)	1	NA	NA	<0.005/<0.005	<0.010	NA	<0.003	0.003	NA	NA	NA	<0.001
Iron (Fe)	0.3	**7.7**	**3.5**	**4.7/4.6**	**2.11**	**1.85**	**0.91**	**0.65 U**	**0.78**	<0.05	**1.9**	**0.36**
Lead (Pb)	0.01	NA	NA	<0.0005/<0.0005	<0.010	NA	0.0031 U	<0.0022	NA	NA	NA	0.0015
Magnesium (Mg)	NV	400	360	430/430	439	389	170	250	170	220	210	150
Manganese (Mn)	0.05	NA	NA	**0.12/0.12**	**0.112**	NA	0.036	0.0014 U	NA	NA	NA	0.021
Mercury (Hg)	0.001	NA	NA	<0.0001	<0.00010	NA	<0.0001	<0.0001	NA	NA	NA	<0.0001
Molybdenum (Mo)	7.3 [2]	NA	NA	0.01/0.01	<0.010	NA	0.0047	0.0063	NA	NA	NA	0.006
Nickel (Ni)	0.1 [2]	NA	NA	<0.001/<0.001	<0.020	NA	<0.001	<0.001	NA	NA	NA	<0.001
Silver (Ag)	0.0012 [2]	NA	NA	<0.0001/<0.0001	<0.0010	NA	<0.0006	<0.0006	NA	NA	NA	<0.0001
Sodium (Na)	200	**230**	**340**	180/180	**204**	187	90	110	88	92	96	85
Thallium (Tl)	0.002 [2]	NA	NA	<0.00005/<0.00005	**<0.0030**	NA	<0.001	<0.001	NA	NA	NA	<0.00005
Vanadium (V)	0.2 [2]	NA	NA	<0.001/<0.001	<0.010	NA	<0.001	<0.001	NA	NA	NA	<0.001
Zinc (Zn)	5	NA	NA	<0.03/<0.03	<0.030	NA	<0.005	<0.005	NA	NA	NA	0.006

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW3A-07*				*OW5A-91*						
	Collection Date	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*
	Sample Identification	*GW-18235-16*	*GW-18235-03*	*GW-18235-09*	*GW-18235-03*	*GW-18235-05*	*GW-18235-12*	*GW-18235-13*	*GW-18235-05*	*GW-18235-07*	*GW-18235-03*	*GW-18235-08*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]											
Aluminum (Al)	0.1	NA	0.01U	<0.10	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (As)	0.025	NA	<0.001	<0.010	NA	<0.0014	0.0058	NA	0.0057	NA	NA	0.006
Barium (Ba)	1	0.043	0.032	0.11	0.156	0.0053	0.0041	<0.005	0.009	<0.05	<0.05	<0.005
Beryllium (Be)	0.004 [2]	NA	<0.0005	<0.010	NA	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005
Boron (B)	5	0.36	0.46	0.53	0.373	0.48	0.48	0.51	0.49	0.54	0.47	0.45
Cadmium (Cd)	0.005	NA	<0.0001	<0.0010	NA	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001
Chromium (Cr)	0.05	NA	<0.005	<0.010	NA	<0.0016	0.0034 U	NA	<0.005	NA	NA	<0.005
Cobalt (Co)	0.1 [2]	NA	0.0033	<0.0080	NA	0.002	0.003	NA	0.0029	NA	NA	0.015
Copper (Cu)	1	NA	<0.005	<0.010	NA	<0.003	0.004	NA	<0.001	NA	NA	<0.001
Iron (Fe)	0.3	0.12	**0.36**	<0.50	0.192	**4.3**	**6.1**	**3.8**	**3.9**	**<0.5**	**3.7**	**4.0**
Lead (Pb)	0.01	NA	<0.0005	<0.010	NA	0.0065 U	<0.0022	NA	<0.0002	NA	NA	<0.0005
Magnesium (Mg)	NV	120	160	125	94.1	350	380	390	380	420	370	360
Manganese (Mn)	0.05	NA	**1.2**	**0.548**	NA	**0.12**	**0.12**	NA	**0.12**	NA	NA	**0.12**
Mercury (Hg)	0.001	NA	<0.0001	<0.00010	NA	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001
Molybdenum (Mo)	7.3 [2]	NA	0.007	<0.010	NA	0.0044	0.0051	NA	0.0052	NA	NA	0.005
Nickel (Ni)	0.1 [2]	NA	0.003	<0.020	NA	<0.001	<0.001	NA	0.006	NA	NA	<0.005
Silver (Ag)	0.0012 [2]	NA	<0.0001	<0.0010	NA	<0.0006	<0.0006	NA	<0.0005	NA	NA	<0.0001
Sodium (Na)	200	82	86	81.8	67.8	110	120	140	120	130	120	110
Thallium (Tl)	0.002 [2]	NA	<0.00005	<0.0030	NA	<0.001	<0.001	NA	<0.00005	NA	NA	<0.00005
Vanadium (V)	0.2 [2]	NA	<0.001	<0.010	NA	<0.001	<0.001	NA	<0.001	NA	NA	<0.001
Zinc (Zn)	5	NA	<0.005	<0.030	NA	0.009 U	<0.005	NA	<0.05	NA	NA	<0.05

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

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559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW5A-06*					*OW5B-91*						
	Collection Date	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*
	Sample Identification	*GW-18235-07*	*GW-18235-18*	*GW-18235-10*	*GW-18235-19*	*GW-18235-10*	*GW-18235-06*	*GW-18235-13*	*GW-18235-14*	*GW-18235-06*	*GW-18235-08*	*GW-18235-09*	*GW-18235-10*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	NA	NA	0.006U	<0.10	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (As)	0.025	NA	NA	0.012	0.011	NA	0.0044	0.0043	NA	0.0032	NA	NA	0.002
Barium (Ba)	1	<0.005	0.008	0.009	<0.10	<0.010	0.0074	0.0082	0.009	0.0086	<0.05	0.008	0.007
Beryllium (Be)	0.004 [2]	NA	NA	<0.0005	**<0.010**	NA	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005
Boron (B)	5	0.31	0.44	0.38	0.54	0.389	0.58	0.54	0.57	0.57	0.56	0.55	0.5
Cadmium (Cd)	0.005	NA	NA	<0.0001	<0.0010	NA	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001
Chromium (Cr)	0.05	NA	NA	<0.005	<0.010	NA	<0.0016	0.0035	NA	<0.005	NA	NA	<0.005
Cobalt (Co)	0.1 [2]	NA	NA	<0.0005	<0.0080	NA	<0.001	<0.001	NA	<0.0005	NA	NA	<0.0005
Copper (Cu)	1	NA	NA	<0.005	<0.010	NA	<0.003	0.004	NA	<0.001	NA	NA	<0.001
Iron (Fe)	0.3	**1.6**	**3.9**	**5.6**	**5.32**	**4.80**	**7.2**	**5.2**	**2.6**	**4.0**	**<0.5**	**4.0**	**3.7**
Lead (Pb)	0.01	NA	NA	<0.0005	<0.010	NA	0.0045 U	<0.0022	NA	<0.0002	NA	NA	<0.0005
Magnesium (Mg)	NV	200	250	260	249	189	320	350	360	310	390	350	330
Manganese (Mn)	0.05	NA	NA	**0.28**	**0.099**	NA	**0.083**	**0.1**	NA	**0.16**	NA	NA	**0.18**
Mercury (Hg)	0.001	NA	NA	<0.0001	<0.00010	NA	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001
Molybdenum (Mo)	7.3 [2]	NA	NA	0.009	<0.010	NA	0.0043	0.0061	NA	0.0045	NA	NA	0.003
Nickel (Ni)	0.1 [2]	NA	NA	<0.001	<0.020	NA	<0.001	<0.001	NA	<0.001	NA	NA	<0.001
Silver (Ag)	0.0012 [2]	NA	NA	<0.0001	<0.0010	NA	<0.0006	<0.0006	NA	<0.0005	NA	NA	<0.0001
Sodium (Na)	200	130	100	120	128	96.4	140	180	**200**	170	**200**	180	160
Thallium (Tl)	0.002 [2]	NA	NA	<0.00005	**<0.0030**	NA	<0.001	<0.001	NA	<0.00005	NA	NA	<0.00005
Vanadium (V)	0.2 [2]	NA	NA	<0.001	<0.010	NA	<0.001	<0.001	NA	<0.001	NA	NA	<0.001
Zinc (Zn)	5	NA	NA	<0.03	<0.030	NA	0.13 U	0.13 U	NA	<0.05	NA	NA	<0.05

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW6A-92*								*OW8A-92*							
	Collection Date	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*	*06/07/04*	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	
	Sample Identification	*GW-18235-21*	*GW-18235-26*	*GW-18235-17*	*GW-18235-15*	*GW-18235-17*	*GW-18235-04*	*GW-18235-22*	*GW-18235-18*	*GW-18235-10*	*GW-18235-18*	*GW-18235-11*	*GW-18235-01*	*GW-18235-11*	*GW-18235-07*	*GW-18235-14*	
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]																
Aluminum (Al)	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Arsenic (As)	0.025	<0.0014	<0.0014	NA	0.0016	NA	NA	0.002	NA	<0.0014	0.0064	NA	0.005	NA	NA	0.005	
Barium (Ba)	1	0.031	0.028	0.024	0.016	0.014	0.015	0.005	NA	0.0056	0.005	0.007	0.0053	<0.05	0.006	<0.005	
Beryllium (Be)	0.004 [2]	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.003	NA	<0.0014	<0.0014	NA	<0.0005	NA	NA	<0.0005	
Boron (B)	5	0.79	0.92	1.1	1	0.95	0.78	1	0.92	0.9	0.73	0.71	0.7	0.7	0.75	0.63	
Cadmium (Cd)	0.005	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001	NA	<0.001	<0.001	NA	<0.0001	NA	NA	<0.0001	
Chromium (Cr)	0.05	0.0019	0.0051 U	NA	<0.005	NA	NA	<0.005	NA	<0.0016	0.0046 U	NA	<0.005	NA	NA	<0.005	
Cobalt (Co)	0.1 [2]	0.001	<0.001	NA	0.0043	NA	NA	<0.003	NA	<0.001	<0.001	NA	<0.0005	NA	NA	<0.003	
Copper (Cu)	1	<0.003	0.006	NA	<0.001	NA	NA	0.002	NA	<0.003	0.004	NA	0.043	NA	NA	0.001	
Iron (Fe)	0.3	0.025	**0.34 U**	<0.05	0.21	<0.05	**0.66**	**1.1**	**0.34**	**3.8**	**6.0**	**3.2**	**2.8**	**<0.5**	**3.2**	**3.0**	
Lead (Pb)	0.01	0.003 U	<0.0022	NA	<0.0002	NA	NA	<0.0005	NA	0.0023 U	<0.0022	NA	0.0005	NA	NA	<0.0005	
Magnesium (Mg)	NV	400	390	410	350	330	340	360	360	320	380	330	300	380	320	320	
Manganese (Mn)	0.05	**0.42**	**0.21**	NA	**0.46**	NA	NA	**0.099**	NA	0.041	0.048	NA	0.046	NA	NA	0.04	
Mercury (Hg)	0.001	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	<0.0001	<0.0001	NA	<0.0001	NA	NA	<0.0001	
Molybdenum (Mo)	7.3 [2]	0.0017	0.0018	NA	0.0036	NA	NA	0.004	NA	0.0029	0.0031	NA	0.0029	NA	NA	0.003	
Nickel (Ni)	0.1 [2]	0.014	0.019	NA	0.02	NA	NA	0.012	NA	<0.001	<0.001	NA	<0.001	NA	NA	<0.005	
Silver (Ag)	0.0012 [2]	<0.0006	<0.0006	NA	<0.0005	NA	NA	<0.0001	NA	<0.0006	<0.0006	NA	0.0005	NA	NA	<0.0001	
Sodium (Na)	200	160	160	**230**	170	140	160	160	160	130	150	150	120	150	140	130	
Thallium (Tl)	0.002 [2]	<0.001	<0.001	NA	**0.06**	NA	NA	<0.00005	NA	<0.001	<0.001	NA	<0.00005	NA	NA	<0.00005	
Vanadium (V)	0.2 [2]	<0.001	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	<0.001	NA	<0.001	NA	NA	<0.001	
Zinc (Zn)	5	<0.005	0.012	NA	<0.05	NA	NA	<0.05	NA	<0.005	<0.005	NA	<0.05	NA	NA	<0.05	

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW8A-06*					*OW9A-06*				
	Collection Date	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-11/12*	*GW-18235-19*	*GW-18235-17*	*GW-18235-22*	*GW-18235-25/28*	*GW-18235-03*	*GW-18235-15*	*GW-18235-05*	*GW-18235-11*	*GW-18235-11*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Aluminum (Al)	0.1	NA	NA	<0.005	<0.10	NA	NA	NA	0.01	<0.10	NA
Arsenic (As)	0.025	NA	NA	0.002	<0.010	NA	NA	NA	0.001	<0.010	NA
Barium (Ba)	1	0.011/<0.005	<0.03	0.007	<0.10	<0.010/0.012	0.03	<0.03	0.005	<0.10	<0.010
Beryllium (Be)	0.004 [2]	NA	NA	<0.0005	**<0.010**	NA	NA	NA	<0.0005	**<0.010**	NA
Boron (B)	5	0.43/0.49	0.55	0.50	0.63	0.41/0.427	0.46	0.51	0.52	0.68	0.600
Cadmium (Cd)	0.005	NA	NA	<0.0001	<0.0010	NA	NA	NA	<0.0001	<0.0010	NA
Chromium (Cr)	0.05	NA	NA	<0.005	<0.010	NA	NA	NA	<0.005	<0.010	NA
Cobalt (Co)	0.1 [2]	NA	NA	<0.003	<0.0080	NA	NA	NA	0.0024	<0.0080	NA
Copper (Cu)	1	NA	NA	<0.001	<0.010	NA	NA	NA	<0.005	<0.010	NA
Iron (Fe)	0.3	**6.0/6.3**	**2.8**	**8.1**	**6.93**	**8.05/7.54**	**1.2**	**1.6**	**2.1**	**1.19**	**1.05**
Lead (Pb)	0.01	NA	NA	<0.0005	<0.010	NA	NA	NA	<0.0005	<0.010	NA
Magnesium (Mg)	NV	320/330	380	330	359	258/279	340	390	420	386	323
Manganese (Mn)	0.05	NA	NA	**0.10**	**0.103**	NA	NA	NA	**0.21**	**0.191**	NA
Mercury (Hg)	0.001	NA	NA	<0.0001	<0.00010	NA	NA	NA	<0.0001	<0.00010	NA
Molybdenum (Mo)	7.3 [2]	NA	NA	0.004	<0.010	NA	NA	NA	0.007	<0.010	NA
Nickel (Ni)	0.1 [2]	NA	NA	<0.005	<0.020	NA	NA	NA	0.004	<0.020	NA
Silver (Ag)	0.0012 [2]	NA	NA	<0.0001	<0.0010	NA	NA	NA	<0.0001	<0.0010	NA
Sodium (Na)	200	110/120	130	120	138	131/134	110	120	130	114	92.2
Thallium (Tl)	0.002 [2]	NA	NA	<0.00005	**<0.0030**	NA	NA	NA	<0.00005	**<0.0030**	NA
Vanadium (V)	0.2 [2]	NA	NA	<0.001	<0.010	NA	NA	NA	<0.001	<0.010	NA
Zinc (Zn)	5	NA	NA	<0.03	<0.030	NA	NA	NA	<0.005	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.10

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1A-01*				*MW1A-07*				*MW2A-01*								
	Collection Date	*06/07/04*	*12/02/05*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*12/11/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-17*	*GW-18235-21*	*GW-18235-06*	*GW-18235-05*	*GW-18235-20*	*GW-18235-01*	*GW-18235-05*	*GW-18235-24*	*GW-18235-01/02*	*GW-18235-07*	*GW-18235-01*	*GW-18235-01*	*GW-18235-01*	*GW-18235-12/13*	*GW-18235-07*	*GW-18235-13*	*GW-18235-01*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]																	
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020
Naphthalene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	0.8	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	0.3	<0.020	<0.020
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.020	<0.020
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.3	<0.020	<0.020
Fluorene	280[2]	<0.05	<0.05	0.06	<0.05	<0.05	0.08	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	0.05	<0.020	<0.020
Phenanthrene	63[2]	<0.05	<0.05	0.2	<0.05	0.07	0.8	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	0.1	<0.020	<0.020
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.020	<0.020
Fluoranthene	130[2]	<0.05	<0.05	0.05	<0.05	<0.05	0.07	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	0.05	<0.020	<0.020
Pyrene	40[2]	<0.05	<0.05	0.09	<0.05	<0.05	0.2	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	0.09	<0.020	<0.020
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.020	<0.020
Chrysene	0.5[2]	<0.05	<0.05	0.06	<0.05	<0.05	0.1	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	0.06	<0.020	<0.020
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	NA	NA	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	0.06	NA	NA
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.020	<0.020	<0.1 / <0.1	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.020	<0.020
Benzo(a)pyrene	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.0050	<0.0050	<0.02 / <0.02	<0.01	<0.01	0.01	0.01	<0.01/<0.01	**0.02**	<0.0050	<0.0050
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.020	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.1	NA/NA	<0.1	<0.020	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.020	<0.020
F1 (C6-C10 Hydrocarbons)	NV	NA	NA	<100	<100	NA	<100	<100	NA	NA / NA	<100	NA	<100	<100	NA/NA	<100	<100	NA
F2 (C10-C16 Hydrocarbons)	NV	NA	NA	<100	<100	NA	<100	<100	NA	NA / NA	<100	NA	<100	<100	NA/NA	<100	<100	NA
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	NA	<200	<200	NA	<100	NA	NA	NA / NA	<200	NA	<200	<200	NA/NA	<100	NA	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	NA	130	<100	NA	<100	<250	NA	NA / NA	<100	NA	<100	<100	NA/NA	<100	<250	NA
F4 (C34-C50 Hydrocarbons)	NV	NA	NA	<100	<100	NA	<100	<250	NA	NA / NA	<100	NA	<100	<100	NA/NA	<100	<250	NA
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	NA	130	<200	NA	<100	NA	NA	NA / NA	<200	NA	<200	<200	NA/NA	<100	NA	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Split Sample, analysed by a second laboratory

(4) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/1

(b) The sum of F1 and F2 must be below 1000 µg/1

TABLE 5.10

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW4A-09*		*MW5A-09*		*MW6A-07*		*OW1A-85*						*OW1A-06*				
	Collection Date	*07/23/09*	*11/25/09*	*07/23/09*	*11/24/09*	*07/23/09*	*11/24/09*	*06/07/04*	*07/28/05*	*12/01/05*	*03/30/06*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	Sample Identification	*GW-18235-26*	*GW-18235-30*	*GW-18235-01/02*	*GW-18235-09*	*GW-18235-03*	*GW-18235-08*	*GW-18235-08*	*GW-18235-03*	*GW-18235-09*	*GW-18235-01*	*GW-18235-01*	*GW-18235-12*	*GW-18235-09*	*GW-18235-17*	*GW-18235-13/14*	*GW-18235-20*	*GW-18235-06*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]																	
1-Methylnaphthalene	10[2]	0.022	<0.020	0.031/0.022	<0.020	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020
2-Methylnaphthalene	10[2]	0.044	<0.020	0.04/0.034	<0.020	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020
Naphthalene	21[2]	0.058	<0.020	0.047/0.04	<0.020	<0.020	<0.020	<0.05	0.05	<0.05	<0.05/0.08	0.25	0.1	0.3	0.1	0.3/0.2	<0.020	<0.020
Acenaphthylene	310[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.1	<0.05	<0.05/<0.05	<0.020	<0.020
Acenaphthene	20[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.1	<0.05	<0.05/<0.05	<0.020	<0.020
Fluorene	280[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	0.12	<0.05	0.2	0.2	0.06/0.1	<0.020	<0.020
Phenanthrene	63[2]	0.036	<0.020	0.094/0.067	<0.020	<0.020	<0.020	<0.05	0.08	<0.05	<0.05/0.05	0.17	<0.05	1.6	2	<0.05/0.05	<0.020	0.038
Anthracene	12[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.1	0.1	<0.05/<0.05	<0.020	<0.020
Fluoranthene	130[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	0.05	<0.05	0.3	0.2	0.08/0.1	<0.020	<0.020
Pyrene	40[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	0.06	<0.05	<0.05/<0.05	0.07	<0.05	0.4	0.4	0.1/0.2	<0.020	<0.020
Benzo(a)anthracene	0.2[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	0.06	<0.05	0.1	0.09	<0.05/<0.05	<0.020	<0.020
Chrysene	0.5[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.2	0.2	0.1/0.1	<0.020	0.020
Benzo(b/j)fluoranthene	0.2[2]	NA	NA	NA	NA	NA	NA	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.2	0.1	0.06/0.07	NA	NA
Benzo(b)fluoranthene[4]	0.2[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020
Benzo(k)fluoranthene	21[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.1	<0.05	<0.05/<0.05	<0.020	<0.020
Benzo(a)pyrene	0.01	<0.0050	<0.0050	<0.0050/<0.0050	<0.0050	<0.0050	<0.0050	<0.01	0.01	<0.01	<0.01/<0.01	<0.01	<0.01	**0.09**	**0.04**	**0.02/0.02**	<0.0050	<0.0050
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.2	<0.1	<0.1/<0.1	<0.020	<0.020
Dibenzo(a,h)anthracene	0.2[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.2	NA	<0.1/<0.1	<0.020	<0.020
Benzo(g,h,i)perylene	0.2[2]	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.2	<0.1	<0.1/<0.1	<0.020	<0.020
F1 (C6-C10 Hydrocarbons)	NV	<100	NA	<100/<100	NA	<100	NA	NA	<100	NA	NA	NA	<100	NA	NA	<100	<100	NA
F2 (C10-C16 Hydrocarbons)	NV	<100	NA	<100/<100	NA	<100	NA	NA	<100	NA	NA	NA	<100	NA	NA	<100	<100	NA
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	NA	NA	NA	NA	NA	NA	<200	NA	NA	NA	<200	NA	NA	<100	NA	NA
F3 (C16-C34 Hydrocarbons)	NV	<250	NA	<250/<250	NA	<250	NA	NA	<100	NA	NA	NA	<100	NA	NA	<100	<250	NA
F4 (C34-C50 Hydrocarbons)	NV	<250	NA	<250/<250	NA	<250	NA	NA	<100	NA	NA	NA	<100	NA	NA	<100	<250	NA
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	NA	NA	NA	NA	NA	NA	<200	NA	NA	NA	<200	NA	NA	<100	NA	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Split Sample, analysed by a second laboratory

(4) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/l

(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.10

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW3A-85*			*OW3A-07*				*OW5A-91*					
	Collection Date	*06/07/04*	*12/01/05*	*07/19/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*03/30/06*	*05/29/06*	*07/19/06*
	Sample Identification	*GW-18235-12*	*GW-18235-04*	*GW-18235-04*	*GW-18235-16*	*GW-18235-03*	*GW-18235-09*	*GW-18235-03*	*GW-18235-05*	*GW-18235-05*	*GW-18235-07*	*GW-18235-03*	*GW-18235-03*	*GW-18235-08/09*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]													
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA
Naphthalene	21[2]	<0.05	<0.05	<0.05	0.08	0.03[3]/0.3	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/0.05
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.02[3]/<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.02[3]/<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Fluorene	280[2]	<0.05	<0.05	<0.05	0.2	0.02[3]/0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Phenanthrene	63[2]	<0.05	<0.05	<0.05	0.9	0.19[3]/0.30	0.035	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Anthracene	12[2]	<0.05	<0.05	<0.05	0.08	0.03[3]/<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Fluoranthene	130[2]	<0.05	<0.05	<0.05	0.2	0.04[3]/0.07	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Pyrene	40[2]	<0.05	<0.05	<0.05	0.2	0.06[3]/0.1	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	<0.05	<0.05	<0.02[3]/<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Chrysene	0.5[2]	<0.05	<0.05	<0.05	0.1	0.07[3]/0.06	0.028	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	<0.05	<0.05	<0.02[3]/<0.05	NA	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.02[3]/<0.05	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05
Benzo(a)pyrene	0.01	<0.01	<0.01	<0.01	<0.01	**<0.01[3]/0.02**	<0.0050	<0.0050	<0.01	0.01	<0.01	<0.01	<0.01	<0.01/<0.01
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.02[3]/<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	NA	<0.02[3]/<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.02[3]/<0.1	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1
F1 (C6-C10 Hydrocarbons)	NV	NA	NA	<100	NA	<100	<100	NA	NA	<100	NA	NA	NA	<100/<100
F2 (C10-C16 Hydrocarbons)	NV	NA	NA	<100	NA	<100	<100	NA	NA	<100	NA	NA	NA	<100/<100
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	NA	<200	NA	<100	NA	NA	NA	<200	NA	NA	NA	<200
F3 (C16-C34 Hydrocarbons)	NV	NA	NA	<100	NA	<100	<250	NA	NA	<100	NA	NA	NA	<100/<100
F4 (C34-C50 Hydrocarbons)	NV	NA	NA	<100	NA	<100	<250	NA	NA	<100	NA	NA	NA	<100/<100
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	NA	<200	NA	<100	NA	NA	NA	<200	NA	NA	NA	<200

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Split Sample, analysed by a second laboratory
(4) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.10

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW5A-06*					*OW5B-91*				*OW6A-92*						
	Collection Date	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*06/07/04*	*07/28/05*	*12/01/05*	*07/19/06*	*06/07/04*	*07/28/05*	*12/01/05*	*03/30/06*	*05/29/06*	*07/19/06*	*12/12/06*
	Sample Identification	*GW-18235-07*	*GW-18235-18*	*GW-18235-10*	*GW-18235-19*	*GW-18235-10*	*GW-18235-06*	*GW-18235-06*	*GW-18235-08*	*GW-18235-10*	*GW-18235-21*	*GW-18235-15*	*GW-18235-17*	*GW-18235-04/05*	*GW-18235-04*	*GW-18235-22*	*GW-18235-18*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]																
1-Methylnaphthalene	10[2]	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	10[2]	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	21[2]	0.11	<0.05	3	<0.020	<0.020	<0.05	0.08	0.09	0.08	<0.05	0.11	0.2	0.09/0.09	0.14	12	0.36
Acenaphthylene	310[2]	0.55	<0.05	0.3	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.05
Acenaphthene	20[2]	0.15	<0.05	0.2	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.05
Fluorene	280[2]	<0.05	<0.05	0.5	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05/<0.05	0.06	0.07	0.08
Phenanthrene	63[2]	0.13	<0.05	1	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.11	<0.05/<0.05	0.11	0.06	0.16
Anthracene	12[2]	<0.05	<0.05	0.2	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.06
Fluoranthene	130[2]	<0.05	<0.05	0.2	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.06
Pyrene	40[2]	<0.05	<0.05	0.3	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.06	<0.05/<0.05	0.07	<0.05	0.07
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	0.2U	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.07	<0.05/<0.05	<0.05	<0.05	<0.05
Chrysene	0.5[2]	<0.05	<0.05	0.4	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05/<0.05	0.05	<0.05	<0.05
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	0.2	NA	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05/<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	<0.020	<0.020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.1	<0.020	<0.020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	NA
Benzo(a)pyrene	0.01	0.01	<0.01	**0.04**	<0.0050	<0.0050	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01/<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.2	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.2[2]	<0.1	NA	<0.2	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.2	<0.020	<0.020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.1
F1 (C6-C10 Hydrocarbons)	NV	NA	NA	<100	<100	NA	NA	<100	NA	<100	NA	<100	NA	NA	NA	<100	NA
F2 (C10-C16 Hydrocarbons)	NV	NA	NA	<100	<100	NA	NA	<100	NA	<100	NA	<100	NA	NA	NA	<100	NA
F1+F2 (C6-C16 Hydrocarbons)	1000[2][a]	NA	NA	<100	NA	NA	NA	<200	NA	<200	NA	<200	NA	NA	NA	<200	NA
F3 (C16-C34 Hydrocarbons)	NV	NA	NA	<100	<250	NA	NA	<100	NA	<100	NA	<100	NA	NA	NA	<100	NA
F4 (C34-C50 Hydrocarbons)	NV	NA	NA	<100	<250	NA	NA	<100	NA	<100	NA	<100	NA	NA	NA	<100	NA
F3+F4 (C16-C50 Hydrocarbons)	1000[2][b]	NA	NA	<100	NA	NA	NA	<200	NA	<200	NA	<200	NA	NA	NA	<200	NA

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
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NV No value
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(a) The sum of F1 and F2 must be below 1000 µg/1
(b) The sum of F1 and F2 must be below 1000 µg/1

TABLE 5.10

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW8A-92*						*OW8A-06*					*OW9A-06*					*Field Blank*	
	Collection Date	*06/07/04*	*07/25/05*	*12/01/05*	*03/30/06*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*12/12/06*	*05/16/07*	*07/23/09*	*07/23/09*	*11/25/09*	*05/16/07*	*07/31/07*
	Sample Identification	*GW-18235-10*	*GW-18235-01*	*GW-18235-11*	*GW-18235-02*	*GW-18235-07*	*GW-18235-14*	*GW-18235-11/12*	*GW-18235-19*	*GW-18235-17*	*GW-18235-22*	*GW-18235-25/28*	*GW-18235-03*	*GW-18235-15*	*GW-18235-22*	*GW-18235-11*	*GW-18235-11*	*GW-18235-14*	*GW-18235-15*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]																		
1-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020/<0.020	NA	NA	NA	<0.020	<0.020	NA	NA
2-Methylnaphthalene	10[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020/<0.020	NA	NA	NA	0.023	<0.020	NA	NA
Naphthalene	21[2]	<0.05	3.18	0.1	<0.05	<0.05	<0.05	0.09/1	0.4	0.03[3]/0.3	0.030	<0.020/<0.020	<0.05	<0.05	0.07	0.046	<0.020	<0.05	0.06
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.06	<0.02[3]/<0.05	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5/<0.2	0.06	<0.02[3]/0.06	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/0.3	0.3	<0.02[3]/0.1	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Phenanthrene	63[2]	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	0.11/0.8	0.9	<0.02[3]/0.4	0.022	<0.020/<0.020	<0.05	<0.05	0.1	<0.020	0.038	<0.05	<0.05
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.1	<0.02[3]/0.06	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Fluoranthene	130[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.1	<0.02[3]/0.09	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Pyrene	40[2]	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.05/0.3	0.2	<0.02[3]/0.1	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Benzo(a)anthracene	0.2[2]	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	<0.05	<0.02[3]/0.07U	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.1	<0.02[3]/0.1	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.06	<0.02[3]/0.1	NA	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05
Benzo(b)fluoranthene[4]	0.2[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020/<0.020	NA	NA	NA	<0.020	<0.020	NA	NA
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	<0.05	<0.02[3]/<0.05	<0.020	<0.020/<0.020	<0.05	<0.05	<0.05	<0.020	<0.020	<0.05	<0.05
Benzo(a)pyrene	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01/**0.03**	**0.02**	<0.01 [3]/**0.04**	<0.0050	<0.0050/<0.0050	<0.01	<0.01	0.01	<0.0050	<0.0050	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/**<0.3**	<0.1	<0.02[3]/<0.1	<0.020	<0.020/<0.020	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/**<0.3**	NA	<0.02[3]/<0.1	<0.020	<0.020/<0.020	<0.1	NA	<0.1	<0.020	<0.020	NA	<0.1
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/**<0.3**	<0.1	<0.02[3]/<0.1	<0.020	<0.020/<0.020	<0.1	<0.1	<0.1	<0.020	<0.020	<0.1	<0.1
F1 (C6-C10 Hydrocarbons)	NV	NA	<100	NA	NA	NA	<100	NA	NA	<100	<100	NA	NA	NA	<100	<100	NA	NA	<100
F2 (C10-C16 Hydrocarbons)	NV	NA	<100	NA	NA	NA	<100	NA	NA	<100	<100	NA	NA	NA	<100	<100	NA	NA	<100
F1+F2 (C6-C16 Hydrocarbons)	1000[2](a)	NA	<200	NA	NA	NA	<200	NA	NA	<100	NA	NA	NA	NA	<100	NA	NA	NA	<100
F3 (C16-C34 Hydrocarbons)	NV	NA	<100	NA	NA	NA	<100	NA	NA	<100	<250	NA	NA	NA	<100	<250	NA	NA	<100
F4 (C34-C50 Hydrocarbons)	NV	NA	<100	NA	NA	NA	<100	NA	NA	<100	<250	NA	NA	NA	<100	<250	NA	NA	<100
F3+F4 (C16-C50 Hydrocarbons)	1000[2](b)	NA	<200	NA	NA	NA	<200	NA	NA	<100	NA	NA	NA	NA	<100	NA	NA	NA	<100

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Split Sample, analysed by a second laboratory
(4) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit
(a) The sum of F1 and F2 must be below 1000 µg/l
(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.11

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*MW1A-01*		*MW1A-07*		*MW2A-01*					*MW4A-09*
	Collection Date	*06/07/04*	*07/19/06*	*07/31/07*	*07/23/09*	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*07/23/09*
	Sample Identification	*GW-18235-17*	*GW-18235-06*	*GW-18235-01*	*GW-18235-05*	*GW-18235-01/02*	*GW-18235-07*	*GW-18235-01*	*GW-18235-07*	*GW-18235-13*	*GW-18235-26*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]										
1,1-Dichloroethane	70[2]	<0.4	<0.1	<0.1	<0.50	<0.4 / <0.4	<0.1	<0.1	<0.1	<0.50	<0.50
1,1-Dichloroethylene	14	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
1,1,1-Trichloroethane	200[2]	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
1,1,2-Trichloroethane	5[2]	<0.5	<0.2	<0.2	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<1	<0.1	<0.2	<0.50	<1 / <1	<0.1	<0.1	<0.1	<0.50	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.5	<0.2	<0.2	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50	<0.50
1,2-Dichlorobenzene	3	<0.5	<0.2	<0.2	<0.50	<0.5 / <0.5	<0.1	<0.2	<0.2	<0.50	<0.50
1,2-Dichloroethane	5	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
cis-1,2-Dichloroethylene	70[2]	<1	<0.1	<0.1	<0.50	<1 / <1	<0.1	<0.1	<0.1	<0.50	<0.50
trans-1,2-Dichloroethylene	100[2]	<1	<0.1	<0.1	<0.50	<1 / <1	<0.1	<0.1	<0.1	<0.50	<0.50
1,2-Dichloropropane	5[2]	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
1,3-Dichlorobenzene	630[2]	<0.5	<0.2	<0.2	<0.50	<0.5 / <0.5	<0.1	<0.2	<0.2	<0.50	<0.50
cis-1,3-Dichloropropene	1.4[3]	<0.14	<0.2	<0.2	<0.50	<0.14 / <0.14	<0.2	<0.2	<0.2	<0.50	<0.50
trans-1,3-Dichloropropene	1.4[3]	<0.14	<0.2	<0.2	<0.50	<0.14 / <0.14	<0.2	<0.2	<0.2	<0.50	<0.50
1,4-Dichlorobenzene	5	<0.5	<0.2	<0.2	<0.50	<0.5 / <0.5	<0.1	<0.2	<0.2	<0.50	<0.50
2-Hexanone	NV	<10	<5	<5	<20	<10 / <10	<5	<5	<5	<20	<20
Acetone	3,000[2]	<10	<10	59	<20	<10 / <10	<10	<10	<10	<20	<20
Benzene	5	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
Bromodichloromethane	5[2]	<0.2	<0.1	<0.1	<0.50	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.50	<0.50
Bromoform	5[2]	<0.2	<0.2	<0.2	<0.50	<0.2 / <0.2	<0.2	<0.2	<0.2	<0.50	<0.50
Bromomethane	10[2(a)]	<3	<0.5	<0.5	3.21 U	<3 <3	<0.5	<0.5	<0.5	1.74 U	1.38 U
Carbon Disulfide	NV	NA	NA	NA	<0.50	NA	NA	NA	NA	<0.50	<0.50
Carbon Tetrachloride	5	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	0.50 UJ	<0.50
Chlorobenzene	30[2]	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
Chloroethane	NV	<1	<0.2	<0.2	<1.0	<1 / <1	<0.2	<0.2	<0.2	<1.0	<1.0
Chloroform	5[2]	<0.2	<0.1	0.3	<0.50	<0.2 / <0.2	<0.1	<0.1	<0.1	<0.50	<0.50
Chloromethane	NV	<2	<0.5	<0.5	<1.0	<2 / <2	<0.5	<0.5	0.4	<1.0	<1.0
Dibromochloromethane	5[2]	<0.2	<0.2	<0.2	<0.50	<0.2 / <0.2	<0.2	<0.2	<0.2	<0.50	<0.50
Dichlorodifluoromethane	NV	NA	NA	NA	<1.0	NA	NA	NA	NA	<1.0	<1.0
Dichloromethane(Methylene Chloride	50[2]	<1	<0.5	<0.5	<0.50	<1 / <1	<0.5	<0.5	<0.5	<0.50	<0.50
Ethylbenzene	2.4	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<15	<5	5	<20	<15 / <15	<5	<5	<5	<20	<20
Methyl t-butyl ether (MTBE)	700[2]	<2	<0.2	<0.2	<0.50	<2 / <2	<0.2	<0.2	<0.2	<0.50	<0.50
Methyl isobutyl ketone - (MIBK)	350[2]	<10	<5	<5	<20	<10 / <10	<5	<5	<5	<20	<20
Styrene	100[2]	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
Tetrachloroethylene	30	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
Toluene	24	<0.5	<0.2	0.3U	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50	0.76
Trichloroethylene	5	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
Trichlorofluoromethane (FREON 11)	NV	<2	NA	<0.2	<1.0	<2 / <2	<0.2	NA	<0.2	<1.0	<1.0
Trihalomethanes (total)	NV	NA	NA	NA	<2.0	NA	NA	NA	NA	<2.0	<2.0
Vinyl Chloride	2	<0.2	<0.2	<0.2	<0.50	<0.5 / <0.5	<0.2	<0.2	<0.2	<0.50	<0.50
o-Xylene	300	<0.5	<0.1	<0.1	<0.50	<0.5 / <0.5	<0.1	<0.1	<0.1	<0.50	<0.50
p+m-Xylene	300	<0.5	<0.1	<0.1	<1.0	<0.5 / <0.5	<0.1	<0.1	<0.1	<1.0	<1.0
Total Xylene	300	<1	<0.1	<0.1	<1.5	<1 / <1	<0.1	<0.1	<0.1	<1.5	<1.5

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Criteria for 1,3-dichloropropene

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.11

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW5A-09*	*MW6A-07*	*OW1A-85*			*OW1A-06*		*OW3A-85*		*OW3A-07*	
Collection Date		*07/23/09*	*07/23/09*	*OW1A-85*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*06/07/04*	*07/19/06*	*07/31/07*	*07/23/09*
Sample Identification		*GW-18235-01/02*	*GW-18235-03*	*GW-18235-08*	*GW-18235-03*	*GW-18235-12*	*GW-18235-13/14*	*GW-18235-20*	*GW-18235-12*	*GW-18235-04*	*GW-18235-03*	*GW-18235-09*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]											
1,1-Dichloroethane	70[2]	<0.50	<0.50	<0.4	<0.1	<0.1	<0.1/<0.1	<0.50	<0.4	<0.1	<0.1/<0.1	<0.50
1,1-Dichloroethylene	14	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
1,1,1-Trichloroethane	200[2]	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
1,1,2-Trichloroethane	5[2]	<0.50	<0.50	<0.5	<0.2	<0.2	<0.2/<0.2	<0.50	<0.5	<0.2	<0.2/<0.2	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<0.50	<0.50	<1	<0.1	<0.1	<0.1/<0.1	<0.50	<1	<0.1	<0.2/<0.2	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.50	<0.50	<0.5	<0.2	<0.2	<0.2/<0.2	<0.50	<0.5	<0.2	<0.2/<0.2	<0.50
1,2-Dichlorobenzene	3	<0.50	<0.50	<0.5	<0.1	<0.2	<0.2/<0.2	<0.50	<0.5	<0.2	<0.2/<0.2	<0.50
1,2-Dichloroethane	5	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
cis-1,2-Dichloroethylene	70[2]	<0.50	<0.50	<1	<0.1	<0.1	<0.1/<0.1	<0.50	<1	<0.1	<0.1/<0.1	<0.50
trans-1,2-Dichloroethylene	100[2]	<0.50	<0.50	<1	<0.1	<0.1	<0.1/<0.1	<0.50	<1	<0.1	<0.1/<0.1	<0.50
1,2-Dichloropropane	5[2]	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
1,3-Dichlorobenzene	630[2]	<0.50	<0.50	<0.5	<0.1	<0.2	<0.2/<0.2	<0.50	<0.5	<0.2	<0.2/<0.2	<0.50
cis-1,3-Dichloropropene	1.4[3]	<0.50	<0.50	<0.14	<0.2	<0.2	<0.2/<0.2	<0.50	<0.14	<0.2	<0.2/<0.2	<0.50
trans-1,3-Dichloropropene	1.4[3]	<0.50	<0.50	<0.14	<0.2	<0.2	<0.2/<0.2	<0.50	<0.14	<0.2	<0.2/<0.2	<0.50
1,4-Dichlorobenzene	5	<0.50	<0.50	<0.5	<0.1	<0.2	<0.2/<0.2	<0.50	<0.5	<0.2	<0.2/<0.2	<0.50
2-Hexanone	NV	<20	<20	<10	<5	<5	<5/<5	<20	<10	<5	<5/<5	<20
Acetone	3,000[2]	<20	<20	<10	<10	<10	<10/<10	<20	<10	<10	<10/<10	<20
Benzene	5	<0.50	<0.50	<0.5	0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
Bromodichloromethane	5[2]	<0.50	<0.50	<0.2	<0.1	<0.1	<0.1/<0.1	<0.50	<0.2	<0.1	<0.1/<0.1	<0.50
Bromoform	5[2]	<0.50	<0.50	<0.2	<0.2	<0.2	<0.2/<0.2	<0.50	<0.2	<0.2	<0.2/<0.2	<0.50
Bromomethane	10[2][a]	2.04 U/2.26 U	2.33 U	<3	<0.5	<0.5	<0.5/<0.5	2.78 U	<3	<0.5	<0.5/<0.5	2.31 U
Carbon Disulfide	NV	<0.50	<0.50	NA	NA	NA	NA	<0.50	NA	NA	NA	<0.50
Carbon Tetrachloride	5	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
Chlorobenzene	30[2]	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
Chloroethane	NV	<1.0	<1.0	<1	<0.2	<0.2	<0.2/<0.2	<1.0	<1	<0.2	<0.2/<0.2	<1.0
Chloroform	5[2]	<0.50	<0.50	<0.2	<0.1	<0.1	<0.1/<0.1	<0.50	<0.2	<0.1	<0.1/<0.1	<0.50
Chloromethane	NV	<1.0	<1.0	<2	<0.5	<0.5	<0.5/<0.5	<1.0	<2	<0.5	<0.5/<0.5	<1.0
Dibromochloromethane	5[2]	<0.50	<0.50	<0.2	<0.2	<0.2	<0.2/<0.2	<0.50	<0.2	<0.2	<0.2/<0.2	<0.50
Dichlorodifluoromethane	NV	<1.0	<1.0	NA	NA	NA	NA	<1.0	NA	NA	NA	<1.0
Dichloromethane(Methylene Chloride	50[2]	<0.50	<0.50	<1	<0.5	<0.5	<0.5/<0.5	<0.50	<1	<0.5	<0.5/<0.5	<0.50
Ethylbenzene	2.4	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<20	<20	<15	<5	<5	<5/<5	<20	<15	<5	<5/<5	<20
Methyl t-butyl ether (MTBE)	700[2]	<0.50	<0.50	<2	<0.2	<0.2	<0.2/<0.2	<0.50	<2	<0.2	<0.2/<0.2	0.50 UJ
Methyl isobutyl ketone - (MIBK)	350[2]	<20	<20	<10	<5	<5	<5/<5	<20	<10	<5	<5/<5	<20
Styrene	100[2]	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
Tetrachloroethylene	30	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
Toluene	24	<0.50	3.15	<0.5	0.3	<0.2	<0.2/<0.2	<0.50	<0.5	<0.2	0.3/0.3	<0.50
Trichloroethylene	5	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
Trichlorofluoromethane (FREON 11)	NV	<1.0	<1.0	<2	<0.2	NA	<0.2/<0.2	<1.0	<2	NA	<0.2/<0.2	<1.0
Trihalomethanes (total)	NV	<2.0	<2.0	NA	NA	NA	NA	<2.0	NA	NA	NA	<2.0
Vinyl Chloride	2	<0.50	<0.50	<0.2	<0.2	<0.2	<0.2/<0.2	<0.50	<0.2	<0.2	<0.2/<0.2	<0.50
o-Xylene	300	<0.50	<0.50	<0.5	<0.1	<0.1	<0.1/<0.1	<0.50	<0.5	<0.1	<0.1/<0.1	<0.50
p+m-Xylene	300	<1.0	<1.0	<0.5	<0.1	0.1	<0.1/<0.1	<1.0	<0.5	<0.1	0.1U/0.1U	<1.0
Total Xylene	300	<1.5	<1.5	<1	<0.1	0.1	<0.1/<0.1	<1.5	<1	<0.1	<0.1/<0.1	<1.5

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 200

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Criteria for 1,3-dichloropropene

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 crit

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.11

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW5A-91*			*OW5A-06*		*OW5B-91*		
	Collection Date	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*06/07/04*	*07/28/05*	*07/19/06*
	Sample Identification	*GW-18235-05*	*GW-18235-05*	*GW-18235-08*	*GW-18235-10*	*GW-18235-19*	*GW-18235-06*	*GW-18235-06*	*GW-18235-10*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]								
1,1-Dichloroethane	70[2]	<0.4	<0.1	<0.1	<0.1	<0.50	<0.4	<0.1	<0.1
1,1-Dichloroethylene	14	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
1,1,1-Trichloroethane	200[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
1,1,1,2-Tetrachloroethane	5[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
1,1,2-Trichloroethane	5[2]	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2
1,1,2,2-Tetrachloroethane	1[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1
1,2-Dibromoethane (EDB)	1[2]	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2
1,2-Dichlorobenzene	3	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.1	<0.2
1,2-Dichloroethane	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
cis-1,2-Dichloroethylene	70[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1
trans-1,2-Dichloroethylene	100[2]	<1	<0.1	<0.1	<0.1	<0.50	<1	<0.1	<0.1
1,2-Dichloropropane	5[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
1,3-Dichlorobenzene	630[2]	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.1	<0.2
cis-1,3-Dichloropropene	1.4[3]	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.2	<0.2
trans-1,3-Dichloropropene	1.4[3]	<0.14	<0.2	<0.2	<0.2	<0.50	<0.14	<0.2	<0.2
1,4-Dichlorobenzene	5	<0.5	<0.1	<0.2	<0.2	<0.50	<0.5	<0.1	<0.2
2-Hexanone	NV	<10	<5	<5	<5	<20	<10	<5	<5
Acetone	3,000[2]	<10	<10	<10	<10	<20	<10	<10	<10
Benzene	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
Bromodichloromethane	5[2]	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	<0.1	<0.1
Bromoform	5[2]	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2
Bromomethane	10[2][a]	<3	<0.5	<0.5	<0.5	1.27 U	<3	<0.5	<0.5
Carbon Disulfide	NV	NA	NA	NA	NA	<0.50	NA	NA	NA
Carbon Tetrachloride	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
Chlorobenzene	30[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
Chloroethane	NV	<1	<0.2	<0.2	<0.2	<1.0	<1	<0.2	<0.2
Chloroform	5[2]	<0.2	<0.1	<0.1	<0.1	<0.50	<0.2	<0.1	<0.1
Chloromethane	NV	<2	<0.5	<0.5	<0.5	<1.0	<2	<0.5	<0.5
Dibromochloromethane	5[2]	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2
Dichlorodifluoromethane	NV	NA	NA	NA	NA	<1.0	NA	NA	NA
Dichloromethane(Methylene Chloride	50[2]	<1	<0.5	<0.5	<0.5	<0.50	<1	<0.5	<0.5
Ethylbenzene	2.4	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
Methyl-ethyl ketone - (2-Butanone)	350[2]	<15	<5	<5	<5	<20	<15	<5	<5
Methyl t-butyl ether (MTBE)	700[2]	<2	<0.2	<0.2	<0.2	0.50 UJ	<2	<0.2	<0.2
Methyl isobutyl ketone - (MIBK)	350[2]	<10	<5	<5	<5	<20	<10	<5	<5
Styrene	100[2]	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
Tetrachloroethylene	30	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
Toluene	24	<0.5	<0.2	<0.2	<0.2	<0.50	<0.5	<0.2	<0.2
Trichloroethylene	5	<0.5	<0.1	<0.1	<0.1	<0.50	<0.5	<0.1	<0.1
Trichlorofluoromethane (FREON 11)	NV	<2	<0.2	NA	<0.2	<1.0	<2	<0.2	NA
Trihalomethanes (total)	NV	NA	NA	NA	NA	<2.0	NA	NA	NA
Vinyl Chloride	2	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.2	<0.2
o-Xylene	300	<0.5	<0.1	<0.1	0.1U	<0.50	<0.5	<0.1	<0.1
p+m-Xylene	300	<0.5	<0.1	<0.1	<0.1	<1.0	<0.5	<0.1	<0.1
Total Xylene	300	<1	<0.1	<0.1	<0.1	<1.5	<1	<0.1	<0.1

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 200

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Criteria for 1,3-dichloropropene

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 crit

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.11

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*OW6A-92*			*OW8A-92*			*OW8A-06*		*OW9A-06*	
	Collection Date	*06/07/04*	*07/28/05*	*07/19/06*	*06/07/04*	*07/28/05*	*07/19/06*	*07/31/07*	*07/23/09*	*07/31/07*	*07/23/09*
	Sample Identification	*GW-18235-21*	*GW-18235-15*	*GW-18235-22*	*GW-18235-10*	*GW-18235-01*	*GW-18235-14*	*GW-18235-17*	*GW-18235-22*	*GW-18235-05*	*GW-18235-11*
Parameter (ug/L)	*Ontario Drinking Water Standards*[1]										
1,1-Dichloroethane	70[2]	<0.4	<0.1	<0.1	<0.4	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
1,1-Dichloroethylene	14	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
1,1,1-Trichloroethane	200[2]	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
1,1,2-Trichloroethane	5[2]	<0.5	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.50	<0.2	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.5	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.50	<0.2	<0.50
1,2-Dichlorobenzene	3	<0.5	<0.1	<0.2	<0.5	<0.1	<0.2	<0.2	<0.50	<0.2	<0.50
1,2-Dichloroethane	5	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
cis-1,2-Dichloroethylene	70[2]	<1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
trans-1,2-Dichloroethylene	100[2]	<1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
1,2-Dichloropropane	5[2]	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
1,3-Dichlorobenzene	630[2]	<0.5	<0.1	<0.2	<0.5	<0.1	<0.2	<0.2	<0.50	<0.2	<0.50
cis-1,3-Dichloropropene	1.4[3]	<0.14	<0.2	<0.2	<0.14	<0.2	<0.2	<0.2	<0.50	<0.2	<0.50
trans-1,3-Dichloropropene	1.4[3]	<0.14	<0.2	<0.2	<0.14	<0.2	<0.2	<0.2	<0.50	<0.2	<0.50
1,4-Dichlorobenzene	5	<0.5	<0.1	<0.2	<0.5	<0.1	<0.2	<0.2	<0.50	<0.2	<0.50
2-Hexanone	NV	<10	<5	<5	<10	<5	<5	<5	<20	<5	<20
Acetone	3,000[2]	<10	<10	<10	<10	<10	<10	<10	<20	<10	<20
Benzene	5	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	0.3U	<0.50	<0.1	<0.50
Bromodichloromethane	5[2]	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Bromoform	5[2]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.50
Bromomethane	10[2][a]	<3	<0.5	<0.5	<3	<0.5	<0.5	<0.5	2.7 U	<0.5	2.39 U
Carbon Disulfide	NV	NA	NA	NA	NA	NA	NA	NA	<0.50	NA	<0.50
Carbon Tetrachloride	5	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Chlorobenzene	30[2]	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Chloroethane	NV	<1	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<1.0	<0.2	<1.0
Chloroform	5[2]	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Chloromethane	NV	<2	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<1.0	<0.5	<1.0
Dibromochloromethane	5[2]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.50
Dichlorodifluoromethane	NV	NA	NA	NA	NA	NA	NA	NA	<1.0	NA	<1.0
Dichloromethane(Methylene Chloride	50[2]	<1	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.50	<0.5	<0.50
Ethylbenzene	2.4	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<15	<5	<5	<15	<5	<5	<5	<20	<5	<20
Methyl t-butyl ether (MTBE)	700[2]	<2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.50	<0.2	0.50 UJ
Methyl isobutyl ketone - (MIBK)	350[2]	<10	<5	<5	<10	<5	<5	<5	<20	<5	<20
Styrene	100[2]	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Tetrachloroethylene	30	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Toluene	24	<0.5	<0.2	<0.2	<0.5	<0.2	<0.2	0.5U	<0.50	<0.2	<0.50
Trichloroethylene	5	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
Trichlorofluoromethane (FREON 11)	NV	<2	<0.2	NA	<2	<0.2	NA	<0.2	<1.0	<0.2	<1.0
Trihalomethanes (total)	NV	NA	NA	NA	NA	NA	NA	NA	<2.0	NA	<2.0
Vinyl Chloride	2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.50	<0.2	<0.50
o-Xylene	300	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.50	<0.1	<0.50
p+m-Xylene	300	<0.5	0.1	<0.1	<0.5	<0.1	<0.1	0.2U	<1.0	<0.1	<1.0
Total Xylene	300	<1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<1.5	<0.1	<1.5

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 200

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Criteria for 1,3-dichloropropene

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 crit

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.12

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW1D-07*		*MW1S-07*		*MW2D-07*		*MW2S-07*		*OW8D-07*		*OW8S-07*	
Collection Date		*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-07*	*GW-18235-21*	*GW-18235-08*	*GW-18235-23*	*GW-18235-16A*	*GW-18235-05*	*GW-18235-17*	*GW-18235-02*	*GW-18235-24*	*GW-18235-14*	*GW-18235-25*	*GW-18235-19*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Alkalinity (Total as CaCO3)	30NA500	234	166	430	391	349	390	422	414	161	178	431	412
Ammonia (as Nitrogen)	NV	2.00	2.10	0.434	0.222	1.87	0.469	0.226	0.159	1.14	1.28	0.342	0.231
Hardness (CaCO3)	80NA100	**2,210**	NA	**2,900**	NA	**2,670**	NA	**2,930**	NA	**1,140**	NA	**2,910**	NA
Nitrate (N)	10	<1.0	<0.50	<1.0	<0.50	<1.0	<0.50	<1.0	<0.50	<1.0	<0.50	<1.0	<0.50
Nitrite (N)	1	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA
Total Kjeldahl Nitrogen (TKN)	NV	2.91	NA	0.470	NA	2.03	NA	0.295	NA	1.74	NA	0.405	NA
Chloride (Cl)	250	<20	14.8	<20	11.6	<20	10.4	<20	10.8	35.1	25.7	<20	11.8
Sulfates (SO4)	500	**2,400**	**2,280**	**2,800**	**2,560**	**2,930**	**2,900**	**2,950**	**2,820**	**1,470**	**2,150**	**2,750**	**2,820**
Dissolved Organic Carbon (DOC)	5	3	3.1 U	2.8	2.8 U	2.5	3.4 U	3.3	2.5 U	4.5	4.8 U	4.3	3 U
Total Dissolved Solids (TDS)	500	**3,970**	**3,160**	**3,110**	**3,860**	**3,860**	**4,120**	**4,170**	**4,180**	**2,650**	**3,270**	**4,150**	**4,180**
Total Suspended Solids (TSS)	NV	570	NA	960	NA	2,370	NA	948	NA	1,370	NA	2,450	NA
PhenolNA4AAP	4.2[2]	<0.020	NA	<0.0010	NA	0.0014	NA	0.002	NA	0.0874	NA	0.002	NA
Biological Oxygen Demand (BOD5)	NV	<6.0	NA	2 J	NA	<6.0	NA	<6.0	NA	44.4	NA	<6.0	NA
Chemical Oxygen Demand (COD)	NV	54	106	33	10	<10	106	<10	<10	77	100	<10	12
pH (Standard Units)	6.5NA8.5	8.17	8.23	7.49	7.61	7.64	7.64	7.56	7.57	8.3	8.29	7.51	7.58
Total Phosphorus (P)	NV	1.61	NA	0.193	NA	0.157	NA	0.325	NA	0.571	NA	1.24	NA
Potassium (K)	NV	30	NA	<10	NA	16	NA	<10	NA	12	NA	<10	NA
Conductivity (umhos/cm)	NV	3,160	3,020	3,780	3,640	3,680	3,850	3,880	3,950	2,230	3,160	3,930	3,900
Calcium (Ca)	NV	530	NA	523	NA	516	NA	503	NA	281	NA	504	NA
Turbidity (NTU)	5[3]	**38.0**	**38.0**	**7.00**	**8.70**	**5.90**	4.90	**53.0**	**7.60**	**58.0**	**67.0**	**11.3**	**8.80**

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Applicable at point of consumption.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.13

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW1D-07*		*MW1S-07*		*MW2D-07*		*MW2S-07*		*OW8D-07*		*OW8S-07*	
Collection Date		*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*
Sample Identification		*GW-18235-07*	*GW-18235-21*	*GW-18235-08*	*GW-18235-23*	*GW-18235-16A*	*GW-18235-05*	*GW-18235-17*	*GW-18235-02*	*GW-18235-24*	*GW-18235-14*	*GW-18235-25*	*GW-18235-19*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]												
Aluminum (Al)	0.1	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	NA
Arsenic (As)	0.025	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Barium (Ba)	1	<0.10	<0.10	<0.10	0.012	<0.10	0.013	<0.10	<0.010	<0.10	<0.10	<0.10	<0.010
Beryllium (Be)	0.004[2]	**<0.010**	NA	**<0.010**	NA	**<0.010**	NA	**<0.010**	NA	**<0.010**	NA	**<0.010**	NA
Boron (B)	5	**12.2**	**9.44**	0.73	0.502	3.38	1.47	0.62	0.471	4.01	**8.23**	0.70	0.525
Cadmium (Cd)	0.005	<0.0010	NA	<0.0010	NA	<0.0010	NA	<0.0010	NA	<0.0010	NA	<0.0010	NA
Chromium (Cr)	0.05	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Cobalt (Co)	0.1[2]	<0.0080	NA	<0.0080	NA	<0.0080	NA	<0.0080	NA	<0.0080	NA	<0.0080	NA
Copper (Cu)	1	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Iron (Fe)	0.3	**<0.50**	**<0.50**	**2.60**	**2.35**	**<0.50**	**1.74**	**0.68**	**0.717**	**<0.50**	**<0.50**	**2.71**	**2.41**
Lead (Pb)	0.01	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Magnesium (Mg)	NV	199	187	388	279	337	317	407	328	108	173	400	335
Manganese (Mn)	0.05	0.05	NA	0.04	NA	**0.086**	NA	**0.166**	NA	**0.121**	NA	**0.195**	NA
Mercury (Hg)	0.001	<0.00010	NA	<0.00010	NA	<0.00010	NA	<0.00010	NA	<0.00010	NA	<0.00010	NA
Molybdenum (Mo)	7.3[2]	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Nickel (Ni)	0.1[2]	<0.020	NA	<0.020	NA	<0.020	NA	<0.020	NA	<0.020	NA	<0.020	NA
Silver (Ag)	0.0012[2]	<0.0010	NA	<0.0010	NA	<0.0010	NA	<0.0010	NA	<0.0010	NA	<0.0010	NA
Sodium (Na)	200	73.2	36.3	123	94.1	134	110	127	104	46.5	89.4	131	112
Thallium (Tl)	0.002[2]	**<0.0030**	NA	**<0.0030**	NA	**<0.0030**	NA	**<0.0030**	NA	**<0.0030**	NA	**<0.0030**	NA
Vanadium (V)	0.2[2]	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Zinc (Zn)	5	<0.030	NA	<0.030	NA	<0.030	NA	<0.030	NA	0.070	NA	<0.030	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.14

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Parameter (ug/L)	Well Identification	Ontario Drinking Water Standards [1]	MW1D-07		MW1S-07		MW2D-07		MW2S-07		OW8D-07		OW8S-07	
	Collection Date		07/23/09	11/25/09	07/23/09	11/25/09	07/23/09	11/25/09	07/23/09	11/25/09	07/23/09	11/25/09	07/23/09	11/25/09
	Sample Identification		GW-18235-07	GW-18235-21	GW-18235-08	GW-18235-23	GW-18235-16A	GW-18235-05	GW-18235-17	GW-18235-02	GW-18235-24	GW-18235-14	GW-18235-25	GW-18235-19
1-Methylnaphthalene		10[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.027	<0.020	<0.020	<0.020
2-Methylnaphthalene		10[2]	0.03	0.025	0.021	<0.020	<0.020	<0.020	<0.020	<0.020	0.035	0.022	0.024	<0.020
Naphthalene		21[2]	0.09	0.086	0.046	<0.020	0.024	<0.020	<0.020	<0.020	0.152	0.055	0.033	<0.020
Acenaphthylene		310[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.036	<0.020
Acenaphthene		20[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.041	<0.020	<0.020	<0.020
Fluorene		280[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Phenanthrene		63[2]	<0.020	0.043	0.02	0.038	<0.020	0.021	<0.020	<0.020	0.044	<0.020	0.139	<0.020
Anthracene		12[2]	<0.020	<0.020	0.022	<0.020	<0.020	<0.020	0.031	<0.020	0.028	<0.020	0.038	<0.020
Fluoranthene		130[2]	<0.020	<0.020	<0.020	0.026	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.163	<0.020
Pyrene		40[2]	<0.020	<0.020	<0.020	0.023	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.135	<0.020
Benzo(a)anthracene		0.2[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.069	<0.020
Chrysene		0.5[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.116	<0.020
Benzo(b/j)fluoranthene		0.2[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene[4]		0.2[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.065	<0.020
Benzo(k)fluoranthene		21[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.053	<0.020
Benzo(a)pyrene		0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.0571**	<0.0050
Indeno(1,2,3-cd)pyrene		0.2[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.037	<0.020
Dibenzo(a,h)anthracene		0.2[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo(g,h,i)perylene		0.2[2]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.038	<0.020
F1 (C6-C10 Hydrocarbons)		NV	<100	NA	<100	NA	<100	NA	<100	NA	<100	NA	<100	NA
F2 (C10-C16 Hydrocarbons)		NV	<100	NA	<100	NA	<100	NA	<100	NA	<100	NA	<100	NA
F1+F2 (C6-C16 Hydrocarbons)		1000[2](a)	<200	NA	<200	NA	<200	NA	<200	NA	<200	NA	<200	NA
F3 (C16-C34 Hydrocarbons)		NV	<250	NA	<250	NA	<250	NA	<250	NA	<250	NA	<250	NA
F4 (C34-C50 Hydrocarbons)		NV	<250	NA	<250	NA	<250	NA	<250	NA	<250	NA	<250	NA
F3+F4 (C16-C50 Hydrocarbons)		1000[2](b)	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Split Sample, analysed by a second laboratory

(4) ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/l

(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 5.15

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Well Identification		*MW1D-07*	*MW1S-07*	*MW2D-07*	*MW2S-07*	*OW8D-07*	*OW8S-07*
Collection Date		*07/23/09*	*07/23/09*	*07/23/09*	*07/23/09*	*07/23/09*	*07/23/09*
Sample Identification		*GW-18235-07*	*GW-18235-08*	*GW-18235-16A*	*GW-18235-17*	*GW-18235-24*	*GW-18235-25*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]						
1,1-Dichloroethane	70[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	14	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1-Trichloroethane	200[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1,2-Tetrachloroethane	5[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	5[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	1[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dibromoethane (EDB)	1[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichlorobenzene	3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane	5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-Dichloroethylene	70[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethylene	100[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloropropane	5[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	630[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,3-Dichloropropene	1.4[3]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,3-Dichloropropene	1.4[3]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Hexanone	NV	<20	<20	<20	<20	<20	<20
Acetone	3,000[2]	<20	<20	<20	<20	<20	<20
Benzene	5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	5[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromoform	5[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromomethane	10[2][a]	4.55 U	2.52 U	2.29 U	1.73 U	3.51 U	2.13 U
Carbon Disulfide	NV	2.71	<0.50	<0.50	<0.50	3.36	<0.50
Carbon Tetrachloride	5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chlorobenzene	30[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroethane	NV	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	5[2]	<0.50	<0.50	<0.50	<0.50	1.88	0.99
Chloromethane	NV	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane	5[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dichlorodifluoromethane	NV	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichloromethane(Methylene Chloride)	50[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	2.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-ethyl ketone - (2-Butanone)	350[2]	<20	<20	<20	<20	<20	<20
Methyl t-butyl ether (MTBE)	700[2]	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	<0.50	<0.50
Methyl isobutyl ketone - (MIBK)	350[2]	<20	<20	<20	<20	<20	<20
Styrene	100[2]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethylene	30	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	24	3.41	3.75	0.82	0.7	1.18	<0.50
Trichloroethylene	5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichlorofluoromethane (FREON 11)	NV	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trihalomethanes (total)	NV	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
o-Xylene	300	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
p+m-Xylene	300	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylene	300	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Criteria for 1,3-dichloropropene
NV No value
NA Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.17

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - INORGANIC CHEMISTRY
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW1								
Parameter	*PWQO [a,b] (mg/L)*	*SW-18235-07 5/9/2005*	*SW-18235-01 12/2/2005*	*SW-18235-10 3/30/2006*	*SW-18235-34 5/29/2006*	*SW-18235-27 12/12/2006*	*SW-18235-01/11 3/14/2007*	*SW-18235-23 5/16/2007*	*SW-18235-08 7/19/2009*	*SW-18235-01/02 11/25/2009*
Alkalinity, total (as CaCO3)	See Note [1]	44.6	26	49	12	39	30 /27	182	252	63 /54
Ammonia-N	NV	0.08	< 0.05	< 0.05	0.09	0.12	0.26 /0.28	0.07	< 0.05	< 0.05 /< 0.05
Biochemical oxygen demand (BOD)	NV	< 2	< 2	< 2	< 2	< 2	3 /4	2	38	< 2 /< 2
Calcium	NV	NA	NA	NA	NA	NA	NA	NA	NA	20.6 /24.3
Calcium (dissolved)	NV	16.2	13	NA	4.5	14	NA	NA	151	NA
Chemical oxygen demand (COD)	NV	61	46	56	96	46	35 /31	59	230	60 U/54 U
Chloride	NV	8.1	< 1	12	24	7	11 J/6 J	33	178	21.5
Conductivity (uS/cm)	NV	0.129	0.101	0.164	0.307	0.107	0.094 /0.095	0.478	1.1	0.216 /0.178
Dissolved organic carbon (DOC)	NV	19.6	12.7	NA	29.1	12.9	NA	NA	30.9	12.9 /13.7
Dissolved oxygen (DO)	NV [2]	NA	NA	8.5	NA	NA	NA	NA	0.52	2.68
Hardness	NV	57.9	43	NA	140	45	NA	220	575	74 /87
Nitrate (as N)	NV	< 1	< 1	< 0.1	< 0.1	< 0.1	0.3 /0.3	< 0.1	< 0.1	< 0.1 /< 0.1
Nitrite (as N)	NV	< 0.1	0.02	< 0.01	< 0.01	< 0.01	< 0.01 /< 0.01	< 0.01	< 0.1	< 0.1 /< 0.1
pH (s.u.)	6.5-8.5	7.29	7.24	7.4	7.6	7.4	7.0 / 7.0	7.7	7.43	7.3 / 7.22
Phenol	0.001	**0.004**	< 0.001	< 0.001	0.001	**0.002**	**0.003 / 0.002**	**0.004**	< 0.001	< 0.001 / < 0.001
Potassium	NV	2	6	NA	1	4.3	NA	NA	< 10	2.9 /3.1
Sulfates	NV	7	15	16	4	6	7 /7	15	25.5	6.4 /15.5
Total dissolved solids (TDS)	NV	249	140	100	200	88	60 /57	301	758	142 /120
Total kjeldahl nitrogen (TKN)	NV	1.5	1	0.9	1.3	1.4	1.5 /1.5	1.5	7.32	0.86 /0.73
Total Phosphorus	0.01/0.02/0.03 [3]	**0.17**	**0.175**	**0.12**	**0.28**	**0.18**	**0.14 / 0.13**	**0.12**	**2.28**	**0.127 J /0.0581 J**
Total suspended solids (TSS)	NV	18	5	4	14	< 5	11 /13	< 10	1670	61.5 /120
Turbidity	NV	NA	NA	NA	NA	NA	NA	NA	0.025	0.0063 /0.0064

Notes:

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NA Not analyzed

J Estimated.

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[1] PWQO Alkalinity should not be decreased by more than 25% of the natural concentration.

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TABLE 5.17

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - INORGANIC CHEMISTRY
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW3											
		SW-18235-01	*SW-18235-08*	*SW-18235-08*	*SW-18235-05/06*	*SW-18235-13/14*	*SW-18235-30/31*	*SW-18235-28/29*	*SW-18235-03*	*SW-18235-27*	*SW-18235-03/05*	*SW-18235-03*
		11/29/2004	*3/30/2005*	*5/9/2005*	*12/2/2005*	*3/30/2006*	*5/29/2006*	*12/19/2006*	*3/14/2007*	*5/16/2007*	*7/19/2009*	*11/24/2009*
Parameter	***PWQO*** [a,b] ***(mg/L)***											
Alkalinity, total (as CaCO3)	See Note [1]	174	114	291	220 / 223	275 / 277	373 / 373	337 / 340	183	323	94 / 93	317
Ammonia-N	NV	0.05	0.11	< 0.05	< 0.05 / < 0.05	0.06 / < 0.05	0.06 / 0.07	< 0.05 / 0.13	0.23	0.06	< 0.05 / 0.052	< 0.05
Biochemical oxygen demand (BOD)	NV	< 3	3	< 2	< 2 / < 2	< 2 / < 2	< 2 / < 2	< 2 / < 2	2	4	< 2 / < 2	4.6
Calcium	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	135
Calcium (dissolved)	NV	82	NA	96.2	100 / 110	NA	130 / 130	120 / 120	NA	NA	43.6 / 51.8	NA
Chemical oxygen demand (COD)	NV	36	25	40	19 / 24	25 / 24	90 / 48	45 / 93	24	46	18 / 27	50
Chloride	NV	25	11.9	8.8	22 / 23	10 / 10	5 / 5	11 / 11	7	29	2.3 / 2.3	22.7
Conductivity (uS/cm)	NV	0.519	0.314	0.684	0.631 / 0.64	0.745 / 0.746	0.776 / 0.774	0.759 / 0.766	0.488	1.01	0.438 / 0.443	0.781
Dissolved organic carbon (DOC)	NV	12	NA	14	8 / 8.1	NA	15.1 / 13.7	9.1 / 9	NA	20.7	5.4 J / 12.8 J	8.9
Dissolved oxygen (DO)	NV [2]	NA	9.42	NA	NA	9.25 / 8.97	NA	NA	NA	NA	4.46	6.27
Hardness	NV	282	NA	349	330 / 330	NA	370 / 370	410 / 410	NA	480	246 / 236	505
Nitrate (as N)	NV	0.2	< 1	< 1	< 1 / < 1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	0.2	< 0.1	< 0.1 / < 0.1	< 0.1
Nitrite (as N)	NV	< 0.1	NA	< 0.1	< 0.01 / < 0.01	< 0.01 / < 0.01	< 0.01 / < 0.01	< 0.01 / < 0.01	0.01	< 0.01	< 0.1 / < 0.1	< 0.1
pH (s.u.)	6.5-8.5	8.06	7.8	8.08	8.14 / 8.26	8.1 / 8.1	8 / 8.2	8.2 / 8.2	7.9	8.1	7.92 / 7.9	8.1
Phenol	0.001	0.001 U	**0.004**	**0.002**	< 0.001 / < 0.001	< 0.001 / < 0.001	< 0.001 / < 0.001	0.001 / 0.001	**0.002**	**0.004**	< 0.001 / **0.0013**	**0.009**
Potassium	NV	NA	NA	4.7	4.2 / 4.4	NA	4.3 / 4.3	7.6 / 7.7	NA	NA	2.3 / 2.4	< 10
Sulfates	NV	64.6	27.4	64	94 / 90	136 / 135	71 / 72	102 / 87	65	176	136 / 137	91.2
Total dissolved solids (TDS)	NV	319	229	564	402 / 334	490 / 480	505 / 503	422 / 434	284	583	314 / 316	478
Total kjeldahl nitrogen (TKN)	NV	0.8	1.1	0.7	0.6 / 0.5	0.4 / 0.4	0.8 / 0.8	0.6 / 0.7	1.1	1.1	< 0.15 / < 0.15	0.66
Total Phosphorus	0.01 / 0.02 / 0.03 [3]	**0.08**	**0.07**	**0.05**	**0.055 / 0.032**	< 0.011	0.014 / **0.06**	**0.044 / 0.052**	**0.045**	**0.071**	**0.0306 / 0.0319**	**0.41**
Total suspended solids (TSS)	NV	25	5	19	2 / 3	< 1 / < 1	5 / 16	< 5 / 5	14	35	5.2 / 4.8	377
Turbidity	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0032 / 0.0032	0.021

Notes:

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2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW4								
		SW-18235-04	SW-18235-02/03	SW-18235-09	SW-18235-02	SW-18235-09	SW-18235-32	SW-18235-04	SW-18235-02	SW-18235-04
		11/29/2004	3/30/2005	5/9/2005	12/2/2005	3/30/2006	12/12/2006	3/14/2007	7/19/2009	11/24/2009
Parameter	*PWQO [a],[b] (mg/L)*									
Alkalinity, total (as CaCO3)	See Note [1]	68.4	51.3 / 46.6	144	49	138	97	31	116	132
Ammonia-N	NV	< 0.05	0.1 / 0.09	0.08	< 0.05	0.1	0.12	0.24	< 0.05	< 0.05
Biochemical oxygen demand (BOD)	NV	6	< 4	2	< 2	< 2	< 2	3	< 2	< 2
Calcium	NV	NA	NA	NA	NA	NA	NA	NA	NA	54.1
Calcium (dissolved)	NV	34	NA	45.1	28	NA	33	NA	62	NA
Chemical oxygen demand (COD)	NV	53	25 / 27	61	45	42	35	24	20	37
Chloride	NV	11.6	4 / 4.7	6.2	9	7	10	5	6.7	14.8
Conductivity (uS/cm)	NV	0.228	0.144 / 0.147	0.299	0.21	0.334	0.248	0.122	0.479	0.375
Dissolved organic carbon (DOC)	NV	15.2	NA	18	12.5	NA	12	NA	14.9	11.5
Dissolved oxygen (DO)	NV [2]	NA	10.6 / 10.8	NA	NA	9.35	NA	NA	7.72	10.21
Hardness	NV	114	NA	156	92	NA	110	NA	264	192
Nitrate (as N)	NV	0.6	< 1	< 1	2.9	< 0.1	0.4	2.2	< 0.1	< 0.1
Nitrite (as N)	NV	< 0.1	NA	< 0.1	0.02	< 0.01	0.01	0.02	< 0.1	< 0.1
pH (s.u.)	6.5-8.5	7.98	7.45 / 7.28	8.15	7.58	8.1	8.0	7.3	8.26	8.13
Phenol	0.001	**0.002 U**	**0.002 / 0.003**	**0.004**	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001
Potassium	NV	NA	NA	4.3	5.1	NA	6	NA	3.4	5.2
Sulfates	NV	28.8	15 / 15.7	9	29	32	24	12	131	36.9
Total dissolved solids (TDS)	NV	235	141 / 133	266	246	220	141	68	348	244
Total kjeldahl nitrogen (TKN)	NV	0.9	1 / 1.1	1.9	1.8	1.3	1.7	1.8	0.5	0.65
Total Phosphorus	0.01/0.02/0.03 [3]	**0.12**	**0.06 / 0.04**	**0.25**	**0.171**	**0.09**	**0.13**	**0.15**	**0.063**	**0.092**
Total suspended solids (TSS)	NV	12	12 / 4	38	15	4	15	46	< 3	18.4
Turbidity	NV	NA	NA	NA	NA	NA	NA	NA	0.002	0.027

Notes:

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2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW5											
		SW-18235-01	SW-18235-06/07	SW-18235-07	SW-18235-05	SW-18235-08	SW-18235-16	SW-18235-32	SW-18235-25	SW-18235-05	SW-18235-29	SW-18235-09	SW-18235-09
		6/7/2004	11/29/2004	3/30/2005	5/9/2005	12/2/2005	3/30/2006	5/29/2006	12/12/2006	3/14/2007	5/16/2007	7/19/2009	11/25/2009
Parameter	*PWQO [a],[b] (mg/L)*												
Alkalinity, total (as CaCO3)	See Note [1]	103	26.9 /22.1	20.5	72	42	72	67	103	29	201	155	430
Ammonia-N	NV	< 0.05	0.11 /0.09	0.15	0.1	0.09	< 0.05	0.033	0.22	39	0.57	< 0.05	< 0.05
Biochemical oxygen demand (BOD)	NV	5	7 J/10 J	4	< 2	3	5	5	4	3	4	58	15.2
Calcium	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	153
Calcium (dissolved)	NV	23	22 /21	NA	22	19	NA	24	34	NA	NA	66	NA
Chemical oxygen demand (COD)	NV	116	127 /132	61	100	250	110	220	55	32	110	343	146
Chloride	NV	20.1	6.12 /6.9	2.94	5.8	4	4	4	2	7	5	< 2	3.5
Conductivity (uS/cm)	NV	0.208	0.183 /0.177	0.066	0.161	0.122	0.161	0.137	0.216	0.1	0.392	0.395	0.822
Dissolved organic carbon (DOC)	NV	24.6	35.4 /36.1	NA	29.4	25.6	NA	40.3	15.1	NA	29.6	29.3	21.7
Dissolved oxygen (DO)	NV [2]	NA	NA	8.57	NA	NA	8.04	NA	NA	NA	NA	0.03	2.31
Hardness	NV	91.2	81.7 /77.4	NA	76.2	54	NA	62	100	NA	190	241	546
Nitrate (as N)	NV	< 1	< 0.1 / < 0.1	< 1	< 1	< 1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1	< 0.1
Nitrite (as N)	NV	< 0.1	< 0.1 / < 0.1	NA	< 0.0001	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.03	< 0.1	< 0.1
pH (s.u.)	6.5-8.5	7.83	7.1 / 6.88	6.6	7.59	7.46	7.6	7.4	7.8	7.0	8.1	8.01	7.0
Phenol	0.001	< 0.001	**0.003 U / 0.004 U**	**0.007**	**0.005**	**0.012**	< 0.001	**0.003**	**0.006**	< 0.001	**0.006**	< 0.001	**0.025**
Potassium	NV	7.6	NA	NA	4.2	6	NA	5.9	5.2	NA	NA	< 10	< 10
Sulfates	NV	< 5	51.6 /48.8	8	< 5	16	7	< 10	11	15	6	52.7	44.3
Total dissolved solids (TDS)	NV	110	197 /164	363	183	210	104	90	119	63	242	304	566
Total kjeldahl nitrogen (TKN)	NV	2.1	2.7 /3.3	2.1	2.6	6.7	2.6	3	2	1.8	4	16.8	1
Total Phosphorus	0.01/0.02/0.03 [3]	**0.22**	**0.18 / 0.23**	**0.18**	**0.31**	**1.04**	**0.24**	**0.49**	**0.11**	**0.094**	**0.65**	**2.82**	**0.369**
Total suspended solids (TSS)	NV	43	77 J/22 J	50	23	700	8	74	54	19	550	324	1490
Turbidity	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.053	0.13

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EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW6									
		SW-18235-05	SW-18235-06	SW-18235-06	SW-18235-07	SW-18235-15	SW-18235-33	SW-18235-26	SW-18235-06	SW-18235-28	SW-18235-06
		11/29/2004	3/30/2005	5/9/2005	12/2/2005	3/30/2006	5/29/2006	12/12/2006	3/14/2007	5/16/2007	11/24/2009
Parameter	*PWQO [a],[b] (mg/L)*										
Alkalinity, total (as CaCO3)	See Note [1]	16.9	22.2	57.8	32	50	98	86	0.025	177	219
Ammonia-N	NV	0.07	0.17	0.11	0.05	< 0.05	0.071	0.29	34	0.63	0.05
Biochemical oxygen demand (BOD)	NV	8	4	< 2	< 2	< 2	4	2	0.003	5	10.2
Calcium	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	71
Calcium (dissolved)	NV	20	NA	19.8	20	NA	36	36	NA	NA	NA
Chemical oxygen demand (COD)	NV	333	58	110	120	85	500	220	58	130	92
Chloride	NV	7.48	2.9	0.55	6	3	9	7	8	3	3
Conductivity (uS/cm)	NV	0.097	0.071	0.133	0.116	0.121	0.182	192	0.094	0.425	0.449
Dissolved organic carbon (DOC)	NV	27.8	NA	31.8	21	NA	64	20.9	NA	42.9	21.6
Dissolved oxygen (DO)	NV [2]	NA	9.37	NA	NA	8.78	NA	NA	NA	NA	1.11
Hardness	NV	46.3	NA	76.2	52	NA	90	94	NA	210	253
Nitrate (as N)	NV	0.3	< 1	< 0.1	0.4	< 0.1	< 0.1	< 0.1	0.4	0.1	0.1
Nitrite (as N)	NV	< 0.1	NA	< 0.1	0.05	< 0.01	0.01	< 0.01	0.01	0.02	0.1
pH (s.u.)	6.5-8.5	7.01	6.71	7.4	7.54	7.5	7.6	7.7	7.0	8.0	7.64
Phenol	0.001	**0.002 U**	**0.006**	**0.006**	< 0.001	< 0.001	**0.004**	**0.004**	**0.002**	**0.005**	**0.026**
Potassium	NV	NA	NA	3.9	6.7	NA	7.2	6.7	NA	NA	5.6
Sulfates	NV	15.2	8	< 0.5	24	5	19	13	14	40	23.1
Total dissolved solids (TDS)	NV	164	292	190	230	70	123	126	53	258	284
Total kjeldahl nitrogen (TKN)	NV	4.5	1.5	2.2	3.9	0.6	2.8	10	3	5	1.71
Total Phosphorus	0.01/0.02/0.03 [3]	**0.55**	**0.34**	**0.25**	**0.534**	**0.048**	**1.8**	**1.5**	**0.12**	**0.57**	**0.244**
Total suspended solids (TSS)	NV	134	20	52	410	4	880	700	15	2400	100
Turbidity	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.018

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[1] PWQO Alkalinity should not be decreased by more than 25% of the natural concentration.

[2] Dissolved Oxygen concentrations should not be less than the values specified and is dependant on cold water biota vs warm water biota.

[3] Total Phosphorus Interim PWQO: To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 0.02 mg/L; A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 0.01 mg/L or less. This should apply to all lakes naturally below this value; Excessive plant growth in rivers and streams should be eliminated at a total phosphorus concentration below 0.03 mg/L.

TABLE 5.17

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - INORGANIC CHEMISTRY
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW7												
		SW-18235-02/03	SW-18235-07/77	SW-18235-02	SW-18235-05	SW-18235-02/03	SW-18235-04	SW-18235-12	SW-18235-29	SW-18235-31	SW-18235-07	SW-18235-25/26	SW-18235-06	SW-18235-07
		6/7/2004	8/20/2004	11/29/2004	3/30/2005	5/9/2005	12/2/2005	3/30/2006	5/29/2006	12/12/2006	3/14/2007	5/16/2007	7/19/2009	11/24/2009
Parameter	*PWQO [a],[b] (mg/L)*													
Alkalinity, total (as CaCO3)	See Note [1]	143 /140	164 /166	53.5	22.3	34.4 /34.9	26	26	51	46	12	45 /40	136	141
Ammonia-N	NV	< 0.05 /< 0.05	0.53 /0.52	< 0.05	0.1	0.07 /0.05	0.06	< 0.05	0.1	0.22	0.15	90 /12	< 0.05	0.05
Biochemical oxygen demand (BOD)	NV	6 /5	15 /16	8	< 4	3 /< 2	< 2	< 4	4	2	< 2	4 /5	3	4.3
Calcium	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	42.6
Calcium (dissolved)	NV	45 /42	NA	24	NA	11.6 /11.5	11	NA	17	14	NA	NA	49.9	NA
Chemical oxygen demand (COD)	NV	116 /105	133 /103	423	32	87 /89	99	73	130	60	18	82 /76	39	20
Chloride	NV	18.1 /18.1	5.25 /5.23	8.29	1.25	2 /0.22	3	3	2	7	2	2 /2	7.3	2
Conductivity (uS/cm)	NV	0.316 /0.314	0.311 /0.311	0.143	0.058	0.0861 /0.0868	0.092	0.09	0.11	0.103	0.046	0.111 /0.105	0.255	0.269
Dissolved organic carbon (DOC)	NV	21.5 /22	NA	24.5	NA	25.2 /24.6	19.2	NA	33.3	16.7	NA	28.4 /27.9	16.5	6.9
Dissolved oxygen (DO)	NV [2]	NA	4.06 UJ/4.3 UJ	NA	9.68	NA	NA	8.04	NA	NA	NA	NA	5.43	8.66
Hardness	NV	159 /156	NA	72.5	NA	44.7 /44.3	43	NA	52	47	NA	54 /51	179	150
Nitrate (as N)	NV	< 1 /< 1	0.1 /0.1	< 0.1	0.3	< 1 /< 0.1	< 0.1	< 0.1	< 0.1	0.4	0.4	< 0.1 /< 0.1	0.15	0.1
Nitrite (as N)	NV	< 0.1 /< 0.1	< 0.1 /< 0.1	< 0.1	NA	< 0.1 /< 0.1	0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01 /< 0.01	< 0.1	0.1
pH (s.u.)	6.5-8.5	7.94 / 7.93	7.15 / 7.15	7.54	6.8	7.22 / 7.25	6.94	7.1	7.3	7.5	6.8	7.4 / 7.5	8.28	8.39
Phenol	0.001	< 0.001 / < 0.001	< 0.001 / < 0.001	**0.003 U**	**0.004**	**0.004 / 0.004**	0.001	< 0.001	0.001	**0.004**	< 0.001	**0.003 / 0.004**	< 0.001	**0.006**
Potassium	NV	6.2 /6.4	NA	NA	NA	1.3 /1.2	4.4	NA	1.6	5.5	NA	NA	1.5	1.6
Sulfates	NV	30 /29.8	7 /8.3	11	3.5	7 /0.7	9	13	< 1	4	4	9 /6	3.3	3.9
Total dissolved solids (TDS)	NV	150 /155	261 /284	175	159	110 /193	226	60	71	64	30	54 /51	166	144
Total kjeldahl nitrogen (TKN)	NV	3.1 /3	3 /3.5	3.2	1.3	2 /1.9	2.2	1.2	1.8	2	1.2	2.2 /1.9	0.42	0.6
Total Phosphorus	0.01/0.02/0.03 [3]	**0.34 / 0.28**	**0.66 U /0.57 U**	**0.32**	**0.03**	**0.17 / 0.18**	**0.254**	**0.095**	**0.29**	**0.19**	**0.071**	**0.15 / 0.12**	**0.07**	**0.049**
Total suspended solids (TSS)	NV	61 /68	471 J/170 J	230	12	50 /49	64	20	26	10	9	58 /67	64	17.6
Turbidity	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.026	0.023

Notes:

All results and criteria are reported in mg/L, unless otherwise noted

[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.

* indicates Interim PWQO;

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

NV No value

NA Not analyzed

J Estimated.

U Not present at or above the associated value.

UJ Estimated reporting limit.

\- Not applicable.

[1] PWQO Alkalinity should not be decreased by more than 25% of the natural concentration.

[2] Dissolved Oxygen concentrations should not be less than the values specified and is dependant on cold water biota vs warm water biota.

[3] Total Phosphorus Interim PWQO: To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 0.02 mg/L; A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 0.01 mg/L or less. This should apply to all lakes naturally below this value; Excessive plant growth in rivers and streams should be eliminated at a total phosphorus concentration below 0.03 mg/L.

TABLE 5.17

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - INORGANIC CHEMISTRY
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW8									
		SW-18235-03	SW-18235-04	SW-18235-01	SW-18235-03	SW-18235-11	SW-18235-28	SW-18235-30	SW-18235-08	SW-18235-24	SW-18235-08
		11/29/2004	3/30/2005	5/9/2005	12/2/2005	3/30/2006	5/29/2006	12/12/2006	3/14/2007	5/16/2007	11/24/2009
Parameter	*PWQO [a],[b]*										
	(mg/L)										
Alkalinity, total (as CaCO3)	See Note [1]	7	9	37.3	12	14	24	17	8	30	26
Ammonia-N	NV	< 0.05	0.08	0.1	< 0.05	< 0.05	0.08	0.12	0.12	0.15	0.069
Biochemical oxygen demand (BOD)	NV	< 3	< 4	2	< 2	< 2	< 2	< 2	< 2	6	2.6
Calcium	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.5
Calcium (dissolved)	NV	14	NA	16.5	11	NA	9.6	7.6	NA	NA	NA
Chemical oxygen demand (COD)	NV	70	30	130	52	60	190	53	0.027	110	77
Chloride	NV	7.53	1.41	2	7	2	2	5	2	< 10	3.1
Conductivity (uS/cm)	NV	0.12	0.046	0.106	0.089	0.067	0.063	0.05	0.054	0.092	0.09
Dissolved organic carbon (DOC)	NV	18.2	NA	35.1	14.5	NA	23.7	14.4	NA	32.3	15.4
Dissolved oxygen (DO)	NV [2]	NA	9.86	NA	NA	8.45	NA	NA	NA	NA	0.64
Hardness	NV	50.9	NA	57.7	37	NA	25	22	NA	41	34
Nitrate (as N)	NV	0.1	0.2	< 1	0.6	< 0.1	< 0.1	< 0.1	1.1	< 0.1	0.1
Nitrite (as N)	NV	< 0.1	NA	< 0.1	0.05	< 0.01	0.01	< 0.01	< 0.01	0.01	0.1
pH (s.u.)	6.5-8.5	6.54	6.54	7.0	6.74	6.7	7.2	7.0	6.6	7.3	6.62
Phenol	0.001	**0.002 U**	**0.002**	**0.004**	< 0.001	< 0.001	**0.003**	**0.002**	< 0.001	**0.007**	**0.006**
Potassium	NV	NA	NA	3.5	3.2	NA	5.5	4.5	NA	NA	10
Sulfates	NV	35.8	7.3	11	14	13	1	1	8	< 10	12.5
Total dissolved solids (TDS)	NV	186	101	312	132	46	42	42	34	54	244
Total kjeldahl nitrogen (TKN)	NV	1.5	1.4	3.7	1.3	2.9	1.5	2	1.4	4	0.59
Total Phosphorus	0.01/0.02/0.03 [3]	**0.25**	**0.05**	**0.7**	**0.153**	**0.42**	**0.51**	**0.21**	**0.076**	**0.6**	**0.534**
Total suspended solids (TSS)	NV	33	10	110	20	2	73	68	6	22	11.6
Turbidity	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.117

Notes:

All results and criteria are reported in mg/L, unless otherwise noted

[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.

* indicates Interim PWQO;

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

NV No value

NA Not analyzed

J Estimated.

U Not present at or above the associated value.

UJ Estimated reporting limit.

\- Not applicable.

[1] PWQO Alkalinity should not be decreased by more than 25% of the natural concentration.

[2] Dissolved Oxygen concentrations should not be less than the values specified and is dependant on cold water biota vs warm water biota.

[3] Total Phosphorus Interim PWQO: To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 0.02 mg/L; A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 0.01 mg/L or less. This should apply to all lakes naturally below this value; Excessive plant growth in rivers and streams should be eliminated at a total phosphorus concentration below 0.03 mg/L.

TABLE 5.18

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - METALS
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW1								
		SW-18235-07	*SW-18235-01*	*SW-18235-10*	*SW-18235-34*	*SW-18235-27*	*SW-18235-01/11*	*SW-18235-23*	*SW-18235-08*	*SW-18235-01/02*
		5/9/2005	*12/2/2005*	*3/30/2006*	*5/29/2006*	*12/12/2006*	*3/14/2007*	*5/16/2007*	*7/19/2009*	*11/25/2009*
Parameter	***PWQO [a],[b] (mg/L)***									
Aluminum	0.015*/0.075* [6]	NA	NA	**5.6**	**0.33**	**7.9**	NA	**0.18 J**	**6.56**	**0.369 / 0.357**
Arsenic	0.1/0.005*	0.001	< 0.001	NA	0.002	0.001	NA	0.001	< 0.01	< 0.001 / < 0.001
Barium	NV	0.036	0.036	NA	0.037	0.043	NA	0.045	0.23	0.018 / 0.02
Beryllium	0.011/1.1 [1]	< 0.0005	< 0.0005	NA	< 0.0005	< 0.0005	NA	< 0.0005	< 0.01	< 0.001 / < 0.001
Boron	0.2*	0.02	0.031	NA	0.031	0.017	NA	0.02	**< 0.5**	< 0.05 / < 0.05
Cadmium	0.0002	< 0.0001	0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	**< 0.001**	< 0.0001 / < 0.0001
Chromium	0.0089 [3]	< 0.005	0.006	NA	< 0.005	0.008	NA	< 0.005	**0.012**	0.0012 / 0.0011
Cobalt	0.0009	**0.001**	**0.001**	NA	**0.0022**	**0.0012**	NA	**0.0016**	**< 0.008**	< 0.0008 / < 0.0008
Copper	0.001 / 0.005 [4]	**0.014**	**0.006**	NA	0.002	0.003	NA	0.001	**0.027**	< 0.001 / 0.0018
Iron	0.3	**4.2**	**4.1**	**4.7**	**7.1**	**5.1**	**2.6 / 2.6**	**3**	**44.6**	**1.7 / 1.4**
Lead	0.001 / 0.003 / 0.005* [5]	0.0017	0.0027	NA	0.0007	0.0022	NA	< 0.0005	**< 0.01**	< 0.001 / < 0.001
Magnesium	NV	4.9	4.5	NA	11	4.9	NA	19	NA	5.56 / 6.48
Magnesium (dissolved)	NV	4.23	NA	NA	NA	NA	NA	NA	48.4	-
Manganese	NV	0.1	0.059	NA	0.83	0.081	NA	1	0.657	0.0419 / 0.0384
Mercury	0.0002	**0.0003**	< 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	< 0.0001	< 0.0001 / < 0.0001
Molybdenum	0.04	< 0.001	< 0.001	NA	< 0.001	< 0.001	NA	0.001	< 0.01	< 0.001 / < 0.001
Nickel	0.025	0.004	0.004	NA	0.002	0.003	NA	0.002 U	< 0.02	< 0.002 / < 0.002
Silver	0.0001	**< 0.0005**	**< 0.0005**	NA	**< 0.0005**	< 0.0001	NA	< 0.0001	**< 0.001**	< 0.0001 / < 0.0001
Sodium	NV	1.7	4.2	NA	4.4	1.1	NA	6	41.7	3.58 / 4.46
Thallium	0.0003*	0.00005	0.00007	NA	< 0.00005	0.00008	NA	< 0.00005	**< 0.003**	< 0.0003 / < 0.0003
Vanadium	0.006*	0.005	**0.011**	NA	0.001	**0.013**	NA	< 0.001	**0.011**	< 0.001 / < 0.001
Zinc	0.03* (0.02)	**0.54**	**0.024**	NA	**0.7**	**0.16**	NA	**0.13**	**1.12**	0.0043 U / 0.0103 J

Notes:
All results and criteria are reported in mg/L, unless otherwise noted

[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.

* indicates Interim PWQO;

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

J Estimated.

NV No value

NA Not analyzed.

U Not present at or above the associated value.

UJ Estimated reporting limit.

\- Not applicable

[1] Beryllium PWQO dependent upon hardness (mg/L). If hardness <75 then PWQO is 11, if hardness > 75 then PWQO is 1,100.

[3] PWQO for Cr(III) is 0.0089 ug/L and PWQO for Cr(VI) is 0.001 mg/L

[4] Copper interim PWQO is dependent on hardness (mg/L). If hardness is between 0-20 then the interim PWQO is 0.001
If hardness is >20 the interim PWQO is 0.005

[5] Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 0.005, if alkalinity is between 20-40 then PWQO is 0.01, if alkalinity is between 40-80 then PWQO is 0.02 and if alkalinity is above 80 then PWQO is 0.025; The interim PWQO is dependent on hardness (mg/L). If hardness is < 30 the interim PWQO is 0.001, if hardness is between 30-80 then the interim PWQO is 0.003, if hardness is >80 than the interim PWQO is 0.005

[6] Aluminum interm PWQO at pH 6.5-9.0 is 0.075 (mg/L) and at pH 4.5-5.5 is 0.015 (mg/L) in clay-free samples; at pH 5.5-6.5, concentrations in clay-free samples are not permitted

TABLE 5.18

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - METALS
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

							SW3					
		SW-18235-01	*SW-18235-08*	*SW-18235-08*	*SW-18235-05/06*	*SW-18235-13/14*	*SW-18235-30/31*	*SW-18235-28/29*	*SW-18235-03*	*SW-18235-27*	*SW-18235-03/05*	*SW-18235-03*
		11/29/2004	*3/30/2005*	*5/9/2005*	*12/2/2005*	*3/30/2006*	*5/29/2006*	*12/12/2006*	*3/14/2007*	*5/16/2007*	*7/19/2009*	*11/24/2009*
Parameter	***PWQO [a,b] (mg/L)***											
Aluminum	0.015*/0.075* [6]	NA	NA	NA	NA	**0.12** / 0.066	**0.21** / **0.16**	**0.32** / **0.55**	NA	**0.35 J**	**0.177** / **0.251**	**3.95**
Arsenic	0.1/0.005*	< 0.0014	NA	< 0.001	< 0.001 / < 0.001	NA	0.001 / 0.001	< 0.001 / < 0.001	NA	0.002	< 0.001 / < 0.001	< 0.01
Barium	NV	0.058	NA	0.14	0.06 /0.061	NA	0.12 /0.11	0.064 /0.066	NA	0.067	0.037 /0.036	0.12
Beryllium	0.011/1.1 [1]	< 0.0014	NA	< 0.0005	< 0.0005 / < 0.0005	NA	< 0.0005 / < 0.0005	< 0.0005 / < 0.0005	NA	< 0.0005	< 0.001 / < 0.001	< 0.01
Boron	0.2*	0.097	NA	**1**	**0.69** / **0.79**	NA	**0.62** / **0.6**	**0.71** / **0.7**	NA	**0.61**	< 0.05 / 0.056	**< 0.5**
Cadmium	0.0002	**< 0.001**	NA	< 0.0001	< 0.0001 / < 0.0001	NA	< 0.0001 / < 0.0001	< 0.0001 / < 0.0001	NA	< 0.0001	< 0.0001 / < 0.0001	**< 0.001**
Chromium	0.0089 [3]	0.0049 U	NA	< 0.005	< 0.005 / < 0.005	NA	< 0.005 / < 0.005	< 0.005 / < 0.005	NA	< 0.005	< 0.001 / < 0.001	**0.01**
Cobalt	0.0009	**< 0.001**	NA	0.0009	**< 0.001** / **< 0.001**	NA	0.0006 / 0.0005	< 0.0005 / < 0.0005	NA	0.0005	< 0.0008 / < 0.0008	**< 0.008**
Copper	0.001 / 0.005 [4]	< 0.003	NA	**0.008**	0.004 / 0.004	NA	0.003 / 0.004	0.004 / 0.004	NA	0.004	< 0.001 / < 0.001	**< 0.01**
Iron	0.3	**2**	**1.2**	**0.71**	**1** / **0.99**	0.18 / 0.069	**0.34** / 0.25	0.28 / **0.57**	**0.88**	**0.61**	0.258 / 0.288	**14.7**
Lead	0.001 / 0.003 / 0.005* [5]	< 0.0022	NA	< 0.0005	0.0008 / 0.0008	NA	< 0.0005 / < 0.0005	0.0006 / 0.0012	NA	0.0015	< 0.001 / < 0.001	**< 0.01**
Magnesium	NV	21	NA	29	23 /23	NA	32 /31	31 /31	NA	50	NA	40.9
Magnesium (dissolved)	NV	NA	NA	26.4	NA	NA	NA	NA	NA	NA	27.4 /26	-
Manganese	NV	0.033	NA	0.037	0.024 /0.023	NA	2.2 /2.1	0.029 /0.038	NA	0.16	0.0341 /0.0324	0.925
Mercury	0.0002	< 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001 / < 0.0001	< 0.0001 / < 0.0001	NA	< 0.0001	< 0.0001 / < 0.0001	< 0.0001
Molybdenum	0.04	< 0.0014	NA	0.006	0.002 / 0.002	NA	0.007 / 0.007	0.001 / 0.001	NA	0.007	0.0114 / 0.0115	< 0.01
Nickel	0.025	0.002	NA	0.012	0.002 / 0.002	NA	0.004 / 0.003	0.001 / < 0.001	NA	0.003 U	0.0022 / 0.0022	< 0.02
Silver	0.0001	**< 0.0006**	NA	**< 0.0005**	**< 0.0005** / **< 0.0005**	NA	**< 0.0005** / **< 0.0005**	< 0.0001 / < 0.0001	NA	< 0.0001	< 0.0001 / < 0.0001	**< 0.001**
Sodium	NV	5	NA	8.7	6.2 /6.3	NA	8.6 /8.4	9.8 /9.8	NA	21	6.91 /7.02	16.3
Thallium	0.0003*	**< 0.001**	NA	0.00009	**< 0.001** / **< 0.001**	NA	< 0.00005 / < 0.00005	< 0.00005 / < 0.00005	NA	< 0.00005	< 0.0003 / < 0.0003	**< 0.003**
Vanadium	0.006*	0.004	NA	0.001	0.002 / 0.003	NA	< 0.001 / < 0.001	< 0.001 / < 0.001	NA	< 0.001	< 0.001 / < 0.001	**< 0.01**
Zinc	0.03* (0.02)	**0.023**	NA	0.013	0.006 / 0.009	NA	0.015 / 0.014	0.015 / 0.015	NA	0.011	**0.021 J** /0.009 J	**0.055**

Notes:
All results and criteria are reported in mg/L, unless otherwise noted

[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.

* indicates Interim PWQO;

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

J Estimated.

NV No value

NA Not analyzed.

U Not present at or above the associated value.

UJ Estimated reporting limit.

\- Not applicable

[1] Beryllium PWQO dependent upon hardness (mg/L). If hardness <75 then PWQO is 11, if hardness > 75 then PWQO is 1,100.

[3] PWQO for Cr(III) is 0.0089 ug/L and PWQO for Cr(VI) is 0.001 mg/L

[4] Copper interim PWQO is dependent on hardness (mg/L). If hardness is between 0-20 then the interim PWQO is 0.001
If hardness is >20 the interim PWQO is 0.005

[5] Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 0.005, if alkalinity is between 20-40 then PWQO is 0.01, if alkalinity is between 40-80 then PWQO is 0.02 and if alkalinity is above 80 then PWQO is 0.025; The interim PWQO is dependent on hardness (mg/L). If hardness is < 30 the interim PWQO is 0.001, if hardness is between 30-80 then the interim PWQO is 0.003, if hardness is >80 than the interim PWQO is 0.005

[6] Aluminum interm PWQO at pH 6.5-9.0 is 0.075 (mg/L) and at pH 4.5-5.5 is 0.015 (mg/L) in clay-free samples; at pH 5.5-6.5, concentrations in clay-free samples are not permitted

TABLE 5.18

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - METALS
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW4								
		SW-18235-04	*SW-18235-02/03*	*SW-18235-09*	*SW-18235-02*	*SW-18235-09*	*SW-18235-32*	*SW-18235-04*	*SW-18235-02*	*SW-18235-04*
		11/29/2004	*3/30/2005*	*5/9/2005*	*12/2/2005*	*3/30/2006*	*12/12/2006*	*3/14/2007*	*7/19/2009*	*11/24/2009*
Parameter	***PWQO [a],[b] (mg/L)***									
Aluminum	0.015*/0.075* [6]	NA	NA	NA	NA	**3.1**	**7.7**	NA	**0.085**	**1.67**
Arsenic	0.1/0.005*	< 0.0014	NA	0.002	0.001	NA	< 0.001	NA	< 0.001	< 0.001
Barium	NV	0.06	NA	0.031	0.046	NA	0.047	NA	0.028	0.034
Beryllium	0.011/1.1 [1]	< 0.0014	NA	< 0.0005	< 0.0005	NA	< 0.0005	NA	< 0.001	< 0.001
Boron	0.2*	0.045	NA	0.11	0.059	NA	0.071	NA	0.061	0.058
Cadmium	0.0002	**< 0.001**	NA	< 0.0001	< 0.0001	NA	< 0.0001	NA	< 0.0001	< 0.0001
Chromium	0.0089 [3]	**0.011 U**	NA	< 0.005	0.006	NA	0.007	NA	< 0.001	0.0023
Cobalt	0.0009	**0.002**	NA	**0.0014**	**0.0017**	NA	**0.0014**	NA	< 0.0008	0.00087
Copper	0.001 / 0.005 [4]	0.005	NA	**0.013**	**0.008**	NA	0.004	NA	0.0011	0.0029
Iron	0.3	**5.4**	**2.6 / 2.2**	**3.3**	**6**	**2.3**	**4.5**	**3.5**	0.19	**1.72**
Lead	0.001 / 0.003 / 0.005* [5]	0.0025	NA	0.0013	0.0027	NA	0.0018	NA	< 0.001	< 0.001
Magnesium	NV	9.6	NA	11	8.2	NA	9	NA	NA	13.8
Magnesium (dissolved)	NV	NA	NA	10.5	NA	NA	NA	NA	26.4	-
Manganese	NV	0.047	NA	0.51	0.057	NA	0.098	NA	0.0277	0.137
Mercury	0.0002	< 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	NA	< 0.0001	< 0.0001
Molybdenum	0.04	< 0.0014	NA	< 0.001	< 0.001	NA	< 0.001	NA	0.0065	0.0011
Nickel	0.025	0.004	NA	0.004	0.006	NA	0.003	NA	< 0.002	0.0042
Silver	0.0001	**< 0.0006**	NA	**< 0.0005**	**< 0.0005**	NA	< 0.0001	NA	< 0.0001	< 0.0001
Sodium	NV	2.8	NA	3	2.7	NA	2.5	NA	8.99	11.3
Thallium	0.0003*	**< 0.001**	NA	< 0.00005	0.00008	NA	0.00008	NA	< 0.0003	< 0.0003
Vanadium	0.006*	**0.014**	NA	0.005	**0.009**	NA	**0.012**	NA	< 0.001	0.0031
Zinc	0.03* (0.02)	**0.023**	NA	0.014	0.02	NA	0.014	NA	**0.0307**	**0.0836**

Notes:
All results and criteria are reported in mg/L, unless otherwise noted

[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
* indicates Interim PWQO;
1.5 Does not meet the applicable PWQO criteria
63 U Estimated value does not meet PWQO criteria
<30 Method detection limit does not meet PWQO criteria
<30 Result below method detection limit
J Estimated.
NV No value
NA Not analyzed.
U Not present at or above the associated value.
UJ Estimated reporting limit.
\- Not applicable
[1] Beryllium PWQO dependent upon hardness (mg/L). If hardness <75 then PWQO is 11, if hardness > 75 then PWQO is 1,100.
[3] PWQO for Cr(III) is 0.0089 ug/L and PWQO for Cr(VI) is 0.001 mg/L
[4] Copper interim PWQO is dependent on hardness (mg/L). If hardness is between 0-20 then the interim PWQO is 0.001 If hardness is >20 the interim PWQO is 0.005
[5] Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 0.005, if alkalinity is between 20-40 then PWQO is 0.01, if alkalinity is between 40-80 then PWQO is 0.02 and if alkalinity is above 80 then PWQO is 0.025; The interim PWQO is dependent on hardness (mg/L). If hardness is < 30 the interim PWQO is 0.001, if hardness is between 30-80 then the interim PWQO is 0.003, if hardness is >80 than the interim PWQO is 0.005
[6] Aluminum interm PWQO at pH 6.5-9.0 is 0.075 (mg/L) and at pH 4.5-5.5 is 0.015 (mg/L) in clay-free samples; at pH 5.5-6.5, concentrations in clay-free samples are not permitted

TABLE 5.18

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - METALS
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW5											
		SW-18235-01	*SW-18235-06/07*	*SW-18235-07*	*SW-18235-05*	*SW-18235-08*	*SW-18235-16*	*SW-18235-32*	*SW-18235-25*	*SW-18235-05*	*SW-18235-29*	*SW-18235-09*	*SW-18235-09*
		6/7/2004	*11/29/2004*	*3/30/2005*	*5/9/2005*	*12/2/2005*	*3/30/2006*	*5/29/2006*	*12/12/2006*	*3/14/2007*	*5/16/2007*	*7/19/2009*	*11/25/2009*
Parameter	***PWQO*** [a,b] ***(mg/L)***												
Aluminum	0.015*/0.075* [6]	NA	NA	NA	NA	NA	**6**	**7.5**	**13**	NA	**45 J**	**5.71**	**8.1**
Arsenic	0.1/0.005*	< 0.0014	< 0.0014 / < 0.0014	NA	0.002	0.005	NA	0.004	0.002	NA	0.02	< 0.01	< 0.01
Barium	NV	0.03	0.056 /0.061	NA	0.039	0.15	NA	0.08	0.072	NA	0.35	< 0.1	0.11
Beryllium	0.011/1.1 [1]	< 0.0014	< 0.0014 / < 0.0014	NA	< 0.0005	0.0009	NA	< 0.0005	< 0.0005	NA	0.0022	< 0.01	< 0.01
Boron	0.2*	**0.26**	0.086 / 0.085	NA	0.11	0.064	NA	0.082	0.021	NA	0.07	**< 0.5**	**< 0.5**
Cadmium	0.0002	**< 0.001**	**< 0.001**	NA	< 0.0001	**0.0004**	NA	< 0.0001	< 0.0001	NA	**0.0004**	**< 0.001**	**< 0.001**
Chromium	0.0089 [3]	0.0027	**0.0097 J /0.01 J**	NA	< 0.005	**0.025**	NA	0.008	**0.013**	NA	**0.059**	**< 0.01**	**0.011**
Cobalt	0.0009	**0.002**	**0.003 / 0.003**	NA	**0.0018**	**0.01**	NA	**0.0065**	**0.0033**	NA	**0.027**	**< 0.008**	**< 0.008**
Copper	0.001 / 0.005 [4]	0.003	0.004 / 0.005	NA	**0.009**	**0.024**	NA	0.005	0.005	NA	**0.071**	**< 0.01**	**0.011**
Iron	0.3	**3**	**4.9 / 5.6**	**11**	**6.8**	**28**	**8**	**17**	**12**	**2.8**	**72**	**2.31**	**18.2**
Lead	0.001 / 0.003 / 0.005* [5]	0.003	**0.0036 / 0.0043**	NA	**0.0044**	**0.023**	NA	**0.0038**	0.0043	NA	**0.081**	**< 0.01**	**0.01**
Magnesium	NV	11	10 /10	NA	8	11	NA	7.9	8.4	NA	30	NA	40
Magnesium (dissolved)	NV	NA	NA	NA	7.86	NA	NA	NA	NA	NA	NA	18.5	NA
Manganese	NV	0.62	0.38 /0.36	NA	0.19	0.53	NA	1.9	0.37	NA	1.5	0.059	1.07
Mercury	0.0002	< 0.0001	< 0.0001 / < 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	< 0.0001	< 0.0001
Molybdenum	0.04	< 0.0014	< 0.0014 / < 0.0014	NA	< 0.001	< 0.001	NA	< 0.001	< 0.001	NA	0.002	< 0.01	< 0.01
Nickel	0.025	0.002	0.004 / 0.004	NA	0.005	0.024	NA	0.006	0.007	NA	**0.066**	< 0.02	< 0.02
Silver	0.0001	**< 0.0006**	**< 0.0006 / < 0.0006**	NA	**< 0.0005**	**0.0011**	NA	< 0.0001	< 0.0001	NA	0.0001	**< 0.001**	**< 0.001**
Sodium	NV	6.7	5 /4.9	NA	3.3	2.5	NA	2.4	1.5	NA	3.8	< 5	8.3
Thallium	0.0003*	**< 0.001**	**< 0.001 / < 0.001**	NA	< 0.00005	0.00022	NA	0.00008	0.00014	NA	**0.00053**	**< 0.003**	**< 0.003**
Vanadium	0.006*	0.002	**0.012 / 0.014**	NA	0.006	**0.036**	NA	**0.012**	**0.023**	NA	**0.079**	**< 0.01**	**0.016**
Zinc	0.03* (0.02)	**0.063 U**	**0.054 / 0.046**	NA	0.014	**0.091**	NA	**0.024**	**0.025**	NA	**0.19**	**0.042**	**0.059**

Notes:
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[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.

* indicates Interim PWQO;

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

J Estimated.

NV No value

NA Not analyzed.

U Not present at or above the associated value.

UJ Estimated reporting limit.

\- Not applicable

[1] Beryllium PWQO dependent upon hardness (mg/L). If hardness <75 then PWQO is 11, if hardness > 75 then PWQO is 1,100.

[3] PWQO for Cr(III) is 0.0089 ug/L and PWQO for Cr(VI) is 0.001 mg/L

[4] Copper interim PWQO is dependent on hardness (mg/L). If hardness is between 0-20 then the interim PWQO is 0.001
If hardness is >20 the interim PWQO is 0.005

[5] Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 0.005, if alkalinity is between 20-40 then PWQO is 0.01, if alkalinity is between 40-80 then PWQO is 0.02 and if alkalinity is above 80 then PWQO is 0.025; The interim PWQO is dependent on hardness (mg/L). If hardness is < 30 the interim PWQO is 0.001, if hardness is between 30-80 then the interim PWQO is 0.003, if hardness is >80 than the interim PWQO is 0.005

[6] Aluminum interm PWQO at pH 6.5-9.0 is 0.075 (mg/L) and at pH 4.5-5.5 is 0.015 (mg/L) in clay-free samples; at pH 5.5-6.5, concentrations in clay-free samples are not permitted

TABLE 5.18

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - METALS
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW6									
		SW-18235-05	SW-18235-06	SW-18235-06	SW-18235-07	SW-18235-15	SW-18235-33	SW-18235-26	SW-18235-06	SW-18235-28	SW-18235-06
		11/29/2004	3/30/2005	5/9/2005	12/2/2005	3/30/2006	5/29/2006	12/12/2006	3/14/2007	5/16/2007	11/24/2009
Parameter	*PWQO [a,b] (mg/L)*										
Aluminum	0.015*/0.075* [6]	NA	NA	NA	NA	**6.1**	**20**	**39**	NA	**39 J**	**1.08**
Arsenic	0.1/0.005*	0.0024	NA	0.002	0.004	NA	0.007	0.006	NA	0.017	0.0031
Barium	NV	0.13	NA	0.051	0.17	NA	0.2	0.29	NA	0.36	0.044
Beryllium	0.011/1.1 [1]	< 0.0014	NA	< 0.0005	0.0009	NA	0.0013	0.0015	NA	0.0021	0.001
Boron	0.2*	0.068	NA	0.05	0.04	NA	0.073	0.024	NA	0.083	0.05
Cadmium	0.0002	**< 0.001**	NA	< 0.0001	**0.0005**	NA	**0.0006**	**0.0006**	NA	**0.0007**	< 0.0001
Chromium	0.0089 [3]	**0.021**	NA	< 0.005	**0.026**	NA	**0.023**	**0.045**	NA	**0.048**	0.0019
Cobalt	0.0009	**0.005**	NA	**0.0053**	**0.0091**	NA	**0.013**	**0.015**	NA	**0.024**	**0.00163**
Copper	0.001 / 0.005 [4]	**0.014**	NA	**0.006**	**0.021**	NA	**0.022**	**0.034**	NA	**0.067**	0.0033
Iron	0.3	**13**	**7.6**	**7.3**	**30**	**5**	**38**	**49**	**2.3**	**63**	**5.27**
Lead	0.001 / 0.003 / 0.005* [5]	**0.02**	NA	**0.0042**	**0.024**	NA	**0.025**	**0.036**	NA	**0.081**	0.0014
Magnesium	NV	8	NA	6.8	9.5	NA	13	14	NA	30	18.4
Magnesium (dissolved)	NV	NA	NA	6.48	NA	NA	NA	NA	NA	NA	-
Manganese	NV	0.48	NA	1.4	0.4	NA	1.9	0.74	NA	1.6	0.61
Mercury	0.0002	< 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	< 0.0001
Molybdenum	0.04	< 0.0014	NA	< 0.001	< 0.001	NA	< 0.001	< 0.001	NA	0.002	< 0.001
Nickel	0.025	0.013	NA	0.006	0.024	NA	0.022	**0.038**	NA	**0.055**	0.0044
Silver	0.0001	**< 0.0006**	NA	**< 0.0005**	**< 0.0005**	NA	**0.0002**	0.0001	NA	0.0001	< 0.0001
Sodium	NV	1.7	NA	2.1	1.7	NA	2.5	1.4	NA	3.9	4.63
Thallium	0.0003*	**< 0.001**	NA	0.00005	**0.00031**	NA	0.00028	**0.00047**	NA	**0.00043**	< 0.0003
Vanadium	0.006*	**0.027**	NA	**0.007**	**0.039**	NA	**0.028**	**0.056**	NA	**0.067**	0.0024
Zinc	0.03* (0.02)	**0.14**	NA	0.017	**0.1**	NA	**0.097**	**0.14**	NA	**0.18**	0.0096

Notes:
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[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
* indicates Interim PWQO;
1.5 Does not meet the applicable PWQO criteria
63 U Estimated value does not meet PWQO criteria
<30 Method detection limit does not meet PWQO criteria
<30 Result below method detection limit
J Estimated.
NV No value
NA Not analyzed.
U Not present at or above the associated value.
UJ Estimated reporting limit.
\- Not applicable
[1] Beryllium PWQO dependent upon hardness (mg/L). If hardness <75 then PWQO is 11, if hardness > 75 then PWQO is 1,100.
[3] PWQO for Cr(III) is 0.0089 ug/L and PWQO for Cr(VI) is 0.001 mg/L
[4] Copper interim PWQO is dependent on hardness (mg/L). If hardness is between 0-20 then the interim PWQO is 0.001 If hardness is >20 the interim PWQO is 0.005
[5] Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 0.005, if alkalinity is between 20-40 then PWQO is 0.01, if alkalinity is between 40-80 then PWQO is 0.02 and if alkalinity is above 80 then PWQO is 0.025; The interim PWQO is dependent on hardness (mg/L). If hardness is < 30 the interim PWQO is 0.001, if hardness is between 30-80 then the interim PWQO is 0.003, if hardness is >80 than the interim PWQO is 0.005
[6] Aluminum interm PWQO at pH 6.5-9.0 is 0.075 (mg/L) and at pH 4.5-5.5 is 0.015 (mg/L) in clay-free samples; at pH 5.5-6.5, concentrations in clay-free samples are not permitted

TABLE 5.18

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - METALS
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW7													
		SW-18235-02/S03	*SW-18235-07/77*	*SW-18235-02*	*SW-18235-05*	*SW-18235-02/03*	*SW-18235-04*	*SW-18235-12*	*SW-18235-29*	*SW-18235-01/02*	*SW-18235-31*	*SW-18235-07*	*SW-18235-25/26*	*SW-18235-06*	*SW-18235-07*
		6/7/2004	*8/20/2004*	*11/29/2004*	*3/30/2005*	*5/9/2005*	*12/2/2005*	*3/30/2006*	*5/29/2006*	*8/10/2006*	*12/12/2006*	*3/14/2007*	*5/16/2007*	*7/19/2009*	*11/24/2009*
Parameter	***PWQO*** [a),(b)] ***(mg/L)***														
Aluminum	0.015*/0.075* [6]	NA	NA	NA	NA	NA	NA	**3.1**	**0.7**	0.14 /0.14	**11**	NA	**0.66 J / 0.8 J**	**1.45**	**1.38**
Arsenic	0.1/0.005*	< 0.0014 / < 0.0014	NA	0.0018	NA	0.001 / < 0.001	0.001	NA	0.001	NA	0.002	NA	0.001 / 0.001	0.0014	0.001
Barium	NV	0.023 /0.03	NA	0.095	NA	0.023 /0.022	0.047	NA	0.017	NA	0.054	NA	0.013 /0.005	0.056	0.038
Beryllium	0.011/1.1 [1]	< 0.0014 / < 0.0014	NA	< 0.0014	NA	< 0.0005 / < 0.0005	< 0.0005	NA	< 0.0005	NA	< 0.0005	NA	< 0.0005 / < 0.0005	< 0.001	0.001
Boron	0.2*	**0.41 / 0.45**	NA	0.087	NA	0.04 / 0.05	0.038	NA	0.12	NA	0.034	NA	0.031 / 0.038	< 0.05	0.05
Cadmium	0.0002	**< 0.001 / < 0.001**	NA	**< 0.001**	NA	< 0.0001 / < 0.0001	0.0001	NA	< 0.0001	NA	< 0.0001	NA	< 0.0001 / < 0.0001	< 0.0001	< 0.0001
Chromium	0.0089 [3]	0.0018 UJ /0.0033 UJ	NA	**0.016**	NA	< 0.005 / < 0.005	0.008	NA	< 0.005	NA	**0.01**	NA	< 0.005 / < 0.005	0.0018	0.0016
Cobalt	0.0009	**< 0.001 / < 0.001**	NA	**0.003**	NA	**0.0012 / 0.0012**	**0.0024**	NA	**0.0013**	NA	**0.0028**	NA	0.0005 / 0.0006	0.00085	< 0.0008
Copper	0.001 / 0.005 [4]	< 0.003 / < 0.003	NA	**0.01**	NA	**0.011** / < 0.005	**0.007**	NA	0.002	NA	0.005	NA	0.001 / 0.001	0.0022	0.0028
Iron	0.3	**0.66 / 0.72**	**1.1 J /1.7 J**	**10**	**2.5**	**2.6 / 2.8**	**7.2**	**2.6**	**3.6**	**1.9 / 1.7**	**7.6**	**1.5**	**1.7 / 1.6**	**1.46**	**1.07**
Lead	0.001 / 0.003 / 0.005* [5]	0.0022 J /**0.0078 J**	NA	**0.0092**	NA	0.0015 / 0.002	**0.0043**	NA	0.0011	NA	0.0027	NA	< 0.0005 /0.0006	0.0013	0.001
Magnesium	NV	16 /16	NA	9.3	NA	4.5 /4.9	5.5	NA	5.5	NA	5.7	NA	5.8 /5.4	NA	10.6
Magnesium (dissolved)	NV	NA	NA	NA	NA	3.82 /3.77	NA	NA	NA	NA	NA	NA	NA	13.2	-
Manganese	NV	0.087 /0.095	NA	0.19	NA	0.23 /0.24	0.17	NA	0.29	NA	0.32	NA	0.075 /0.074	0.0997	0.0478
Mercury	0.0002	< 0.0001 / < 0.0001	NA	< 0.0001	NA	< 0.0001 / < 0.0001	< 0.0001	NA	< 0.0001	NA	< 0.0001	NA	< 0.0001 / < 0.0001	< 0.0001	< 0.0001
Molybdenum	0.04	< 0.0014 / < 0.0014	NA	< 0.0014	NA	< 0.001 / < 0.001	< 0.001	NA	< 0.001	NA	< 0.001	NA	< 0.001 / < 0.001	0.002	0.001
Nickel	0.025	< 0.001 / < 0.001	NA	0.008	NA	0.003 / 0.003	0.007	NA	0.002	NA	0.005	NA	0.002 U /0.002 U	0.0026	< 0.0027
Silver	0.0001	**< 0.0006 / < 0.0006**	NA	**< 0.0006**	NA	**< 0.0005 / < 0.0005**	**< 0.0005**	NA	< 0.0001	NA	< 0.0001	NA	< 0.0001 / < 0.0001	< 0.0001	< 0.0001
Sodium	NV	6.2 /7	NA	2.4	NA	1.5 /1.7	1.3	NA	1.7	NA	1.1	NA	2.1 /2.1	2.5	2.13
Thallium	0.0003*	**< 0.001 / < 0.001**	NA	**< 0.001**	NA	< 0.00005 / < 0.00005	0.00008	NA	< 0.00005	NA	0.00011	NA	< 0.00005 / < 0.00005	< 0.0003	< 0.0003
Vanadium	0.006*	< 0.001 / < 0.001	NA	**0.021**	NA	0.003 / 0.003	**0.011**	NA	0.002	NA	**0.017**	NA	0.002 / 0.001	0.0029	0.0026
Zinc	0.03* (0.02)	**0.034 U /0.031 U**	NA	**0.078**	NA	0.02 / 0.013	**0.028**	NA	0.008	NA	**0.023**	NA	0.006 / 0.012	**0.0539**	0.0045

Notes:
All results and criteria are reported in mg/L, unless otherwise noted

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(b) If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.

* indicates Interim PWQO;

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

J Estimated.

NV No value

NA Not analyzed.

U Not present at or above the associated value.

UJ Estimated reporting limit.

\- Not applicable

(1) Beryllium PWQO dependent upon hardness (mg/L). If hardness <75 then PWQO is 11, if hardness > 75 then PWQO is 1,100.

(3) PWQO for Cr(III) is 0.0089 ug/L and PWQO for Cr(VI) is 0.001 mg/L

(4) Copper interim PWQO is dependent on hardness (mg/L). If hardness is between 0-20 then the interim PWQO is 0.001 If hardness is >20 the interim PWQO is 0.005

(5) Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 0.005, if alkalinity is between 20-40 then PWQO is 0.01, if alkalinity is between 40-80 then PWQO is 0.02 and if alkalinity is above 80 then PWQO is 0.025; The interim PWQO is dependent on hardness (mg/L). If hardness is < 30 the interim PWQO is 0.001, if hardness is between 30-80 then the interim PWQO is 0.003, if hardness is >80 than the interim PWQO is 0.005

(6) Aluminum interm PWQO at pH 6.5-9.0 is 0.075 (mg/L) and at pH 4.5-5.5 is 0.015 (mg/L) in clay-free samples; at pH 5.5-6.5, concentrations in clay-free samples are not permitted

TABLE 5.18

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - METALS
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW8									
		SW-18235-03	SW-18235-04	SW-18235-01	SW-18235-03	SW-18235-11	SW-18235-28	SW-18235-30	SW-18235-08	SW-18235-24	SW-18235-08
		11/29/2004	3/30/2005	5/9/2005	12/2/2005	3/30/2006	5/29/2006	12/12/2006	3/14/2007	5/16/2007	11/24/2009
Parameter	*PWQO [a,b] (mg/L)*										
Aluminum	0.015*/0.075* [6]	NA	NA	NA	NA	**19**	**12**	**15**	NA	**4.1 J**	**12.7**
Arsenic	0.1/0.005*	< 0.0014	NA	0.003	0.001	NA	0.001	0.001	NA	0.001	< 0.01
Barium	NV	0.082	NA	0.081	0.053	NA	0.07	0.069	NA	0.041	< 0.1
Beryllium	0.011/1.1 [1]	< 0.0014	NA	0.0006	< 0.0005	NA	0.0006	< 0.0005	NA	< 0.0005	< 0.01
Boron	0.2*	0.031	NA	0.12	0.023	NA	0.044	0.021	NA	0.027	**< 0.5**
Cadmium	0.0002	**< 0.001**	NA	**0.0003**	**< 0.001**	NA	0.0001	0.0001	NA	< 0.0001	**< 0.001**
Chromium	0.0089 [3]	**0.013 U**	NA	0.008	0.007	NA	**0.011**	**0.013**	NA	< 0.005	**0.01**
Cobalt	0.0009	**0.002**	NA	**0.0041**	**0.0016**	NA	**0.0021**	**0.0019**	NA	**0.0018**	**< 0.008**
Copper	0.001 / 0.005 [4]	**0.006**	NA	**0.023**	**0.006**	NA	**0.008**	**0.006**	NA	**0.006**	**< 0.01**
Iron	0.3	**5.9**	**2.3**	**13**	**4.1**	**7.8**	**6.9**	**5.6**	**1.7**	**6.4**	**7.17**
Lead	0.001 / 0.003 / 0.005* [5]	**0.0048**	NA	**0.0065**	**0.0031**	NA	**0.0044**	**0.0038**	NA	0.0026	**< 0.01**
Magnesium	NV	5.5	NA	5.4	3.9	NA	3.6	3.7	NA	4	< 5
Magnesium (dissolved)	NV	NA	NA	4.04	NA	NA	NA	NA	NA	NA	-
Manganese	NV	0.066	NA	0.19	0.057	NA	0.075	0.057	NA	0.1	0.127
Mercury	0.0002	< 0.0001	NA	**0.0012**	< 0.0001	NA	< 0.0001	< 0.0001	NA	< 0.0001	< 0.0001
Molybdenum	0.04	< 0.0014	NA	< 0.001	< 0.001	NA	< 0.001	< 0.001	NA	< 0.001	< 0.01
Nickel	0.025	0.005	NA	0.009	0.005	NA	0.008	0.006	NA	0.005 U	< 0.02
Silver	0.0001	**< 0.0006**	NA	**0.0025**	**< 0.0005**	NA	< 0.0001	< 0.0001	NA	< 0.0001	**< 0.001**
Sodium	NV	1.1	NA	1.7	1.2	NA	1	0.86	NA	1.5	5
Thallium	0.0003*	**< 0.001**	NA	0.00012	0.0001	NA	0.00012	0.00014	NA	0.00005	**< 0.003**
Vanadium	0.006*	**0.018**	NA	**0.015**	**0.014**	NA	**0.017**	**0.022**	NA	**0.007**	**0.016**
Zinc	0.03* (0.02)	**0.03**	NA	**0.07**	**0.024**	NA	**0.025**	**0.025**	NA	0.014	**0.045**

Notes:
All results and criteria are reported in mg/L, unless otherwise noted

[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
* indicates Interim PWQO;
1.5 Does not meet the applicable PWQO criteria
63 U Estimated value does not meet PWQO criteria
<30 Method detection limit does not meet PWQO criteria
<30 Result below method detection limit
J Estimated.
NV No value
NA Not analyzed.
U Not present at or above the associated value.
UJ Estimated reporting limit.
\- Not applicable
[1] Beryllium PWQO dependent upon hardness (mg/L). If hardness <75 then PWQO is 11, if hardness > 75 then PWQO is 1,100.
[3] PWQO for Cr(III) is 0.0089 ug/L and PWQO for Cr(VI) is 0.001 mg/L
[4] Copper interim PWQO is dependent on hardness (mg/L). If hardness is between 0-20 then the interim PWQO is 0.001 If hardness is >20 the interim PWQO is 0.005
[5] Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 0.005, if alkalinity is between 20-40 then PWQO is 0.01, if alkalinity is between 40-80 then PWQO is 0.02 and if alkalinity is above 80 then PWQO is 0.025; The interim PWQO is dependent on hardness (mg/L). If hardness is < 30 the interim PWQO is 0.001, if hardness is between 30-80 then the interim PWQO is 0.003, if hardness is >80 than the interim PWQO is 0.005
[6] Aluminum interm PWQO at pH 6.5-9.0 is 0.075 (mg/L) and at pH 4.5-5.5 is 0.015 (mg/L) in clay-free samples; at pH 5.5-6.5, concentrations in clay-free samples are not permitted

TABLE 5.19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW1						
		SW-18235-07	SW-18235-01	SW-18235-34	SW-18235-27	SW-18235-23	SW-18235-08	SW-18235-01/02
		5/9/2005	12/2/2005	5/29/2006	12/14/2006	5/16/2007	7/19/2009	11/25/2009
Parameter	*PWQO [a],[b] (ug/L)*							
1-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.20	< 0.020 / < 0.020
2-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.20	< 0.020 / < 0.020
Acenaphthene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.20	< 0.020 / < 0.020
Acenaphthylene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.20	< 0.020 / < 0.020
Anthracene	0.0008*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.20**	**< 0.020 / < 0.020**
Benzo(a)anthracene	0.0004*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.20**	**< 0.020 / < 0.020**
Benzo(a)pyrene	NV	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.065	< 0.0050 / < 0.0050
Benzo(b)fluoranthene	NV	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (ALS)	NV	NA	NA	NA	NA	NA	< 0.20	< 0.020 / < 0.020
Benzo(b,j)fluoranthene	NV	< 0.05	NA	< 0.05	< 0.05	< 0.05	NA	NA
Benzo(g,h,i)perylene	0.00002*	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.20**	**< 0.020 / < 0.020**
Benzo(j)fluoranthene	NV	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.0002*	**< 0.05**	**< 0.05**	**< 0.05**	NA	**< 0.05**	**< 0.20**	**< 0.020 / < 0.020**
Chrysene	0.0001	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.20**	**< 0.020 / < 0.020**
Dibenz(a,h)anthracene	0.002	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	NA	**< 0.20**	**< 0.020 / < 0.020**
Fluoranthene	0.0008*	**< 0.05**	**0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.20**	**< 0.020 / < 0.020**
Fluorene	0.2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	**0.24**	< 0.020 / < 0.020
Indeno(1,2,3-cd)pyrene	NV	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.20	< 0.020 / < 0.020
Naphthalene	7*	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.20	< 0.020 / < 0.020
Phenanthrene	0.03*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.21**	< 0.020 / < 0.020
Pyrene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.20	< 0.020 / < 0.020

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
UJ	Estimated reporting limit.
-	Not applicable
[1]	ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene. Does not meet the applicable PWQO criteria

TABLE 5.19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW3							
		SW-18235-01	SW-18235-08	SW-18235-05/06	SW-18235-30/31	SW-18235-28/29	SW-18235-27	SW-18235-03/05	SW-18235-03
		11/29/2004	5/9/2005	12/2/2005	5/29/2006	12/12/2006	5/16/2007	7/19/2009	11/24/2009
Parameter	*PWQO [a],[b] (ug/L)*								
1-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05	< 0.020 / < 0.020	0.032
2-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05	< 0.020 / < 0.020	0.037
Acenaphthene	NV	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05	< 0.020 / < 0.020	< 0.020
Acenaphthylene	NV	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05	< 0.020 / < 0.020	0.106
Anthracene	0.0008*	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.020 / < 0.020**	**0.073**
Benzo(a)anthracene	0.0004*	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**0.06 / 0.06**	**< 0.05**	**< 0.020 / < 0.020**	**0.292**
Benzo(a)pyrene	NV	< 0.01	< 0.01	< 0.01 / < 0.01	< 0.01 / < 0.01	0.05 / < 0.01	0.03	< 0.0050 / < 0.0050	0.294
Benzo(b)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (ALS)	NV	NA	NA	NA	NA	NA	NA	< 0.020 / < 0.020	0.357
Benzo(b,j)fluoranthene	NV	NA	< 0.05	NA	< 0.05 / < 0.05	0.09 / < 0.05	0.07	NA	NA
Benzo(g,h,i)perylene	0.00002*	**< 0.1**	**< 0.1**	**< 0.1 / < 0.1**	**< 0.1 / < 0.1**	**< 0.1 / < 0.1**	**< 0.1**	**< 0.020 / < 0.020**	**0.206**
Benzo(j)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.0002*	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.020 / < 0.020**	**0.205**
Chrysene	0.0001	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**< 0.05 / 0.06**	**< 0.05**	**< 0.020 / < 0.020**	**0.310**
Dibenz(a,h)anthracene	0.002	**< 0.1**	**< 0.1**	**< 0.1 / < 0.1**	**< 0.1 / < 0.1**	**< 0.1 / < 0.1**	-	**< 0.020 / < 0.020**	**0.034**
Fluoranthene	0.0008*	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**0.09 / < 0.05**	**0.08**	**< 0.020 / < 0.020**	**0.539**
Fluorene	0.2*	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05	< 0.020 / < 0.020	0.034
Indeno(1,2,3-cd)pyrene	NV	< 0.1	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.1	< 0.020 / < 0.020	0.193
Naphthalene	7*	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	< 0.05	< 0.020 / < 0.020	0.035
Phenanthrene	0.03*	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**< 0.05 / < 0.05**	**< 0.05**	0.02 / < 0.020	**0.234**
Pyrene	NV	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.05 / < 0.05	0.07 / < 0.05	0.08	< 0.020 / < 0.020	0.463

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
UJ	Estimated reporting limit.
-	Not applicable
[1]	ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene. Does not meet the applicable PWQO criteria

TABLE 5.19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW4					
		SW-18235-04	SW-18235-09	SW-18235-02	SW-18235-32	SW-18235-02	SW-18235-04
		11/29/2004	5/9/2005	12/2/2005	12/12/2006	7/19/2009	11/24/2009
Parameter	*PWQO [a],[b] (ug/L)*						
1-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	0.036	< 0.020
2-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.020	< 0.020
Acenaphthene	NV	< 0.05	< 0.05	< 0.05	< 0.05	0.055	< 0.020
Acenaphthylene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.020	< 0.020
Anthracene	0.0008*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	0.0004*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	NV	< 0.01	< 0.01	< 0.01	< 0.01	< 0.0050	< 0.0050
Benzo(b)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (ALS)	NV	NA	NA	NA	NA	< 0.020	< 0.020
Benzo(b,j)fluoranthene	NV	NA	< 0.05	NA	< 0.05	NA	NA
Benzo(g,h,i)perylene	0.00002*	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.020**	**< 0.020**
Benzo(j)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.0002*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.020**	**< 0.020**
Chrysene	0.0001	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	0.002	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.020**	**< 0.020**
Fluoranthene	0.0008*	**0.09**	**< 0.05**	**0.05**	**< 0.05**	**< 0.020**	**< 0.020**
Fluorene	0.2*	< 0.05	< 0.05	< 0.05	< 0.05	0.035	< 0.020
Indeno(1,2,3-cd)pyrene	NV	< 0.1	< 0.1	< 0.1	< 0.1	< 0.020	< 0.020
Naphthalene	7*	< 0.05	< 0.05	< 0.05	< 0.05	0.073	< 0.020
Phenanthrene	0.03*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.043**	< 0.020
Pyrene	NV	0.43	< 0.05	< 0.05	< 0.05	< 0.020	< 0.020

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
UJ	Estimated reporting limit.
-	Not applicable
[1]	ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene. Does not meet the applicable PWQO criteria

TABLE 5.19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW5								
		SW-18235-01	SW-18235-06/07	SW-18235-05	SW-18235-08	SW-18235-32	SW-18235-25	SW-18235-29	SW-18235-09	SW-18235-09
		6/7/2004	11/29/2004	5/9/2005	12/2/2005	5/29/2006	12/12/2006	5/16/2007	7/19/2009	11/25/2009
Parameter	*PWQO [a],[b] (ug/L)*									
1-Methylnaphthalene	2*	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.20	< 0.020
2-Methylnaphthalene	2*	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.20	< 0.030
Acenaphthene	NV	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.20	< 0.020
Acenaphthylene	NV	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.4	< 0.20	< 0.020
Anthracene	0.0008*	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.2**	**< 0.20**	**< 0.020**
Benzo(a)anthracene	0.0004*	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**0.07**	**< 0.05**	**< 0.05**	**0.4**	**< 0.20**	**< 0.020**
Benzo(a)pyrene	NV	< 0.01	< 0.01 / < 0.01	< 0.01	0.02	< 0.01	0.01	0.4	< 0.050	0.0069
Benzo(b)fluoranthene	NV	< 0.05	< 0.05 / < 0.05	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (ALS)	NV	-	NA	NA	NA	NA	NA	NA	< 0.20	< 0.020
Benzo(b,j)fluoranthene	NV	NA	NA	< 0.05	NA	< 0.05	< 0.05	0.8	NA	NA
Benzo(g,h,i)perylene	0.00002*	**< 0.1**	**< 0.1 / < 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.4**	**< 0.20**	**< 0.020**
Benzo(j)fluoranthene	NV	< 0.05	< 0.05 / < 0.05	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.0002*	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.2**	**< 0.20**	**< 0.020**
Chrysene	0.0001	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.3**	**< 0.20**	**< 0.020**
Dibenz(a,h)anthracene	0.002	**< 0.1**	**< 0.1 / < 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	-	**< 0.20**	**< 0.020**
Fluoranthene	0.0008*	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**0.05**	**< 0.05**	**< 0.05**	**0.6**	**< 0.20**	**0.022**
Fluorene	0.2*	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.20	< 0.020
Indeno(1,2,3-cd)pyrene	NV	< 0.1	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.5	< 0.20	< 0.020
Naphthalene	7*	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.20	< 0.020
Phenanthrene	0.03*	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.1**	**< 0.20**	0.025
Pyrene	NV	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.6	< 0.20	< 0.020

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
UJ	Estimated reporting limit.
-	Not applicable
[1]	ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene. Does not meet the applicable PWQO criteria

TABLE 5.19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW6						
		SW-18235-05	SW-18235-06	SW-18235-07	SW-18235-33	SW-18235-26	SW-18235-28	SW-18235-06
		11/29/2004	5/9/2005	12/2/2005	5/29/2006	12/12/2006	5/16/2007	11/24/2009
Parameter	*PWQO [a],[b] (ug/L)*							
1-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.020
2-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.020
Acenaphthene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.020
Acenaphthylene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.2	< 0.020
Anthracene	0.0008*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.1**	**< 0.020**
Benzo(a)anthracene	0.0004*	**< 0.05**	**< 0.05**	**0.06**	**0.06**	**< 0.05**	**0.3**	**< 0.020**
Benzo(a)pyrene	NV	< 0.01	< 0.01	0.01	< 0.01	0.02	0.2	0.0073
Benzo(b)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (ALS)	NV	-	NA	NA	NA	NA	NA	< 0.020
Benzo(b,j)fluoranthene	NV	NA	< 0.05	NA	< 0.05	< 0.05	0.4	NA
Benzo(g,h,i)perylene	0.00002*	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.2**	**< 0.020**
Benzo(j)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.0002*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.1**	**< 0.020**
Chrysene	0.0001	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.2**	**< 0.020**
Dibenz(a,h)anthracene	0.002	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	-	**< 0.020**
Fluoranthene	0.0008*	**< 0.05**	**< 0.05**	**0.05**	**< 0.05**	**0.05**	**0.4**	**< 0.020**
Fluorene	0.2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.020
Indeno(1,2,3-cd)pyrene	NV	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.020
Naphthalene	7*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.020
Phenanthrene	0.03*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.1**	< 0.020
Pyrene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.4	< 0.020

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
* indicates Interim PWQO;
1.5 Does not meet the applicable PWQO criteria
63 U Estimated value does not meet PWQO criteria
<30 Method detection limit does not meet PWQO criteria
<30 Result below method detection limit
NV No value
NA Not analyzed
UJ Estimated reporting limit.
\- Not applicable
[1] ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene. Does not meet the applicable PWQO criteria

TABLE 5.19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW7								
		SW-18235-02/03	SW-18235-02	SW-18235-02/03	SW-18235-04	SW-18235-29	SW-18235-31	SW-18235-25/26	SW-18235-06	SW-18235-07
		6/7/2004	11/29/2004	5/9/2005	12/2/2005	5/29/2006	12/12/2006	5/16/2007	7/19/2009	11/24/2009
Parameter	*PWQO [a],[b] (ug/L)*									
1-Methylnaphthalene	2*	< 0.05 / < 0.05	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.020	< 0.020
2-Methylnaphthalene	2*	< 0.05 / < 0.05	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.020	< 0.020
Acenaphthene	NV	< 0.05 / < 0.05	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.020	< 0.020
Acenaphthylene	NV	< 0.05 / < 0.05	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.020	< 0.020
Anthracene	0.0008*	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	0.0004*	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	NV	< 0.01 / < 0.01	< 0.01	< 0.01 / < 0.01	< 0.01	< 0.01	< 0.01	< 0.01 / < 0.01	< 0.0050	< 0.0050
Benzo(b)fluoranthene	NV	< 0.05 / < 0.05	< 0.05	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (ALS)	NV	NA	NA	NA	NA	NA	NA	NA	< 0.020	< 0.020
Benzo(b,j)fluoranthene	NV	NA	NA	< 0.05 / < 0.05	NA	< 0.05	< 0.05	< 0.05 / < 0.05	NA	NA
Benzo(g,h,i)perylene	0.00002*	**< 0.1 / < 0.1**	**< 0.1**	**< 0.1 / < 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1 / < 0.1**	**< 0.020**	**< 0.020**
Benzo(j)fluoranthene	NV	< 0.05 / < 0.05	< 0.05	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.0002*	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.020**	**< 0.020**
Chrysene	0.0001	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	0.002	**< 0.1 / < 0.1**	**< 0.1**	**< 0.1 / < 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	-	**< 0.020**	**< 0.020**
Fluoranthene	0.0008*	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**0.05**	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.020**	**< 0.020**
Fluorene	0.2*	< 0.05 / < 0.05	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 / < 0.05	0.036	< 0.020
Indeno(1,2,3-cd)pyrene	NV	< 0.1 / < 0.1	< 0.1	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.1	< 0.1 / < 0.1	< 0.020	< 0.020
Naphthalene	7*	< 0.05 / < 0.05	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.020	< 0.020
Phenanthrene	0.03*	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05 / < 0.05**	**0.035**	< 0.020
Pyrene	NV	< 0.05 / < 0.05	< 0.05	< 0.05 / < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 / < 0.05	< 0.020	< 0.020

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
UJ	Estimated reporting limit.
-	Not applicable
[1]	ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene. Does not meet the applicable PWQO criteria

TABLE 5.19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW8						
		SW-18235-03	SW-18235-01	SW-18235-03	SW-18235-28	SW-18235-30	SW-18235-24	SW-18235-08
		11/29/2004	5/9/2005	12/2/2005	5/29/2006	12/12/2006	5/16/2007	11/24/2009
Parameter	*PWQO [a],[b] (ug/L)*							
1-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05 UJ	< 0.020
2-Methylnaphthalene	2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05 UJ	< 0.020
Acenaphthene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05 UJ	< 0.020
Acenaphthylene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05 UJ	< 0.020
Anthracene	0.0008*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.05 UJ**	**< 0.020**
Benzo(a)anthracene	0.0004*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.05 UJ**	**< 0.020**
Benzo(a)pyrene	NV	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01 UJ	< 0.0050
Benzo(b)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (ALS)	NV	NA	NA	NA	NA	NA	NA	< 0.020
Benzo(b,j)fluoranthene	NV	NA	< 0.05	NA	< 0.05	< 0.05	0.05 UJ	NA
Benzo(g,h,i)perylene	0.00002*	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1 UJ**	**< 0.020**
Benzo(j)fluoranthene	NV	< 0.05	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.0002*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.05 UJ**	**< 0.020**
Chrysene	0.0001	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.05 UJ**	**< 0.020**
Dibenz(a,h)anthracene	0.002	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	-	**< 0.020**
Fluoranthene	0.0008*	**< 0.05**	**< 0.05**	**0.05**	**< 0.05**	**< 0.05**	**0.05 UJ**	**< 0.020**
Fluorene	0.2*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05 UJ	< 0.020
Indeno(1,2,3-cd)pyrene	NV	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1 UJ	< 0.020
Naphthalene	7*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05 UJ	< 0.020
Phenanthrene	0.03*	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**< 0.05**	**0.05 UJ**	< 0.020
Pyrene	NV	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05 UJ	< 0.020

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
UJ	Estimated reporting limit.
-	Not applicable
[1]	ALS reports the following results as Benzo(b)fluoranthene, however the results are interpreted as representative of Benzo(b/j)fluoranthene. Does not meet the applicable PWQO criteria

TABLE 5.20

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - VOCs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW1						
		SW-18235-07	*SW-18235-01*	*SW-18235-34*	*SW-18235-27*	*SW-18235-23*	*SW-18235-08*	*SW-18235-01/02*
		5/9/2005	*12/2/2005*	*5/29/2006*	*12/12/2006*	*5/16/2007*	*7/19/2009*	*11/25/2009*
Parameter	***PWQO [a],[b] (ug/L)***							
1,1,1,2-Tetrachloroethane	20*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
1,1,1-Trichloroethane	10*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
1,1,2,2-Tetrachloroethane	70*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
1,1,2-Trichloroethane	800*	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
1,1-Dichloroethane	200*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
1,1-Dichloroethene	40*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
1,2-Dibromoethane (Ethylene dibromide)	5*	< 0.2	< 0.2	NA	NA	< 0.2	< 0.50	< 0.50 / < 0.50
1,2-Dichlorobenzene	2.5	< 0.1	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
1,2-Dichloroethane	100*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
1,2-Dichloropropane	0.7*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
1,3-Dichlorobenzene	2.5	< 0.1	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
1,4-Dichlorobenzene	4	< 0.1	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	400*	< 5	< 5	< 10	< 5	< 5	< 20	< 20 / < 20
2-Hexanone	NV	< 5	< 5	< 10	< 5	NA	< 20	< 20 / < 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	NV	< 5	< 5	< 10	< 5	< 5	< 20	< 20 / < 20
Acetone	NV	< 10	< 10	< 20	< 10	< 10	< 20	< 20 / < 20
Benzene	100*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Bromodichloromethane	200*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Bromoform	60*	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
Bromomethane (Methyl bromide)	0.9*	< 0.5	< 0.5	**< 1**	< 0.5	< 0.5	**2.50 U**	**< 1.0 / < 1.0**
Carbon disulfide	NV	NA	NA	NA	NA	NA	< 0.50	< 0.50 / < 0.50
Carbon tetrachloride	NV	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Chlorobenzene	15	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Chloroethane	NV	< 0.2	< 0.2	< 0.4	< 0.2	NA	< 1.0	< 1.0 / < 1.0
Chloroform (Trichloromethane)	NV	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Chloromethane (Methyl chloride)	700	< 0.5	< 0.5	< 1	< 0.5	NA	< 1.0	< 1.0 / < 1.0
cis-1,2-Dichloroethene	200*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
cis-1,3-Dichloropropene	NV	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
Dibromochloromethane	40	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
Dichlorodifluoromethane (CFC-12)	NV	NA	NA	NA	NA	NA	< 1.0	< 1.0 / < 1.0
Ethylbenzene	8*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
m&p-Xylene	2[c]*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 1.0	< 1.0 / < 1.0
Methyl tert butyl ether (MTBE)	200*	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
Methylene chloride	100*	< 0.5	< 0.5	< 1	< 0.5	< 0.5	< 0.50	< 0.50 / < 0.50
o-Xylene	40*	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Styrene	4	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Tetrachloroethene	50	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Toluene	0.8	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
trans-1,2-Dichloroethene	200	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
trans-1,3-Dichloropropene	7	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
Trichloroethene	NV	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.50	< 0.50 / < 0.50
Trichlorofluoromethane (CFC-11)	NV	< 0.2	< 0.2	< 0.4	< 0.2	NA	< 1.0	< 1.0 / < 1.0
Trihalomethanes	20	NA	NA	NA	NA	NA	< 2.0	< 2.0 / < 2.0
Vinyl chloride	600	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2	< 0.50	< 0.50 / < 0.50
Xylene (total)	NV	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 1.5	< 1.5 / < 1.5

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
[c]	Recommended criteria based on MOE comments of 2005 AMR; March 20, 2007
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
J	Estimated.
NA	Not analyzed.
R	Rejected.
U	Not present at or above the associated value.
-	Not applicable.

TABLE 5.20

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - VOCs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW3							
		SW-18235-01	*SW-18235-08*	*SW-18235-05/06*	*SW-18235-30/31*	*SW-18235-28/29*	*SW-18235-27*	*SW-18235-03/05*	*SW-18235-03*
		11/29/2004	*5/9/2005*	*12/2/2005*	*5/29/2006*	*12/12/2006*	*5/16/2007*	*7/19/2009*	*11/24/2009*
Parameter	***PWQO [a],[b] (ug/L)***								
1,1,1,2-Tetrachloroethane	20*	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
1,1,1-Trichloroethane	10*	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
1,1,2,2-Tetrachloroethane	70*	< 1	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
1,1,2-Trichloroethane	800*	< 0.5	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
1,1-Dichloroethane	200*	< 0.4	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
1,1-Dichloroethene	40*	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	5*	< 0.5	< 0.2	< 0.2 / < 0.2	NA	NA	< 0.2	< 0.50 / < 0.50	< 0.50
1,2-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
1,2-Dichloroethane	100*	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
1,2-Dichloropropane	0.7*	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
1,3-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
1,4-Dichlorobenzene	4	< 0.5	< 0.1	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	400*	< 15	< 5	< 5 / < 5	< 5 / < 5	< 10 / < 5	< 5	< 20 / < 20	< 20
2-Hexanone	NV	< 10	< 5	< 5 / < 5	< 5 / < 5	< 10 / < 5	NA	< 20 / < 20	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	NV	< 10	< 5	< 5 / < 5	< 5 / < 5	< 10 / < 5	< 5	< 20 / < 20	< 20
Acetone	NV	< 10	< 10	< 10 / < 10	< 10 / < 10	< 20 / < 10	< 10	< 20 / < 20	< 20
Benzene	100*	< 0.5	< 0.1	0.3 / 0.2	< 0.1 / < 0.1	< 0.2 / 0.2	< 0.1	< 0.50 / < 0.50	< 0.50
Bromodichloromethane	200*	< 0.2	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Bromoform	60*	< 0.2	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
Bromomethane (Methyl bromide)	0.9*	**< 3**	< 0.5	< 0.5 / < 0.5	< 0.5 / < 0.5	**< 1** / < 0.5	< 0.5	**2.4 U / 2.7 U**	**< 1.0**
Carbon disulfide	NV	NA	NA	NA	NA	NA	NA	< 0.50 / < 0.50	< 0.50
Carbon tetrachloride	NV	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Chlorobenzene	15	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Chloroethane	NV	< 1	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	NA	< 1.0 / < 1.0	< 1.0
Chloroform (Trichloromethane)	NV	< 0.2	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Chloromethane (Methyl chloride)	700	< 2	< 0.5	< 0.5 / < 0.5	< 0.5 / < 0.5	< 1 / < 0.5	NA	< 1.0 / < 1.0	< 1.0
cis-1,2-Dichloroethene	200*	< 1	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
cis-1,3-Dichloropropene	NV	< 0.14	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
Dibromochloromethane	40	< 0.2	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
Dichlorodifluoromethane (CFC-12)	NV	NA	NA	NA	NA	NA	NA	< 1.0 / < 1.0	< 1.0
Ethylbenzene	8*	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
m&p-Xylene	2[c]*	< 0.5	< 0.1	0.2 / 0.2	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 1.0 / < 1.0	< 1.0
Methyl tert butyl ether (MTBE)	200*	< 2	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	R
Methylene chloride	100*	< 1	< 0.5	< 0.5	< 0.5 / < 0.5	< 1 / < 0.5	< 0.5	< 0.50 / < 0.50	< 0.50
o-Xylene	40*	< 0.5	< 0.1	0.7 / 0.7	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Styrene	4	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Tetrachloroethene	50	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Toluene	0.8	< 0.5	< 0.2	0.4 / 0.3	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
trans-1,2-Dichloroethene	200	< 1	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
trans-1,3-Dichloropropene	7	< 0.14	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
Trichloroethene	NV	< 0.5	< 0.1	< 0.1 / < 0.1	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 0.50 / < 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	NV	< 2	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	NA	< 1.0 / < 1.0	< 1.0
Trihalomethanes	20	NA	NA	NA	NA	NA	NA	< 2.0 / < 2.0	< 2.0
Vinyl chloride	600	< 0.2	< 0.2	< 0.2 / < 0.2	< 0.2 / < 0.2	< 0.4 / < 0.2	< 0.2	< 0.50 / < 0.50	< 0.50
Xylene (total)	NV	< 1	< 0.2	0.9 /0.9	< 0.1 / < 0.1	< 0.2 / < 0.1	< 0.1	< 1.5 / < 1.5	< 1.5

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
[c]	Recommended criteria based on MOE comments of 2005 AMR; March 20, 2007
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
J	Estimated.
NA	Not analyzed.
R	Rejected.
U	Not present at or above the associated value.
-	Not applicable.

TABLE 5.20

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - VOCs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW4					
		SW-18235-04	SW-18235-09	SW-18235-02	SW-18235-32	SW-18235-02	SW-18235-04
		11/29/2004	5/9/2005	12/2/2005	12/12/2006	7/19/2009	11/24/2009
Parameter	*PWQO [a,b] (ug/L)*						
1,1,1,2-Tetrachloroethane	20*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
1,1,1-Trichloroethane	10*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	70*	< 1	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
1,1,2-Trichloroethane	800*	< 0.5	< 0.2	< 0.2	< 0.4	< 0.50	< 0.50
1,1-Dichloroethane	200*	< 0.4	< 0.1	< 0.1	< 0.2	< 0.50	< 0.5
1,1-Dichloroethene	40*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	5*	< 0.5	< 0.2	< 0.2	NA	< 0.50	< 0.50
1,2-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2	< 0.4	< 0.50	< 0.50
1,2-Dichloroethane	100*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
1,2-Dichloropropane	0.7*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
1,3-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2	< 0.4	< 0.50	< 0.50
1,4-Dichlorobenzene	4	< 0.5	< 0.1	< 0.2	< 0.4	< 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	400*	< 15	< 5	< 5	< 10	< 20	< 20
2-Hexanone	NV	< 10	< 5	< 5	< 10	< 20	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	NV	< 10	< 5	< 5	< 10	< 20	< 20
Acetone	NV	< 10	< 10	< 10	99	< 20	< 20
Benzene	100*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Bromodichloromethane	200*	< 0.2	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Bromoform	60*	< 0.2	< 0.2	< 0.2	< 0.4	< 0.50	< 0.50
Bromomethane (Methyl bromide)	0.9*	**< 3**	< 0.5	< 0.5	**< 1**	**3.2 U**	**< 1.0**
Carbon disulfide	NV	NA	NA	NA	NA	< 0.50	< 0.50
Carbon tetrachloride	NV	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Chlorobenzene	15	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Chloroethane	NV	< 1	< 0.2	< 0.2	< 0.4	< 1.0	< 1.0
Chloroform (Trichloromethane)	NV	< 0.2	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Chloromethane (Methyl chloride)	700	< 2	< 0.5	< 0.5	< 1	< 1.0	< 1.0
cis-1,2-Dichloroethene	200*	< 1	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
cis-1,3-Dichloropropene	NV	< 0.14	< 0.2	< 0.2	< 0.4	< 0.50	< 0.50
Dibromochloromethane	40	< 0.2	< 0.2	< 0.2	< 0.4	< 0.50	< 0.50
Dichlorodifluoromethane (CFC-12)	NV	NA	NA	NA	NA	< 1.0	< 1.0
Ethylbenzene	8*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
m&p-Xylene	2[c]*	< 0.5	< 0.1	< 0.1	< 0.2	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	200*	< 2	< 0.2	< 0.2	< 0.4	< 0.50	R
Methylene chloride	100*	< 1	< 0.5	< 0.5	< 1	< 0.50	< 0.50
o-Xylene	40*	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Styrene	4	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Tetrachloroethene	50	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Toluene	0.8	< 0.5	< 0.2	< 0.2	< 0.4	< 0.50	< 0.50
trans-1,2-Dichloroethene	200	< 1	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
trans-1,3-Dichloropropene	7	< 0.14	< 0.2	< 0.2	< 0.4	< 0.50	< 0.50
Trichloroethene	NV	< 0.5	< 0.1	< 0.1	< 0.2	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	NV	< 2	< 0.2	< 0.2	< 0.4	< 1.0	< 1.0
Trihalomethanes	20	NA	NA	NA	NA	< 2.0	< 2.0
Vinyl chloride	600	< 0.2	< 0.2	< 0.2	< 0.4	< 0.50	< 0.50
Xylene (total)	NV	< 1	< 0.2	< 0.2	< 0.2	< 1.5	< 1.5

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
[c]	Recommended criteria based on MOE comments of 2005 AMR; March 20, 2007
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
J	Estimated.
NA	Not analyzed.
R	Rejected.
U	Not present at or above the associated value.
-	Not applicable.

TABLE 5.20

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - VOCs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW5								
		SW-18235-01	*SW-18235-06/07*	*SW-18235-05*	*SW-18235-08*	*SW-18235-32*	*SW-18235-25*	*SW-18235-29*	*SW-18235-09*	*SW-18235-09*
		6/7/2004	*11/29/2004*	*5/9/2005*	*12/2/2005*	*5/29/2006*	*12/12/2006*	*5/16/2007*	*7/19/2009*	*11/25/2009*
Parameter	***PWQO*** [a,b] ***(µg/L)***									
1,1,1,2-Tetrachloroethane	20*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
1,1,1-Trichloroethane	10*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	70*	< 1	< 1 / < 1	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
1,1,2-Trichloroethane	800*	< 0.5	< 0.5 / < 0.5	< 0.2	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
1,1-Dichloroethane	200*	< 0.4	< 0.4 / < 0.4	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
1,1-Dichloroethene	40*	< 0.5	< 0.5 / < 0.5	< 0.1	0.4	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	5*	< 0.5	< 0.5 / < 0.5	< 0.2	< 0.2	NA	NA	< 0.2	< 0.50	< 0.50
1,2-Dichlorobenzene	2.5	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
1,2-Dichloroethane	100*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
1,2-Dichloropropane	0.7*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
1,3-Dichlorobenzene	2.5	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
1,4-Dichlorobenzene	4	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	400*	< 15	< 15 / < 15	< 5	< 5	< 5	< 10	< 5	< 20	< 20
2-Hexanone	NV	< 10	< 10 / < 10	< 5	< 5	< 5	< 10	NA	< 20	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	NV	< 10	< 10 / < 10	< 5	< 5	< 5	< 10	< 5	< 20	< 20
Acetone	NV	78	32 J / < 10	< 10	< 10	< 10	< 20	< 10	< 20	< 20
Benzene	100*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Bromodichloromethane	200*	< 0.2	< 0.2 / < 0.2	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Bromoform	60*	< 0.2	< 0.2 / < 0.2	< 0.2	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
Bromomethane (Methyl bromide)	0.9*	**< 3**	**< 3 / < 3**	< 0.5	< 0.5	< 0.5	**< 1**	< 0.5	**< 1.0**	**< 1.0**
Carbon disulfide	NV	NA	NA	NA	NA	NA	NA	NA	< 0.50	< 0.50
Carbon tetrachloride	NV	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Chlorobenzene	15	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Chloroethane	NV	< 1	< 1 / < 1	< 0.2	< 0.2	< 0.2	< 0.4	NA	< 1.0	< 1.0
Chloroform (Trichloromethane)	NV	< 0.2	< 0.2 / < 0.2	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Chloromethane (Methyl chloride)	700	< 2	< 2 / < 2	< 0.5	< 0.5	< 0.5	< 1	NA	< 1.0	< 1.0
cis-1,2-Dichloroethene	200*	< 1	< 1 / < 1	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
cis-1,3-Dichloropropene	NV	< 0.14	< 0.14 / < 0.14	< 0.2	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
Dibromochloromethane	40	< 0.2	< 0.2 / < 0.2	< 0.2	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
Dichlorodifluoromethane (CFC-12)	NV	-	NA	NA	NA	NA	NA	NA	< 1.0	< 1.0
Ethylbenzene	8*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
m&p-Xylene	2[c]*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	200*	< 2	< 2 / < 2	< 0.2	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
Methylene chloride	100*	< 1	< 1 / < 1	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.50	< 0.50
o-Xylene	40*	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Styrene	4	< 0.5	< 0.5 / < 0.5	< 0.1	0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Tetrachloroethene	50	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Toluene	0.8	< 0.5	< 0.5 / < 0.5	< 0.2	**1.1**	**1.7**	0.8	< 0.2	< 0.50	< 0.50
trans-1,2-Dichloroethene	200	< 1	< 1 / < 1	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
trans-1,3-Dichloropropene	7	< 0.14	< 0.14 / < 0.14	< 0.2	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
Trichloroethene	NV	< 0.5	< 0.5 / < 0.5	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	NV	< 2	< 2 / < 2	< 0.2	< 0.2	< 0.2	< 0.4	NA	< 1.0	< 1.0
Trihalomethanes	20	-	NA	NA	NA	NA	NA	NA	< 2.0	< 2.0
Vinyl chloride	600	< 0.2	< 0.2 / < 0.2	< 0.2	< 0.2	< 0.2	< 0.4	< 0.2	< 0.50	< 0.50
Xylene (total)	NV	< 1	< 1 / < 1	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 1.5	< 1.5

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
[c]	Recommended criteria based on MOE comments of 2005 AMR; March 20, 2007
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
J	Estimated.
NA	Not analyzed.
R	Rejected.
U	Not present at or above the associated value.
-	Not applicable.

TABLE 5.20

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - VOCs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

					SW6			
		SW-18235-05	SW-18235-06	SW-18235-07	SW-18235-33	SW-18235-26	SW-18235-28	SW-18235-06
		11/29/2004	5/9/2005	12/2/2005	5/29/2006	12/12/2006	5/16/2007	11/24/2009
Parameter	*PWQO [a],[b] (ug/L)*							
1,1,1,2-Tetrachloroethane	20*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
1,1,1-Trichloroethane	10*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
1,1,2,2-Tetrachloroethane	70*	< 1	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
1,1,2-Trichloroethane	800*	< 0.5	< 0.2	< 0.2	< 1	< 0.4	< 0.2	< 0.50
1,1-Dichloroethane	200*	< 0.4	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
1,1-Dichloroethene	40*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	5*	< 0.5	< 0.2	< 0.2	NA	NA	< 0.2	< 0.50
1,2-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2	< 1	< 0.4	< 0.2	< 0.50
1,2-Dichloroethane	100*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
1,2-Dichloropropane	0.7*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
1,3-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2	< 1	< 0.4	< 0.2	< 0.50
1,4-Dichlorobenzene	4	< 0.5	< 0.1	< 0.2	< 1	< 0.4	< 0.2	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	400*	< 15	< 5	< 5	< 30	< 10	< 5	< 20
2-Hexanone	NV	< 10	< 5	< 5	< 30	< 10	NA	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	NV	< 10	< 5	< 5	< 30	< 10	< 5	< 20
Acetone	NV	< 10	< 10	< 10	< 50	< 20	< 10	< 20
Benzene	100*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Bromodichloromethane	200*	< 0.2	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Bromoform	60*	< 0.2	< 0.2	< 0.2	< 1	< 0.4	< 0.2	< 0.50
Bromomethane (Methyl bromide)	0.9*	**< 3**	< 0.5	< 0.5	**< 3**	**< 1**	< 0.5	**< 1.0**
Carbon disulfide	NV	NA	NA	NA	NA	NA	NA	< 0.50
Carbon tetrachloride	NV	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Chlorobenzene	15	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Chloroethane	NV	< 1	< 0.2	< 0.2	< 1	< 0.4	NA	< 1.0
Chloroform (Trichloromethane)	NV	< 0.2	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Chloromethane (Methyl chloride)	700	< 2	< 0.5	< 0.5	< 3	< 1	NA	< 1.0
cis-1,2-Dichloroethene	200*	< 1	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
cis-1,3-Dichloropropene	NV	< 0.14	< 0.2	< 0.2	< 1	< 0.4	< 0.2	< 0.50
Dibromochloromethane	40	< 0.2	< 0.2	< 0.2	< 1	< 0.4	< 0.2	< 0.50
Dichlorodifluoromethane (CFC-12)	NV	NA	NA	NA	NA	NA	NA	< 1.0
Ethylbenzene	8*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
m&p-Xylene	2[c]*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 1.0
Methyl tert butyl ether (MTBE)	200*	< 2	< 0.2	< 0.2	< 1	< 0.4	< 0.2	R
Methylene chloride	100*	< 1	< 0.5	< 0.5	< 3	< 1	< 0.5	< 0.50
o-Xylene	40*	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Styrene	4	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Tetrachloroethene	50	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Toluene	0.8	< 0.5	< 0.2	< 0.2	**7**	< 0.4	< 0.2	< 0.50
trans-1,2-Dichloroethene	200	< 1	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
trans-1,3-Dichloropropene	7	< 0.14	< 0.2	< 0.2	< 1	< 0.4	< 0.2	< 0.50
Trichloroethene	NV	< 0.5	< 0.1	< 0.1	< 0.5	< 0.2	< 0.1	< 0.50
Trichlorofluoromethane (CFC-11)	NV	< 2	< 0.2	< 0.2	< 1	< 0.4	NA	< 1.0
Trihalomethanes	20	NA	NA	NA	NA	NA	NA	< 2.0
Vinyl chloride	600	< 0.2	< 0.2	< 0.2	< 1	< 0.4	< 0.2	< 0.50
Xylene (total)	NV	< 1	< 0.2	< 0.2	< 0.5	< 0.2	< 0.1	< 1.5

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
[c]	Recommended criteria based on MOE comments of 2005 AMR; March 20, 2007
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
J	Estimated.
NA	Not analyzed.
R	Rejected.
U	Not present at or above the associated value.
-	Not applicable.

TABLE 5.20

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - VOCs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		SW7								
		SW-18235-02/03	*SW-18235-02*	*SW-18235-02/03*	*SW-18235-04*	*SW-18235-29*	*SW-18235-31*	*SW-18235-25/26*	*SW-18235-06*	*SW-18235-07*
		6/7/2004	*11/29/2004*	*5/9/2005*	*12/2/2005*	*5/29/2006*	*12/12/2006*	*5/16/2007*	*7/19/2009*	*11/24/2009*
Parameter	*PWQO [a],[b] (ug/L)*									
1,1,1,2-Tetrachloroethane	20*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
1,1,1-Trichloroethane	10*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	70*	< 1 / < 1	< 1	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
1,1,2-Trichloroethane	800*	< 0.5 / < 0.5	< 0.5	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
1,1-Dichloroethane	200*	< 0.4 / < 0.4	< 0.4	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
1,1-Dichloroethene	40*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	5*	< 0.5 / < 0.5	< 0.5	< 0.2 / < 0.2	< 0.2	NA	NA	< 0.2 / < 0.2	< 0.50	< 0.50
1,2-Dichlorobenzene	2.5	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
1,2-Dichloroethane	100*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
1,2-Dichloropropane	0.7*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
1,3-Dichlorobenzene	2.5	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
1,4-Dichlorobenzene	4	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	400*	< 15 / < 15	< 15	< 0.5 / < 0.5	< 5	< 5	< 30	< 5 / < 5	< 20	< 20
2-Hexanone	NV	< 10 / < 10	< 10	< 5 / < 5	< 5	< 5	< 30	NA	< 20	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	NV	< 10 / < 10	< 10	< 0.5 / < 0.5	< 5	< 5	< 30	< 5 / < 5	< 20	< 20
Acetone	NV	< 10 / < 10	< 10	< 10 / < 10	< 10	< 10	< 50	< 10 / < 10	< 20	< 20
Benzene	100*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Bromodichloromethane	200*	< 0.2 / < 0.2	< 0.2	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Bromoform	60*	< 0.2 / < 0.2	< 0.2	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
Bromomethane (Methyl bromide)	0.9*	**< 3 / < 3**	**< 3**	< 0.5 / < 0.5	< 0.5	< 0.5	**< 3**	< 0.5 / < 0.5	**1.5 U**	**< 1.0**
Carbon disulfide	NV	NA	NA	NA	NA	NA	NA	NA	< 0.50	< 0.50
Carbon tetrachloride	NV	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Chlorobenzene	15	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Chloroethane	NV	< 1 / < 1	< 1	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 1.0	< 1.0
Chloroform (Trichloromethane)	NV	< 0.2 / < 0.2	< 0.2	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Chloromethane (Methyl chloride)	700	< 2 / < 2	< 2	< 0.5 / < 0.5	< 0.5	< 0.5	< 3	NA	< 1.0	< 1.0
cis-1,2-Dichloroethene	200*	< 1 / < 1	< 1	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
cis-1,3-Dichloropropene	NV	< 0.14 / < 0.14	< 0.14	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
Dibromochloromethane	40	< 0.2 / < 0.2	< 0.2	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
Dichlorodifluoromethane (CFC-12)	NV	NA	NA	NA	NA	NA	NA	NA	< 1.0	< 1.0
Ethylbenzene	8*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
m&p-Xylene	2[c]*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	200*	< 2 / < 2	< 2	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	R
Methylene chloride	100*	< 1 / < 1	< 1	< 0.5 / < 0.5	< 0.5	< 0.5	< 3	< 0.5 / < 0.5	< 0.50	< 0.50
o-Xylene	40*	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Styrene	4	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Tetrachloroethene	50	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Toluene	0.8	< 0.5 / < 0.5	< 0.5	< 0.2 / < 0.2	0.5	0.2	**< 1**	0.3 / 0.4	< 0.50	< 0.50
trans-1,2-Dichloroethene	200	< 1 / < 1	< 1	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
trans-1,3-Dichloropropene	7	< 0.14 / < 0.14	< 0.14	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
Trichloroethene	NV	< 0.5 / < 0.5	< 0.5	< 0.1 / < 0.1	< 0.1	< 0.1	< 0.5	< 0.1 / < 0.1	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	NV	< 2 / < 2	< 2	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	NA	< 1.0	< 1.0
Trihalomethanes	20	NA	NA	NA	NA	NA	NA	NA	< 2.0	< 2.0
Vinyl chloride	600	< 0.2 / < 0.2	< 0.2	< 0.2 / < 0.2	< 0.2	< 0.2	< 1	< 0.2 / < 0.2	< 0.50	< 0.50
Xylene (total)	NV	< 1 / < 1	< 1	< 0.2 / < 0.2	< 0.2	< 0.1	< 0.5	< 0.1 / < 0.1	< 1.5	< 1.5

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
[c]	Recommended criteria based on MOE comments of 2005 AMR; March 20, 2007
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
J	Estimated.
NA	Not analyzed.
R	Rejected.
U	Not present at or above the associated value.
-	Not applicable.

TABLE 5.20

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - VOCs
2009 MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

					SW8			
		SW-18235-03	SW-18235-01	SW-18235-03	SW-18235-28	SW-18235-30	SW-18235-24	SW-18235-08
		11/29/2004	5/9/2005	12/2/2005	5/29/2006	12/12/2006	5/16/2007	11/24/2009
Parameter	*PWQO [a],[b] (ug/L)*							
1,1,1,2-Tetrachloroethane	20*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
1,1,1-Trichloroethane	10*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
1,1,2,2-Tetrachloroethane	70*	< 1	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
1,1,2-Trichloroethane	800*	< 0.5	< 0.2	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
1,1-Dichloroethane	200*	< 0.4	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
1,1-Dichloroethene	40*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	5*	< 0.5	< 0.2	< 0.2	NA	NA	< 0.2	< 0.50
1,2-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
1,2-Dichloroethane	100*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
1,2-Dichloropropane	0.7*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
1,3-Dichlorobenzene	2.5	< 0.5	< 0.1	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
1,4-Dichlorobenzene	4	< 0.5	< 0.1	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	400*	< 15	< 5	< 5	< 5	< 20	< 5	< 20
2-Hexanone	NV	< 10	< 5	< 5	< 5	< 20	NA	< 20
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	NV	< 10	< 5	< 5	< 5	< 20	< 5	< 20
Acetone	NV	< 10	< 10	< 10	< 10	< 40	< 10	< 20
Benzene	100*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Bromodichloromethane	200*	< 0.2	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Bromoform	60*	< 0.2	< 0.2	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
Bromomethane (Methyl bromide)	0.9*	**< 3**	< 0.5	< 0.5	< 0.5	**< 2**	< 0.5	**< 1.0**
Carbon disulfide	NV	NA	NA	NA	NA	NA	NA	< 0.50
Carbon tetrachloride	NV	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Chlorobenzene	15	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Chloroethane	NV	< 1	< 0.2	< 0.2	< 0.2	< 0.8	NA	< 1.0
Chloroform (Trichloromethane)	NV	< 0.2	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Chloromethane (Methyl chloride)	700	< 2	< 0.5	< 0.5	< 0.5	< 2	NA	< 1.0
cis-1,2-Dichloroethene	200*	< 1	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
cis-1,3-Dichloropropene	NV	< 0.14	< 0.2	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
Dibromochloromethane	40	< 0.2	< 0.2	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
Dichlorodifluoromethane (CFC-12)	NV	NA	NA	NA	NA	NA	NA	< 1.0
Ethylbenzene	8*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
m&p-Xylene	2[c]*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 1.0
Methyl tert butyl ether (MTBE)	200*	< 2	< 0.2	< 0.2	< 0.2	< 0.8	< 0.2	R
Methylene chloride	100*	< 1	< 0.5	< 0.5	< 0.5	< 2	< 0.5	0.54
o-Xylene	40*	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Styrene	4	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Tetrachloroethene	50	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Toluene	0.8	< 0.5	< 0.2	< 0.2	**5**	< 0.8	**3.1**	0.65
trans-1,2-Dichloroethene	200	< 1	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
trans-1,3-Dichloropropene	7	< 0.14	< 0.2	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
Trichloroethene	NV	< 0.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.1	< 0.50
Trichlorofluoromethane (CFC-11)	NV	< 2	< 0.2	< 0.2	< 0.2	< 0.8	NA	< 1.0
Trihalomethanes	20	NA	NA	NA	NA	NA	NA	< 2.0
Vinyl chloride	600	< 0.2	< 0.2	< 0.2	< 0.2	< 0.8	< 0.2	< 0.50
Xylene (total)	NV	< 1	< 0.2	< 0.2	< 0.1	< 0.4	< 0.1	< 1.5

Notes:
All results and criteria are reported in µg/L, unless otherwise noted

[a]	MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b]	If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
[c]	Recommended criteria based on MOE comments of 2005 AMR; March 20, 2007
*	indicates Interim PWQO;
1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
J	Estimated.
NA	Not analyzed.
R	Rejected.
U	Not present at or above the associated value.
-	Not applicable.

TABLE 5.22

SUMMARY OF TEMPORARY DEWATERING SEDIMENTATION (TDS) POND ANALYTICAL RESULTS
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		Background Monitoring Locations [b]											
	Sample Location:	*SW 1*	*SW 8*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*
	Sampling Date:			*11/22/06*	*01/03/07*	*02/14/07*	*03/16/07*	*04/04/07*	*05/01/07*	*08/28/07*	*10/10/07*	*07/23/09*	*11/24/09*
	Sample ID:			*SW-18235-112206-JL-01*	*SW-18235-010307-JPL-01*	*SW-18235-021407-JL-01*	*SW-18235-01-031607-SB-01*	*SW-18235-01-040407-SB-01*	*SW-18235-01-050107-JL-01*	*SW-18235-082807-DD-POND*	*SW-18235-101007-JE-01*	*SW-18235-072309-JE-TDS*	*SW-18235-072309-JE-POND 1*
Parameter	*PWQO* [a]												
General													
Alkalinity (Total as CaCO3)	See Note (1)	26,000 to 44,600	7,000 to 37,300	135,000	111,000	172,000	128,000	144,000	155,000	218,000	126,000	77,000	107,000
Conductivity (umho/cm)	NV	101 to 129	89 to 106	NA	NA	NA	954(8)	1,170(9)	NA	645	1,410	399	626
Hardness	NV	43,000 to 57,900	37,000 to 57,700	NA	NA	NA	450,000(8)	580,000(9)	NA	320,000	810,000	213,000	340,000
pH (pH standard units)	6.5-8.5	7.2 to 7.29	6.7 to 7.21	NA	NA	NA	7.9(8)	8.1(9)	8.2	8.2	8.1	8.08	8.48
Chloride (Cl)	NV	<1,000 to 8,100	1,410 to 7,000	4,000	3,000	5,000	5,000	9,000	8,000	7,000	14,000	7,000	3,200
Sulfates (SO4)	NV	7,000 to 15,000	7,300 to 35,800	63,000	186,000	421,000	427,000	410,000	522,000	126,000	649,000	120,000	226,000
Nitrate (N)	NV	<1,000	<1,000	100	400	200	500	300	<100	NA	3,100	150	NA
Nitrite (N)	NV	<100	<100	<10	10	10	30	20	10	NA	150	<100	NA
Ammonia (as Nitrogen)	NV	<50 to 80	<50 to 100	<50	60	60	160	<50	170	NA	90	<50	NA
Total Suspended Solids (TSS)	NV	5,000 to 18,000	10,000 to 110,000	25,000	150,000	45,000	63,000/21,000(8)	27,000/20,000(9)	14,000/15,000	NA	17,000	7,600	NA
Total Dissolved Solids (TDS)	NV	140,000 to 249,000	101,000 to 312,000	223,000	347,000	660,000	600,000	720,000	806,000	NA	502,000	256,000	NA
Chemical Oxygen Demand (COD)	NV	46,000 to 61,000	30,000 to 130,000	16,000	17,000	36,000	17,000	31,000	25,000	NA	29,000	<10,000	NA
Total Phosphorus (P)	10/20/30 (3)	170 to 175	50 to 700	54	50	47	77	57	25	NA	31	27.3	NA
Total Kjeldahl Nitrogen (TKN)	NV	1,000 to 1,500	1,300 to 3,700	900	800	1,200	1,400	1,100	1,100	NA	1,300	NA	NA
Biological Oxygen Demand (BOD	NV	<2,000	<4,000	<2,000	<2,000	<2,000	<2,000	<2,000	3,000/2,000	NA	<2,000	<2,000	NA
Phenol-4AAP	1	<1 to 4	2 to 4	<1	1	1	2	2	2	NA	<1	<1	NA
Field Measurements													
Conductivity (uS/cm)	NV	160 to 173	75 to 117	308	572	110	673 /930 (8)	1,210	1,170	980	1,270	407	626
Dissolved Oxygen (DO)	4,000-8,000 (2)	5,760	5,940	8,130	13,770	17,270	-- /10,530 (8)	13,330	20,230	NA	12,790	5,630	NA
pH (pH standard units)	6.5-8.5	7.62 to 8.0	7.12 to 7.63	8.15	7.65	7.54	8.42 /8.03 (8)	7.71	8.10	7.49	7.82	9.75	8.48
Temperature (C)	NV	2.6 to 19.7	2.7 to 15.7	6.60	5.10	1.10	3.1 /15.1 (8)	10.90	14.50	20.20	15.50	21.6	NA
Metals													
Arsenic (As)	100*	<1 to 1	<1.4 to 3	<1	1	<1	<1	<1	<1	2	1	<1	<1
Barium (Ba)	NV	36	53 to 82	38	50	51	48	52	51	44	65	20	37
Boron (B)	200*	20 to 31	23 to 120	24	26	50	40	38	71	53	66	<50	<50
Cadmium (Cd)	0.1/0.5 (4)	<0.1 to 0.1	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	9.9 (5)	<5 to 6	7 to 13	<5	41/<5/<5 (7)	<5	<5	<5	<5	<5	<5	1.5	<1
Copper (Cu)	5	6 to 14	6 to 23	3	5	2	3	3	2	2	2	<1	2
Iron (Fe)	300	4,100 to 4,200	2,300 to 13,000	2,700	4,600	810	3,100	850	610	NA	550	388	NA
Lead (Pb)	5/10/20/25 (6)	1.7 to 2.7	3.1 to 6.5	1	2	<0.5	1.4	<0.5	<0.5	NA	<0.5	<1	NA
Mercury (Hg)	0.2	<0.1 to 0.3	<0.1 to 1.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
Zinc (Zn)	30 (20*)	24 to 540	24 to 30	14	17	8	10	9	6	NA	<5	12	NA
VOCs													
Ethylbenzene	8*	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.5	NA
PAHs													
Naphthalene	7*	<0.05	<0.05	0.1	<0.05	<0.05	<0.5	<0.05	<0.05	NA	<0.05	<0.2	NA
Benzo(a)pyrene	NV	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	<0.01	<0.05	NA

Notes:

All results and criteria are reported in ug/L, unless otherwise noted
[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1994).
[b] Monitoring data as presented in the 2005 Annual Operations and Monitoring Report, Edwards Landfill Site, (CRA, April 2006)
* indicates Interim PWQO; if both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
<30 - Result below method detection limit
NV - No value
NA - Not Analyzed
(1) PWQO Alkalinity should not be decreased by more than 25% of the natural concentration.
(2) Dissolved Oxygen concentrations should not be less than the values specified and is dependant on cold water biota vs warm water biota.

Notes:

(3) Total Phosphorus Interim PWQO: To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 20 ug/L; A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 10 ug/L or less. This should apply to all lakes naturally below this value; Excessive plant growth in rivers and streams should be eliminated at a total phosphorus concentration below 30 ug/L.
(4) Cadmium interim PWQO is dependent on hardness (mg/L). If hardness is between 0-100 then the interim PWQO is 0.1. If hardness is > 100 the interim PWQO is 0.5.
(5) PWQO for Cr(III) is 8.9 ug/L and PWQO for Cr(VI) is 1 ug/L
(6) Lead PWQO dependent upon alkalinity (mg/L). If alkalinity <20 then PWQO is 5.
(7) Two follow-up samples collected January 16, 2007 were non-detect at detection limit of 5 ug/L.
(8) Followup sampling performed March 27, 2007.
(9) Followup sampling performed April 13, 2007.

TABLE 6.1

GROUNDWATER TRIGGER AND ASSESSMENT CRITERIA - SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Shallow Overburden Unit

Groundwater Trigger Parameter (1)	*Average Median Background Level (2, 4)*	*Maximum Leachate Level (3)*	*ODWS Characterization (5)*	*ODWS (5)*	*Maximum Leachate Level to Average Median Backgroun Level Ratio*	*Maximum Leachate Level to ODWS Ratio*	*RUC (Trigger Level)*
General Chemistry							
Chloride (Cl)	20.44	243	NHR	250	11.9	1.0	135
Sulfates (SO4)	**1,134**	615	NHR	500	0.5	1.2	817
Metals							
Boron (B)	0.102	0.93	HR	5	9.2	0.2	1.33
Chromium (Cr)	0.0024	0.0063	HR	0.05	2.6	0.1	0.014
Iron (Fe)	**1.14**	26	NHR	0.3	22.9	86.7	0.72
Lead (Pb)	0.00030	0.0027	HR	0.01	9.0	0.3	0.0027
PAHs (6)							
Naphthalene	0.0	145,000	NV	21	NV	NV	10.5
Phenanthrene	0.0	25,000	NV	63	NV	NV	31.5
Pyrene	0.0	6,000	NV	40	NV	NV	20.0
Benzo(a)pyrene	0.0000	1,100	HR	0.01	NV	NV	0.0025
VOCs (6)							
Benzene	0.0	510	HR	5	NV	NV	1.25
Ethylbenzene	0.0	1,800	NHR	2.4	NV	NV	1.20
Toluene	0.0	100	NHR	24	NV	NV	12.0

Notes:

(1) All results and guidelines are expressed in µg/L except for metals which are expressed in mg/L.

(2) Average median background concentrations are based on groundwater quality reported at wells OW3B-85, OW3B-07, OW9B-92, and OW9B-06 between 2004 and 2009.

(3) Highest reported concentration in former waste disposal area (LW1-92, LW2-92, OW4B-91, and OW6B-92 between 2001 and 2006.

(4) Where a parameter was analyzed for but was not detected at or above the Method Detection Limit (MDL), a value of 1/2 of the lowest MDL was assumed.

(5) Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment

'(6) A value of zero was used to calculate the RUC for PAHs and VOCs.

Standards for Use under Part XV.I of the Environmental Protection Act, March 2004 (Part XV.I Standards)

NV: No value

HR: Health Related Parameters

NHR: Non Health Related Parameters

RUC: Reasonable Use Criteria

RUC for NHR Parameters = (ODWS - Average Background Level) x 0.5 + Average Background Level

RUC for HR Parameters = (ODWS - Average Background Level) x 0.25 + Average Background Level

1,134 Concentration excceds RUC trigger level

TABLE 6.2

GROUNDWATER TRIGGER AND ASSESSMENT CRITERIA - DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Deep Overburden/Shallow Bedrock Unit

Groundwater Trigger Parameter (1)	*Average Median Background Level (2, 4)*	*Maximum Leachate Level (3)*	*ODWS Characterization (5)*	*ODWS (5)*	*Maximum Leachate Level to Average Median Backgroun Level Ratio*	*Maximum Leachate Level to ODWS Ratio*	*RUC (Trigger Level)*
General Chemistry							
Chloride (Cl)	9.81	243	NHR	250	24.8	1.0	130
Sulfates (SO4)	**1,667**	615	NHR	500	0.4	1.2	1,084
Metals							
Boron (B)	0.429	0.93	HR	5	2.2	0.2	1.57
Chromium (Cr)	0.0017	0.0063	HR	0.05	3.8	0.1	0.014
Iron (Fe)	**0.64**	26	NHR	0.3	40.7	86.7	0.47
Lead (Pb)	0.00070	0.0027	HR	0.01	3.9	0.3	0.0030
PAHs (6)							
Naphthalene	0.0	145,000	NV	21	NV	NV	10.5
Phenanthrene	0.0	25,000	NV	63	NV	NV	31.5
Pyrene	0.0	6,000	NV	40	NV	NV	20.0
Benzo(a)pyrene	0.0000	1,100	HR	0.01	NV	NV	0.0025
VOCs (6)							
Benzene	0.0	510	HR	5	NV	NV	1.25
Ethylbenzene	0.0	1,800	NHR	2.4	NV	NV	1.20
Toluene	0.0	100	NHR	24	NV	NV	12.0

Notes:

(1) All results and guidelines are expressed in µg/L except for metals which are expressed in mg/L.

(2) Average median background concentrations are based on groundwater quality reported at wells OW3A-85, OW3A-07, OW9A-92, and OW9A-06 between 2004 and 2009.

(3) Highest reported concentration in former waste disposal area (LW1-92, LW2-92, OW4B-91, and OW6B-92 between 2001 and 2006.

(4) Where a parameter was analyzed for but was not detected at or above the Method Detection Limit (MDL), a value of 1/2 of the MDL was assumed.

(5) Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment

(6) A value of zero was used to calculate the RUC for PAHs and VOCs.

Standards for Use under Part XV.I of the Environmental Protection Act, March 2004 (Part XV.I Standards)

NV: No value

HR: Health Related Parameters

NHR: Non Health Related Parameters

RUC: Reasonable Use Criteria

RUC for NHR Parameters = (ODWS - Average Background Level) x 0.5 + Average Background Level

RUC for HR Parameters = (ODWS - Average Background Level) x 0.25 + Average Background Level

[ ] Concentration exceeds RUC trigger level.

TABLE 6.3A

SUMMARY OF RUC GROUNDWATER ASSESSMENT - BOUNDARY AND DOWNGRADIENT WELLS
SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		SOUTHERN PORTION OF SITE											
		OW1B-06				*OW5B-06*				*OW8B-06*			
	RUC	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	(Trigger Level)	*GW-18235-05*	*GW-18235-16*	*GW-18235-21*	*GW-18235-22*	*GW-18235-06*	*GW-18235-09*	*GW-18235-18*	*GW-18235-16*	*GW-18235-07*	*GW-18235-18*	*GW-18235-23*	*GW-18235-15*
General Chemistry													
Chloride (Cl)	135	28	27	27.1	19.5	18	20	22.5	13.8	45	42	42.1	34.7
Sulfates (SO4)	817	596	683	553	596	408	443	282	290	367	383	363	385
Metals													
Boron (B)	1.33	0.069	0.087	<0.50	0.114	0.046	0.055	<0.50	0.067	0.66	0.55	0.80	1.15
Chromium (Cr)	0.014	--	<0.005	<0.010	--	--	<0.005	<0.010	--	--	<0.005	<0.010	--
Iron (Fe)	0.72	**1.70**	0.14	<0.50	0.231	<0.05	**1.9**	<0.50	<0.050	**1.3**	**3.0**	<0.50	<0.050
Lead (Pb)	0.0027	--	<0.0005	**<0.010**	--	--	<0.0005	**<0.010**	--	--	<0.0005	**<0.010**	--
PAHs													
Naphthalene	10.5	--	0.1 U	<0.020	<0.020	--	0.06 U	<0.020	--	--	0.07 U	<0.020	--
Phenanthrene	31.5	--	0.1	0.053	0.023	--	<0.05	<0.020	--	--	<0.05	<0.020	--
Pyrene	20.0	--	0.1	0.038	0.021	--	<0.05	<0.020	--	--	<0.05	<0.020	--
Benzo(a)pyrene	0.0025	--	**0.06**	**0.0296**	**0.0110**	--	**<0.01**	**<0.0050**	--	--	**0.01**	**<0.0050**	--
VOCs													
Benzene	1.25	--	<0.1	<0.50	--	--	<0.1	<0.50	--	--	<0.1	<0.50	--
Ethylbenzene	1.20	--	<0.1	<0.50	--	--	<0.1	<0.50	--	--	<0.1	<0.50	--
Toluene	12.0	--	<0.2	<0.50	--	--	<0.2	<0.50	--	--	<0.2	<0.50	--

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.3A

SUMMARY OF RUC GROUNDWATER ASSESSMENT - BOUNDARY AND DOWNGRADIENT WELLS
SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		EASTERN PORTION OF SITE					
		MW2B-07		*MW2C-01*			
	RUC	*05/16/07*	*07/23/09*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	(Trigger Level)	*GW-18235-01*	*GW-18235-14*	*GW-18235-02*	*GW-18235-08*	*GW-18235-15*	*GW-18235-12*
General Chemistry							
Chloride (Cl)	135	10	<20	15	15	20.4	13.0
Sulfates (SO4)	817	**1,590**	753	**2,190**	**2,350**	**2,650**	**2,820**
Metals							
Boron (B)	1.33	0.21	<0.50	0.35	0.31	<0.50	0.326
Chromium (Cr)	0.014	--	<0.010	--	<0.005	<0.010	--
Iron (Fe)	0.72	<0.05	<0.50	<0.3	<0.05	<0.50	<0.050
Lead (Pb)	0.0027	--	**<0.010**	--	<0.0005	**<0.010**	--
PAHs							
Naphthalene	10.5	--	<0.020	--	0.1 U	<0.020	--
Phenanthrene	31.5	--	<0.020	--	<0.05	<0.020	--
Pyrene	20.0	--	<0.020	--	<0.05	<0.020	--
Benzo(a)pyrene	0.0025	--	**<0.0050**	--	**0.02**	**<0.006**	--
VOCs							
Benzene	1.25	--	<0.50	--	<0.1	<0.50	--
Ethylbenzene	1.20	--	<0.50	--	<0.1	<0.50	--
Toluene	12.0	--	<0.50	--	<0.2	<0.50	--

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.3A

SUMMARY OF RUC GROUNDWATER ASSESSMENT - BOUNDARY AND DOWNGRADIENT WELLS
SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		IMMEDIATELY WEST OF SITE											
		MW1-03				*MW2-03*				*MW3-03*			
	RUC	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	(Trigger Level)	*GW-18235-10*	*GW-18235-21*	*GW-18235-29*	*GW-18235-29*	*GW-18235-08*	*GW-18235-19*	*GW-18235-27*	*GW-18235-26*	*GW-18235-09*	*GW-18235-20*	*GW-18235-28*	*GW-18235-20*
General Chemistry													
Chloride (Cl)	135	24	26	51.6	31.9	56	53	116	98.5	44	48	56.3	66.5
Sulfates (SO4)	817	183	179	227	218	188	187	230	176	263	305	429	219
Metals													
Boron (B)	1.33	0.045	0.054	<0.50	0.061	0.033	0.044	<0.50	0.057	0.04	0.058	<0.50	0.064
Chromium (Cr)	0.014	--	<0.0005	<0.010	--	--	<0.005	<0.010	--	--	<0.005	<0.010	--
Iron (Fe)	0.72	<0.05	<0.05	<0.50	<0.050	<0.05	<0.05	<0.50	0.640	0.56	0.23	**2.04**	0.117
Lead (Pb)	0.0027	--	<0.0005	**<0.010**	--	--	<0.0005	**<0.010**	--	--	0.0009	**<0.010**	--
PAHs													
Naphthalene	10.5	--	0.05 U	<0.020	<0.020	--	0.06 U	<0.020	<0.020	--	0.07 U	<0.020	<0.020
Phenanthrene	31.5	--	<0.05	<0.020	<0.020	--	0.05	<0.020	0.040	--	0.07	0.099	0.029
Pyrene	20.0	--	<0.05	<0.020	<0.020	--	<0.05	<0.020	0.030	--	<0.05	0.049	<0.020
Benzo(a)pyrene	0.0025	--	**0.01**	**<0.0050**	**<0.0050**	--	**0.01**	**<0.0050**	**0.0126**	--	**0.02**	**0.0421**	**0.0072**
VOCs													
Benzene	1.25	--	<0.1	<0.50	--	--	<0.1	<0.50	--	--	<0.1	<0.50	--
Ethylbenzene	1.20	--	<0.1	<0.50	--	--	<0.1	<0.50	--	--	<0.1	<0.50	--
Toluene	12.0	--	<0.2	<0.50	--	--	<0.2	<0.50	--	--	<0.2	<0.50	--

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.3B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		OW3B-85						Median or	Average Median		
	Ontario Drinking Water Standards [1]	*06/07/04 GW-18235-13*	*05/09/05 GW-18235-09*	*07/28/05 GW-18235-09*	*12/01/05 GW-18235-05*	*05/29/06 GW-18235-15*	*07/19/06 GW-18235-05*	**Half of DL** Concentration	Background Level	ODWS	RUC (Trigger Level)
General Chemistry											
Chloride (Cl)	250	22.1	8.2	10.3	5	6	13	9.25	20.44	250	135
Sulfates (SO4)	500	45.1	51	48.6	34	31	41	43	1134	500	817
Metals											
Boron (B)	5	0.02 U	0.01	<0.01	0.01	<0.01	<0.01	0.010	0.102	5	1.33
Chromium (Cr)	0.05	<0.0016	--	<0.005	--	--	<0.005	0.0008	0.0024	0.05	0.014
Iron (Fe)	0.3	**1.5**	<0.05	**1**	<0.05	**0.64**	**1.3**	1.00	1.14	0.3	0.72
Lead (Pb)	0.01	0.0023 U	--	0.0006	--	--	<0.0005	0.001	0.00030	0.01	0.0027
PAHs											
Naphthalene [2]	21	<0.05	--	<0.05	<0.05	--	<0.05	0.0	0.0	21	10.5
Phenanthrene [2]	63	<0.05	--	<0.05	<0.05	--	<0.05	0.0	0.0	63	31.5
Pyrene [2]	40	<0.05	--	<0.05	<0.05	--	<0.05	0.0	0.0	40	20.0
Benzo(a)pyrene	0.01	<0.01	--	<0.01	<0.01	--	<0.01	0.0	0.0000	0.01	0.0025
VOCs											
Benzene	5	<0.50	--	<0.1	--	--	<0.1	0.0	0.0	5	1.25
Ethylbenzene	2.4	<0.50	--	<0.1	--	--	<0.1	0.0	0.0	2.4	1.20
Toluene	24	<0.50	--	<0.2	--	--	<0.2	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.3B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		OW3B-07							
	Ontario Drinking Water Standards [1]	*05/16/07 GW-18235-04*	*07/31/07 GW-18235-04*	*07/23/09 GW-18235-10*	*11/25/09 GW-18235-04*	Median or **Half of DL** Concentration	Average Median Background Level	ODWS	RUC (Trigger Level)
General Chemistry									
Chloride (Cl)	250	19	19	<20	14.1	19	20.44	250	135
Sulfates (SO4)	500	251	256	194	183	223	1134	500	817
Metals									
Boron (B)	5	0.042	0.032	<0.50	<0.05	0.046	0.102	5	1.33
Chromium (Cr)	0.05	--	<0.005	<0.01	--	0.0025	0.0024	0.05	0.014
Iron (Fe)	0.3	<0.05	**6**	**4.22**	**1.70**	2.96	1.14	0.3	0.72
Lead (Pb)	0.01	--	<0.0005	<0.01	--	0.0003	0.00030	0.01	0.0027
PAHs									
Naphthalene [2]	21	--	0.2 U	<0.02	<0.02	0.0	0.0	21	10.5
Phenanthrene [2]	63	--	0.2	0.033	0.093	0.0	0.0	63	31.5
Pyrene [2]	40	--	0.1	<0.02	0.049	0.0	0.0	40	20.0
Benzo(a)pyrene	0.01	--	**0.04**	<0.005	0.0098	0.0	0.0000	0.01	0.0025
VOCs									
Benzene	5	--	<0.1	<0.50	--	0.0	0.0	5	1.25
Ethylbenzene	2.4	--	<0.1	<0.50	--	0.0	0.0	2.4	1.20
Toluene	24	--	<0.2	<0.50	--	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.3B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		OW9B-92										
	Ontario Drinking Water Standards [1]	*06/07/04 GW-18235-04*	*11/29/04 GW-18235-21*	*05/09/05 GW-18235-08*	*07/28/05 GW-18235-08*	*12/01/05 GW-18235-03*	*5/29/06 GW-18235-16*	*7/19/06 GW-18235-03*	Median or **Half of DL** Concentration	Average Median Background Level	ODWS	RUC (Trigger Level
General Chemistry												
Chloride (Cl)	250	36.8	24.4	24	30	25	28	27	27	20.44	250	135
Sulfates (SO4)	500	**3,830**	**3,930**	**4,060**	**3,380**	**4,120**	**3,440**	**4,040**	3,930	1134	500	817
Metals												
Boron (B)	5	0.24	0.3	0.3	0.24	0.28	0.23	0.24	0.240	0.102	5	1.33
Chromium (Cr)	0.05	<0.0016	0.0025 U	NA	<0.005	NA	NA	<0.005	0.004	0.0024	0.05	0.014
Iron (Fe)	0.3	<0.011	**0.36 U**	**<0.5**	**0.73**	<0.05	<0.05	0.11	0.080	1.14	0.3	0.72
Lead (Pb)	0.01	0.003 U	<0.0022	NA	<0.0002	NA	NA	<0.0005	0.0001	0.00030	0.01	0.0027
PAHs												
Naphthalene [2]	21	<0.1	--	<0.05	--	0.06	--	<0.05	0.0	0.0	21	10.5
Phenanthrene [2]	63	<0.1	--	<0.05	--	<0.05	--	<0.05	0.0	0.0	63	31.5
Pyrene [2]	40	<0.1	--	<0.05	--	<0.05	--	<0.05	0.0	0.0	40	20.0
Benzo(a)pyrene	0.01	**<0.02**	--	<0.01	--	<0.01	--	<0.01	0.0	0.0000	0.01	0.0025
VOCs												
Benzene	5	<0.50	--	--	<0.1	--	--	<0.1	0.0	0.0	5	1.25
Ethylbenzene	2.4	<0.50	--	--	<0.1	--	--	<0.1	0.0	0.0	2.4	1.20
Toluene	24	<0.50	--	--	<0.2	--	--	<0.2	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.3B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
SHALLOW OVERBURDEN UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		OW9B-06								
	Ontario Drinking Water Standards [1]	*12/12/06* *GW-18235-04*	*05/16/07* *GW-18235-03*	*07/31/07* *GW-18235-06*	*07/23/09* *GW-18235-12*	*11/25/09* *GW-18235-13*	Median or **Half of DL** Concentration	Average Median Background Level	ODWS	RUC (Trigger Level)
General Chemistry										
Chloride (Cl)	250	23	27	29	26.5	24.8	26.5	20.44	250	135
Sulfates (SO4)	500	561	338	323 J	453	341	341	1134	500	817
Metals										
Boron (B)	5	0.10	0.10	0.11	<0.50	0.119	0.110	0.102	5	1.33
Chromium (Cr)	0.05	--	--	<0.005	<0.01	--	0.0025	0.0024	0.05	0.014
Iron (Fe)	0.3	0.37	**1.1**	0.7	**<0.50**	<0.05	0.500	1.14	0.3	0.72
Lead (Pb)	0.01	--	--	<0.0005	<0.01	--	0.0003	0.00030	0.01	0.0027
PAHs										
Naphthalene [2]	21	--	--	0.2 U	<0.02	--	0.0	0.0	21	10.5
Phenanthrene [2]	63	--	--	0.06	<0.02	--	0.0	0.0	63	31.5
Pyrene [2]	40	--	--	<0.05	<0.02	--	0.0	0.0	40	20.0
Benzo(a)pyrene	0.01	--	--	**0.01**	<0.005	--	0.0	0.0000	0.01	0.0025
VOCs										
Benzene	5	--	--	<0.1	<0.50	--	0.0	0.0	5	1.25
Ethylbenzene	2.4	--	--	<0.1	<0.50	--	0.0	0.0	2.4	1.20
Toluene	24	--	--	<0.2	<0.50	--	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.4A

SUMMARY OF RUC ASSESSMENT - BOUNDARY AND DOWNGRADIENT WELLS
DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		SOUTHERN PORTION OF SITE											
		OW1A-06				*OW5A-06*				*OW8A-06*			
	RUC	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*
	(Trigger Level)	*GW-18235-17*	*GW-18235-13/14*	*GW-18235-20*	*GW-18235-06*	*GW-18235-18*	*GW-18235-10*	*GW-18235-19*	*GW-18235-10*	*GW-18235-19*	*GW-18235-17*	*GW-18235-22*	*GW-18235-25/28*
General Chemistry													
Chloride (Cl)	130	12	12/13	<20	10.6	21	16	<20	<10	16	14	<20	10.9/10.9
Sulfates (SO4)	1,084	**2,400**	**2,800 J/2,690**	**2,800**	**2,680**	**2,170**	**2,030**	**2,440**	**2,550**	**2,230**	**2,280 J**	**2,680**	**2,670/2,510**
Metals													
Boron (B)	1.57	0.62	0.53/0.52	0.73	0.546	0.44	0.38	0.54	0.389	0.55	0.50	0.63	0.41/0.427
Chromium (Cr)	0.014	--	<0.005/<0.005	<0.010	--	--	<0.005	<0.010	--	--	<0.005	<0.010	--
Iron (Fe)	0.47	**3.5**	**4.7/4.6**	**2.11**	**1.85**	**3.9**	**5.6**	**5.32**	**4.80**	**2.8**	**8.1**	**6.93**	**8.05/7.54**
Lead (Pb)	0.0030	--	<0.0005/<0.0005	**<0.010**	--	--	<0.0005	**<0.010**	--	--	<0.0005	**<0.010**	--
PAHs													
Naphthalene	10.5	0.1	0.3/0.2	<0.020	<0.020	<0.05	3	<0.020	<0.020	0.4	0.03[3]/0.3	0.030	<0.020/<0.020
Phenanthrene	31.5	2	<0.05/0.05	<0.020	0.038	<0.05	1	<0.020	<0.020	0.9	<0.02[3]/0.4	0.022	<0.020/<0.020
Pyrene	20.0	0.4	0.1/0.2	<0.020	<0.020	<0.05	0.3	<0.020	<0.020	0.2	<0.02[3]/0.1	<0.020	<0.020/<0.020
Benzo(a)pyrene	0.0025	**0.04**	**0.02/0.02**	**<0.0050**	**<0.0050**	**<0.01**	**0.04**	**<0.0050**	**<0.0050**	**0.02**	**<0.01[3]/0.04**	**<0.0050**	**<0.0050/<0.0050**
VOCs													
Benzene	1.25	--	<0.1/<0.1	<0.50	--	--	<0.1	<0.50	--	--	0.3U	<0.50	--
Ethylbenzene	1.20	--	<0.1/<0.1	<0.50	--	--	<0.1	<0.50	--	--	<0.1	<0.50	--
Toluene	12.0	--	<0.2/<0.2	<0.50	--	--	<0.2	<0.50	--	--	0.5U	<0.50	--

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.4A

SUMMARY OF RUC ASSESSMENT - BOUNDARY AND DOWNGRADIENT WELLS
DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		EASTERN PORTION OF SITE				WESTERN PORTION OF SITE		DOWNGRADIENT OF SITE			
		MW2A-01				*MW4A-09*		*MW5A-09*		*MW6A-07*	
	RUC	*05/16/07*	*07/31/07*	*07/23/09*	*11/25/09*	*07/23/09*	*11/25/09*	*07/23/09*	*11/24/09*	*07/23/09*	*11/24/09*
	(Trigger Level)	*GW-18235-12/13*	*GW-18235-07*	*GW-18235-13*	*GW-18235-01*	*GW-18235-26*	*GW-18235-30*	*GW-18235-01/02*	*GW-18235-09*	*GW-18235-03*	*GW-18235-08*
General Chemistry											
Chloride (Cl)	130	12/13	23	21.4	11.6	<20	17.1	<20/<20	13.3	<20	10
Sulfates (SO4)	1,084	**2,670/2,270**	**2,800 J**	**3,240**	**3,050**	**2,470**	**2,960**	**3,200/3,190**	**2,910**	**2,600**	**2,550**
Metals											
Boron (B)	1.57	0.49/0.47	0.24	0.51	0.365	0.51	0.302	0.81/0.82	0.577	0.65	0.455
Chromium (Cr)	0.014	--	<0.005	<0.010	--	<0.010	--	<0.010/<0.010	--	<0.010	--
Iron (Fe)	0.47	<0.3/<0.3	<0.05	**<0.50**	<0.050	**<0.50**	<0.050	**4.2/4.16**	**2.87**	**7.67**	**6.47**
Lead (Pb)	0.0030	--	<0.0005	**<0.010**	--	**<0.010**	--	**<0.010/<0.010**	--	**<0.010**	--
PAHs											
Naphthalene	10.5	<0.05/<0.05	0.3	<0.020	<0.020	0.058	<0.020	0.047/0.04	<0.020	<0.020	<0.020
Phenanthrene	31.5	<0.05/<0.05	0.1	<0.020	<0.020	0.036	<0.020	0.094/0.067	<0.020	<0.020	<0.020
Pyrene	20.0	<0.05/<0.05	0.09	<0.020	<0.020	<0.020	<0.020	<0.020/<0.020	<0.020	<0.020	<0.020
Benzo(a)pyrene	0.0025	**<0.01/<0.01**	**0.02**	**<0.0050**	**<0.0050**	**<0.0050**	**<0.0050**	**<0.0050/<0.0050**	**<0.0050**	**<0.0050**	**<0.0050**
VOCs											
Benzene	1.25	--	<0.1	<0.50	--	<0.50	--	<0.50	--	<0.50	--
Ethylbenzene	1.20	--	<0.1	<0.50	--	<0.50	--	<0.50	--	<0.50	--
Toluene	12.0	--	<0.2	<0.50	--	0.76	--	<0.50	--	3.15	--

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.4B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		MW2A-01																	
	Ontario Drinking Water Standards [1]	*06/07/04 GW-18235-01*	*06/07/04 GW-18235-02dup*	*11/29/04 GW-18235-14*	*05/09/05 GW-18235-07*	*07/28/05 GW-18235-07*	*12/01/05 GW-18235-01*	*05/29/06 GW-18235-12*	*07/19/06 GW-18235-01*	*12/12/06 GW-18235-01*	*05/16/07 GW-18235-12/13*	*05/16/07 GW-18235-12/13*	*07/31/07 GW-18235-07*	*07/23/09 GW-18235-13*	*11/25/09 GW-18235-01*	Median or **Half of DL** Concentration	Average Median Background Level	ODWS	RUC (Trigger Leve
General Chemistry			field duplicate									field duplicate							
Chloride (Cl)	250	12.5	12.6	10.8	11.8	11.8	11	18	14	12	12	13	23	21.4	11.6	12.3	9.81	250	130
Sulfates (SO4)	500	**2,470**	**2,500**	**2,320**	**2,480**	**2,540**	**2,430**	**2,800**	**2,440**	**2,430**	**2,670**	**2,270**	**2,800 J**	**3,240**	**3,050**	2,490	1667	500	1084
Metals																			
Boron (B)	5	0.46	0.42	0.45	0.49	0.49	0.45	0.37	0.38	0.44	0.49	0.47	0.24	0.51	0.365	0.45	0.429	5	1.57
Chromium (Cr)	0.05	<0.0016	<0.0016	<0.0016	--	<0.005	--	--	<0.005	--	--	--	<0.005	<0.01	--	0.0008	0.0017	0.05	0.014
Iron (Fe)	0.3	**0.86**	**0.92**	**1.8**	<0.05	**3.9**	<0.05	<0.05	<0.05	<0.3	<0.3	<0.3	<0.05	<0.5	<0.05	0.3	0.64	0.3	0.47
Lead (Pb)	0.01	0.0024 U	<0.0022	<0.0022	--	<0.0002	--	--	<0.0005	--	--	--	<0.0005	<0.01	--	0.0001	0.00070	0.01	0.0030
PAHs																			
Naphthalene [2]	21	<0.1	<0.1	--	--	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.05	0.3	<0.02	<0.02	0.0	0.0	21	10.5
Phenanthrene [2]	63	<0.1	<0.1	--	--	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.05	0.1	<0.02	<0.02	0.0	0.0	63	31.5
Pyrene [2]	40	<0.1	<0.1	--	--	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.05	0.09	<0.02	<0.02	0.0	0.0	40	20
Benzo(a)pyrene	0.01	<0.02	<0.02	--	--	<0.01	<0.01	--	**0.01**	**0.01**	<0.01	<0.01	**0.02**	<0.005	<0.005	0.0	0.000	0.01	0.0025
VOCs																			
Benzene	5	<0.5	<0.5	--	--	<0.1	--	--	<0.1	--	--	--	<0.1	<0.5	--	0.0	0.0	5	1.25
Ethylbenzene	2.4	<0.5	<0.5	--	--	<0.1	--	--	<0.1	--	--	--	<0.1	<0.5	--	0.0	0.0	2.4	1.20
Toluene	24	<0.5	<0.5	--	--	<0.2	--	--	<0.2	--	--	--	<0.2	<0.5	--	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.4B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		OW3A-85									
	Ontario Drinking Water Standards [1]	***06/07/04*** ***GW-18235-12***	***11/29/04*** ***GW-18235-23***	***05/09/05*** ***GW-18235-10***	***12/01/05*** ***GW-18235-04***	***05/29/06*** ***GW-18235-14***	***07/19/06*** ***GW-18235-04***	Median or **Half of DL** Concentration	Average Median Background Level	ODWS	RUC (Trigger Level)
General Chemistry											
Chloride (Cl)	250	21.5	4.9	7	6	7	7	7.0	9.81	250	130
Sulfates (SO4)	500	**660**	**807**	**549**	**615**	260	**995**	638	1667	500	1084
Metals											
Boron (B)	5	0.32	0.47	0.29	0.4	0.34	0.27	0.33	0.429	5	1.57
Chromium (Cr)	0.05	<0.0016	0.0031 U	--	--	--	<0.005	0.0008	0.0017	0.05	0.014
Iron (Fe)	0.3	**0.91**	**0.65 U**	**0.78**	<0.05	**1.9**	**0.36**	0.78	0.64	0.3	0.47
Lead (Pb)	0.01	0.0031 U	<0.0022	--	--	--	0.0015	0.0022	0.00070	0.01	0.0030
PAHs											
Naphthalene [2]	21	<0.05	--	--	<0.05	--	<0.05	0.0	0.0	21	10.5
Phenanthrene [2]	63	<0.05	--	--	<0.05	--	<0.05	0.0	0.0	63	31.5
Pyrene [2]	40	<0.05	--	--	<0.05	--	<0.05	0.0	0.0	40	20
Benzo(a)pyrene	0.01	<0.01	--	--	<0.01	--	<0.01	0.0	0.000	0.01	0.0025
VOCs											
Benzene	5	<0.5	--	--	--	--	<0.1	0.0	0.0	5	1.25
Ethylbenzene	2.4	<0.5	--	--	--	--	<0.1	0.0	0.0	2.4	1.20
Toluene	24	<0.5	--	--	--	--	<0.2	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.4B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		OW3A-07								
	Ontario Drinking Water Standards [1]	*05/16/07 GW-18235-16*	*07/31/07 GW-18235-03*	*07/31/07 GW-18235-03*	*07/23/09 GW-18235-09*	*11/25/09 GW-18235-03*	Median or **Half of DL** Concentration	Average Median Background Level	ODWS	RUC (Trigger Level)
General Chemistry										
Chloride (Cl)	250	6	5	--	<20	2.7	5.5	9.81	250	130
Sulfates (SO4)	500	**852**	**1,190**	--	**1,270**	**717**	1,021	1667	500	1084
Metals										
Boron (B)	5	0.36	0.46	--	0.53	0.373	0.4165	0.429	5	1.57
Chromium (Cr)	0.05	NA	<0.005	--	<0.01	--	0.0025	0.0017	0.05	0.014
Iron (Fe)	0.3	0.12	**0.36**	--	<0.5	0.192	0.276	0.64	0.3	0.47
Lead (Pb)	0.01	NA	<0.0005	--	<0.01	--	0.0003	0.00070	0.01	0.0030
PAHs			field duplicate							
Naphthalene [2]	21	0.08	0.3	0.03	<0.02	<0.02	0.0	0.0	21	10.5
Phenanthrene [2]	63	0.9	0.3	0.19	0.035	<0.02	0.0	0.0	63	31.5
Pyrene [2]	40	0.2	0.1	0.06	<0.02	<0.02	0.0	0.0	40	20
Benzo(a)pyrene	0.01	<0.01	**0.02**	<0.01	<0.005	<0.005	0.0	0.000	0.01	0.0025
VOCs			lab duplicate							
Benzene	5	--	<0.1	<0.1	<0.5	--	0.0	0.0	5	1.25
Ethylbenzene	2.4	--	<0.1	<0.1	<0.5	--	0.0	0.0	2.4	1.20
Toluene	24	--	0.3	0.3	<0.5	--	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

TABLE 6.4B

SUMMARY OF RUC GROUNDWATER ASSESSMENT - UPGRADIENT/BACKGROUND WELLS
DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

		OW9A-06								
	Ontario Drinking Water Standards [1]	*12/12/06 GW-18235-03*	*05/16/07 GW-18235-15*	*07/31/07 GW-18235-05*	*07/23/09 GW-18235-11*	*11/25/09 GW-18235-11*	Median or **Half of DL** Concentration	Average Median Background Level	ODWS	RUC (Trigger Level)
General Chemistry										
Chloride (Cl)	250	24	13	16	<20	10.9	14.5	9.81	250	130
Sulfates (SO4)	500	**2,520**	**2,290**	**2,450 J**	**2,600**	**2,720**	2,520	1667	500	1084
Metals										
Boron (B)	5	0.46	0.51	0.52	0.68	0.600	0.52	0.429	5	1.57
Chromium (Cr)	0.05	--	--	<0.005	<0.01	--	0.0025	0.0017	0.05	0.014
Iron (Fe)	0.3	**1.2**	**1.6**	**2.1**	**1.19**	**1.05**	1.2	0.64	0.3	0.47
Lead (Pb)	0.01	--	--	<0.0005	<0.01	--	0.0003	0.00070	0.01	0.0030
PAHs										
Naphthalene [2]	21	<0.05	<0.05	0.07	0.046	<0.02	0.0	0.0	21	10.5
Phenanthrene [2]	63	<0.05	<0.05	0.1	<0.02	0.038	0.0	0.0	63	31.5
Pyrene [2]	40	<0.05	<0.05	<0.05	<0.02	<0.02	0.0	0.0	40	20
Benzo(a)pyrene	0.01	<0.01	<0.01	**0.01**	<0.005	<0.005	0.0	0.000	0.01	0.0025
VOCs										
Benzene	5	--	--	<0.1	<0.5	--	0.0	0.0	5	1.25
Ethylbenzene	2.4	--	--	<0.1	<0.5	--	0.0	0.0	2.4	1.20
Toluene	24	--	--	<0.2	<0.5	--	0.0	0.0	24	12.0

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit.
	The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
NA	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
NS	Not sampled

Table 1
IDENTIFIED UPGRADIENT SHALLOW OVERBURDEN QUALITY AND LEACHATE QUALITY ODWS EXCEEDANCES
WATER QUALITY MONITORING AND TRIGGER LEVEL ASSESSMENT PRGORAM
EDWARDS LANDFILL SITE

	Background Quality in Water Table Aquifer (OW3B-85)						*Ontario Drinking Water Standards* [1]	*Average Concentration OW3B-85* [4]
	06/07/04	***05/09/05***	***07/28/05***	***12/01/05***	***05/29/06***	***07/19/06***		
	GW-18235-13	***GW-18235-09***	***GW-18235-09***	***GW-18235-05***	***GW-18235-15***	***GW-18235-05***		
General Chemistry								
Chloride (Cl)	22.1	8.2	10.3	5	6	13	250	10.77
Sulfates (SO4)	45.1	51	48.6	34	31	41	500	41.78
PAHS								
Benzo(A) Pyrene	<0.01	<0.01	-	<0.01	-	<0.01	0.01	0.00
Naphthalene	<0.05	<0.05	-	<0.05	-	<0.05	21 [2]	0.00
Phenanthrene	<0.05	<0.05	-	<0.05	-	<0.05	63 [2]	0.00
Pyrene	<0.05	<0.05	-	<0.05	-	<0.05	40 [2]	0.00
Metals								
Boron (B)	0.02 U	0.01	<0.01	0.01	<0.01	<0.01	5	0.01
Chromium (Cr)	<0.0016	-	<0.005	-	-	<0.005	0.05	0.00
Iron (Fe)	1.5	<0.05	1	<0.05	0.64	1.3	0.3	0.75
Lead (Pb)	<0.0023	-	0.0006	-	-	<0.0005	0.01	0.00067
VOCs								
Benze	<0.5	-	<0.1	-	-	<0.1	5	0.00
Ethyl Benzene	<0.5	-	<0.1	-	-	<0.1	2.4	0.00
Toluene	<0.5	-	<0.2	-	-	<0.2	24	0.00

	Background Quality in Water Table Aquifer (OW9B-92)							*Ontario Drinking Water Standards* [1]	*Average Concentration OW9B-92* [4]	*Combined Background Level*
	06/07/04	***11/29/04***	***05/09/05***	***07/28/05***	***12/01/05***	***05/29/06***	***07/19/06***			
	GW-18235-04	***GW-18235-21***	***GW-18235-08***	***GW-18235-08***	***GW-18235-03***	***GW-18235-16***	***GW-18235-03***			
General Chemistry										
Chloride (Cl)	36.8	24.4	24	30	25	28	27	250	27.89	19.33
Sulfates (SO4)	3,830	3,930	4,060	3,380	4,120	3,440	4,040	500	3828.57	1935.18
PAHS										
Benzo(A) Pyrene	<0.01	-	<0.02	-	<0.01	-	<0.01	0.01	0.00	0.00
Naphthalene	<0.1	-	<0.05	-	0.06	-	<0.05	21 [2]	0.04	0.02
Phenanthrene	<0.1	-	<0.05	-	<0.05	-	<0.05	63 [2]	0.00	0.00
Pyrene	<0.1	-	<0.05	-	<0.05	-	<0.05	40 [2]	0.00	0.00
Metals										
Boron (B)	0.24	0.3	0.3	0.24	0.28	0.23	0.24	5	0.26	0.13
Chromium (Cr)	<0.0016	<0.0025	-	<0.005	-	-	<0.005	0.05	0.00	0.00
Iron (Fe)	<0.011	<0.36	<0.5	0.73	<0.05	<0.05	0.11	0.3	0.19	0.47
Lead (Pb)	<0.003	<0.0022	-	<0.0002	-	-	<0.0005	0.01	0.00	0.00033
VOCs										
Benze	<0.5	-	-	<0.1	-	-	<0.1	5	0.00	0.00
Ethyl Benzene	<0.5	-	-	<0.1	-	-	<0.1	2.4	0.00	0.00
Toluene	<0.5	-	-	<0.2	-	-	<0.2	24	0.00	0.00

Table 1
IDENTIFIED UPGRADIENT SHALLOW OVERBURDEN QUALITY AND LEACHATE QUALITY ODWS EXCEEDANCES
WATER QUALITY MONITORING AND TRIGGER LEVEL ASSESSMENT PRGORAM
EDWARDS LANDFILL SITE

	Leachate Quality at OW4B-91								*Ontario Drinking Water Standards* [1]	*Avearge Leachate Level* [4]	*Average Leachate Level to Average Background Level Ratio*	*Average Leachate Level to ODWO Ratio*
	06/07/04	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*				
	GW-18235-23	*LW-18235-29*	*GW-18235-20*	*GW-18235-17*	*GW-18235-19/20*	*GW-18235-21*	*GW-18235-24*	*GW-18235-20*				
General Chemistry												
Chloride (Cl)	243	161	149	159	149/148	150	155	150/150	250	164.44	8.51	0.66
Sulfates (SO4)	<25	<0.5	<5	8	<5/<5	<5	<5	<10/<10	500	4.47	0.00	0.01
PAHS												
Benzo(A) Pyrene	<100	-	361	-	94/130	112	1,100	-	0.01	347.00	Elevated(3)	34700.00
Naphthalene	145,000	-	57,000	-	15,000/18,000	16500	140,000	-	21 [2]	75000.00	3750000.00	3571.43
Phenanthrene	18,000	-	7,060	-	1,200/1,500	13500	25,000	-	63 [2]	12982.00	Elevated(3)	206.06
Pyrene	3,020	-	2,180	-	570/940	755	6,000	-	40 [2]	2542.00	Elevated(3)	63.55
Metals												
Boron (B)	0.1	0.1	0.09	0.1	0.12/0.094	0.092	0.13	0.13	5	0.11	0.79	0.02
Chromium (Cr)	<0.0016	0.0063	-	0.0056	-	-	<0.005	-	0.05	0.00380	Elevated(3)	0.08
Iron (Fe)	26	25	26	10/0.61	23	24	25	-	0.3	22.04	47.02	73.48
Lead (Pb)	<0.0022	-	0.0002	-	-	<0.0005	-	-	0.01	0.00052	1.55	0.05
VOCs												
Benze	390	-	-	391	-	-	510	-	5	430.33	Elevated(3)	86.07
Ethyl Benzene	1,300	-	-	1,800	-	-	1,800	-	2.4	1633.33	Elevated(3)	680.56
Toluene	<50	-	-	60	-	-	<100	-	24	45.00	Elevated(3)	1.88

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

(3) Ratio is elevated but undefined since average level is set at zero

(4) Average background and leachate level calculations use a value of 0 when the parameter was analyzed for but not detected at or above the method detection limit, unless other data are available for other sampling date(s), in which case the non-detect samples are given a value equal to half the detection limit to calculate the average concentration.

\- Not Analyzed

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 2

IDENTIFIED UPGRADIENT DEEP OVERBURDEN/SHALLOW BEDROCK GROUNDWATER QUALITY AND LEACHATE QUALITY ODWS EXCEEDANCES
WATER QUALITY MONITORING AND TRIGGER LEVEL ASSESSMENT PROGRAM
EDWARDS LANDFILL SITE

	Background Quality in Water Table Aquifer (MW2A-01)								*Ontario Drinking Water Standards*[1]	*Average Concentration MW2A-01 Average*[4]
	06/07/04	*11/29/04*	*05/09/05*	*07/28/05*	*12/01/05*	*05/29/06*	*07/19/06*	*12/12/06*		
	GW-18235-01/02	*GW-18235-14*	*GW-18235-07*	*GW-18235-07*	*GW-18235-01*	*GW-18235-12*	*GW-18235-01*	*GW-18235-01*		
General Chemistry										
Chloride (Cl)	12.5 / 12.6	10.8	11.8	11.8	11	18	14	12	250	12.74
Sulfates (SO4)	**2,470 / 2,500**	**2,320**	**2,480**	**2,540**	**2,430**	**2,800**	**2,440**	**2,430**	500	2490.63
PAHS										
Benzo(A) Pyrene	<0.01	-	-	<0.01	<0.01	-	0.01	0.01	0.01	0.007
Naphthalene	<0.1,<0.1	-	-	<0.05	<0.05	-	<0.05	<0.05	21[2]	0.00
Phenanthrene	<0.1,<0.1	-	-	<0.05	<0.05	-	<0.05	<0.05	63[2]	0.00
Pyrene	<0.1,<0.1	-	-	<0.05	<0.05	-	<0.05	<0.05	40[2]	0.00
Metals										
Boron (B)	0.46 / 0.42	0.45	0.49	0.49	0.45	0.37	0.38	0.44	5	0.44
Chromium (Cr)	<0.0016 / <0.0016	<0.0016	NA	<0.005	NA	NA	<0.005	NA	0.05	0.00
Iron (Fe)	**0.86 / 0.92**	**1.8**	<0.05	**3.9**	<0.05	<0.05	<0.05	<0.3	0.3	0.86
Lead (Pb)	0.0024U / <0.0022	<0.0022	NA	<0.0002	NA	NA	<0.0005	NA	0.01	0.00
VOCs										
Benze	< 0.5/<0.5	-	-	<0.1	-	-	<0.1	-	5	0.00
Ethyl Benzene	< 0.5/<0.5	-	-	<0.1	-	-	<0.1	-	2.4	0.00
Toluene	< 0.5/<0.5	-	-	<0.2	-	-	<0.2	-	24	0.00

	Background Quality in Water Table Aquifer (OW3A-85)							*Ontario Drinking Water Standards*[1]	*Average Concentration OW3A-85*[4]
	06/07/04	*11/29/04*	*05/09/05*		*12/01/05*	*05/29/06*	*07/19/06*		
	GW-18235-12	*GW-18235-23*	*GW-18235-10*		*GW-18235-04*	*GW-18235-14*	*GW-18235-04*		
General Chemistry									
Chloride (Cl)	21.5	4.9	7	-	6	7	7	250	8.90
Sulfates (SO4)	**660**	**807**	**549**	-	**615**	260	**995**	500	647.67
PAHS									
Benzo(A) Pyrene	<0.01	-	-	-	<0.01	-	<0.01	0.01	0.00
Naphthalene	<0.05	-	-	-	<0.05	-	<0.05	21[2]	0.00
Phenanthrene	<0.05	-	-	-	<0.05	-	<0.05	63[2]	0.00
Pyrene	<0.05	-	-	-	<0.05	-	<0.05	40[2]	0.00
Metals									
Boron (B)	0.32	0.47	0.29	-	0.4	0.34	0.27	5	0.35
Chromium (Cr)	<0.0016	<0.0031	NA	-	-	-	<0.005	0.05	0.00
Iron (Fe)	**0.91**	**<0.65**	**0.78**	-	<0.05	**1.9**	**0.36**	0.3	0.72
Lead (Pb)	<0.0031	<0.0022	-	-	-	-	0.0015	0.0100	0.0014
VOCs									
Benze	<0.5	-	-	-	-	-	<0.1	5	0.00
Ethyl Benzene	<0.5	-	-	-	-	-	<0.1	2.4	0.00
Toluene	<0.5	-	-	-	-	-	<0.2	24	0.00

TABLE 2

IDENTIFIED UPGRADIENT DEEP OVERBURDEN/SHALLOW BEDROCK GROUNDWATER QUALITY AND LEACHATE QUALITY ODWS EXCEEDANCES
WATER QUALITY MONITORING AND TRIGGER LEVEL ASSESSMENT PROGRAM
EDWARDS LANDFILL SITE

	Background Quality in Water Table Aquifer (OW9A-06)							*OW9A-06*	*Ontario Drinking Water Standards* [1]	*Average Concentration OW9A-06* [4]	*Combined Background Level* [5]
								12/12/06			
								GW-18235-03			
General Chemistry											
Chloride (Cl)	-	-	-	-	-	-	-	24	250	24.00	15.67
Sulfates (SO4)	-	-	-	-	-	-	-	2520	500	2520.00	441.13
PAHS											
Benzo(A) Pyrene	-	-	-	-	-	-	-	<0.01	0.01	0.00	0.004
Naphthalene	-	-	-	-	-	-	-	<0.05	21 [2]	0.00	0.00
Phenanthrene	-	-	-	-	-	-	-	<0.05	63 [2]	0.00	0.00
Pyrene	-	-	-	-	-	-	-	<0.05	40 [2]	0.00	0.00
Metals	-	-	-	-	-	-	-				
Boron (B)	-	-	-	-	-	-	-	0.46	5	0.46	0.40
Chromium (Cr)	-	-	-	-	-	-	-	-	0.05	N/A	0.00
Iron (Fe)	-	-	-	-	-	-	-	1.2	0.3	1.20	0.82
Lead (Pb)	-	-	-	-	-	-	-	-	0.01	N/A	0.00
VOCs											
Benze	-	-	-	-	-	-	-	<0.1	5	0.00	0.00
Ethyl Benzene	-	-	-	-	-	-	-	<0.1	2.4	0.00	0.00
Toluene	-	-	-	-	-	-	-	<0.2	24	0.00	0.00

TABLE 2

IDENTIFIED UPGRADIENT DEEP OVERBURDEN/SHALLOW BEDROCK GROUNDWATER QUALITY AND LEACHATE QUALITY ODWS EXCEEDANCES
WATER QUALITY MONITORING AND TRIGGER LEVEL ASSESSMENT PROGRAM
EDWARDS LANDFILL SITE

	Leachate Quality at OW4B-91								*Ontario Drinking Water Standards*[1]	Average Leachate Level	Average Leachate Level to Average Background Level Ratio	Average Leachate Level to ODWS Ratio
	06/07/04	***11/29/04***	***05/09/05***	***07/28/05***	***12/01/05***	***05/29/06***	***07/19/06***	***12/12/06***				
	GW-18235-23	***LW-18235-29***	***GW-18235-20***	***GW-18235-17***	***GW-18235-19/20***	***GW-18235-21***	***GW-18235-24***	***GW-18235-20***				
General Chemistry												
Chloride (Cl)	243	161	149	159	149/148	150	155	150/150	250	164.44	10.49	0.66
Sulfates (SO4)	<25	<0.5	<5	8	<5/<5	<5	<5	<10/<10	500	4.47	0.01	0.01
PAHS												
Benzo(A) Pyrene	<100	-	361	-	94/130	112	1,100	-	0.01	347.00	79314.29	34700.00
Naphthalene	145,000	-	57,000	-	15,000/18,000	16500	140,000	-	21[2]	75000.00	85714285.71	3571.43
Phenanthrene	18,000	-	7,060	-	1,200/1,500	13500	25,000	-	63[2]	12982.00	Elevated(3)	206.06
Pyrene	3,020	-	2,180	-	570/940	755	6,000	-	40[2]	2542.00	Elevated(3)	63.55
Metals												
Boron (B)	0.1	0.1	0.09	0.1	0.12/0.094	0.092	0.13	0.13	5	0.11	0.26	0.02
Chromium (Cr)	<0.0016	0.0063	-	0.0056	-	-	<0.005	-	0.05	0.00	Elevated(3)	0.08
Iron (Fe)	26	25	26	10/0.61	23	24	25	-	0.3	22.04	27.01	73.48
Lead (Pb)	<0.0022	-	0.0002	-	-	<0.0005	-	-	0.01	0.00	0.80	0.05
VOCs												
Benze	390	-	-	391	-	-	510	-	5	430.33	Elevated(3)	86.07
Ethyl Benzene	1,300	-	-	1,800	-	-	1,800	-	2.4	1633.33	Elevated(3)	680.56
Toluene	<50	-	-	60	-	-	<100	-	24	45.00	Elevated(3)	1.88

Notes:
All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Ratio is elevated but undefined since average level is set at zero
(4) Average background and leachate level calculations use a value of 0 when the parameter was analyzed for but not detected at or above the method detection limit, unless other data are available for other sampling date(s), in which case the new detect samples are given a value equal to half the detection limit to calculate the average concentration.
(5) Average is taken with each sample given an equal weight
- Not Analyzed
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 3

INTERIM GROUNDWATER TRIGGER AND ASSESSMENT CRITERIA - SHALLOW OVERBURDEN UNIT
EDWARDS LANDFILL SITE

Shallow Overburden

Groundwater Trigger Parameters (1)	*Average Background Level (2), (4)*	*Maximum Leachate Level (3)*	*ODWS Characterization (5)*	*ODWS (5)*	*Maximum Leachate Level to Average Background Level Ratio*	*Maximum Leachate Level to ODWS Ratio*	*RUC (Trigger Level)*
General Chemistry							
Chloride (Cl)	19.33	243	NHR	250	1.26.E+01	1	134.663
Sulfates (SO4)	1935.18	8	NHR	500	4.13.E-03	0	1217.589
PAHs							
Benzo(A) Pyrene	0.00	1100	HR	0.01	Elevated (6)	110000	0.003
Naphthalene	0.02	145000	NV	21	Elevated (6)	6905	5.265
Phenanthrene	0.000	25000	NV	63	Elevated (6)	397	15.750
Pyrene	0.000	6000	NV	40.0	Elevated (6)	150	10.000
Metals							
Boron	0.13	0.13	HR	5	1	0	1.351
Chromium	0.00	0.0063	HR	0.05	Elevated (6)	0	0.013
Iron	0.47	26	NHR	0.3	55.46	87	0.384
Lead	0.00033	0.00	HR	0.01	1	0	0.003
VOCs							
Benzene	0.00	510	HR	5	Elevated (6)	102	1.250
Toluene	0.00	60	NHR	24	Elevated (6)	3	12.000
Ethylbenzene	0.00	1800	NHR	2.4	Elevated (6)	750	1.200

Notes:

(1) All results and guidelines are expressed in µg/L except for metals which are expressed in mg/L.

(2) Average background concentrations are based on groundwater quality reported at wells OW3B-85 and OW9B-92/06 between 2004 and 2006.

(3) Highest reported concentration in former waste disposal area (OW4B-91) between 2004 and 2006.

(4) Where a parameter was analyzed for but was not detected at or above the Method Detection Limit (MDL), a value of 1/2 of the MDL was assumed.

(5) Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment

(6) Ratio is elevated but undefined since average is set at zero

Standards for Use under Part XV.I of the Environmental Protection Act, March 2004 (Part XV.I Standards)

NV: No value

HR: Health Related Parameters

NHR: Non Health Related Parameters

RUC: Reasonable Use Criteria

RUC for NHR Parameters = (ODWS - Average Background Level) x 0.5 + Average Background Level

RUC for HR and NV Parameters = (ODWS - Average Background Level) x 0.25 + Average Background Level

TABLE 4

INTERIM GROUNDWATER TRIGGER AND ASSESSMENT CRITERIA - DEEP OVERBURDEN/SHALLOW BEDROCK UNIT
EDWARDS LANDFILL SITE

Deep Overburden/Shallow Bedrock Unit

Groundwater Trigger Parameters (1)	*Average Background Level (2), (4)*	*Maximum Leachate Level (3)*	*ODWS Characterization (5)*	*ODWS (5)*	*Maximum Leachate Level to Average Background Level Ratio*	*Maximum Leachate Level to ODWS Ratio*	*RUC (Trigger Level)*
General Chemistry							
Chloride (Cl)	15.67	243	NHR	250	1.55.E+01	1	132.836
Sulfates (SO4)	441.13	8	NHR	500	1.81.E-02	0	470.567
PAHs							
Benzo(A) Pyrene	0.004	1100	HR	0.01	Elevated (6)	110000	0.006
Naphthalene	0.00	145000	NV	21	Elevated (6)	6905	5.251
Phenanthrene	0.00	25000	NV	63	Elevated (6)	397	15.750
Pyrene	0.00	6000	NV	40.0	Elevated (6)	150	10.000
Metals							
Boron	0.40	0.13	HR	5	0	0	1.550
Chromium	0.00	0.0063	HR	0.05	Elevated (6)	0	0.013
Iron	0.82	26	NHR	0.3	32	87	0.558
Lead	0.00	0.00	HR	0.01	0	0	0.003
VOCs							
Benzene	0.00	510	HR	5	Elevated (6)	102	1.250
Toluene	0.00	60	NHR	24	Elevated (6)	3	12.000
Ethylbenzene	0.00	1800	NHR	2.4	Elevated (6)	750	1.200

Notes:

(1) All results and guidelines are expressed in µg/L except for metals which are expressed in mg/L.

(2) Average background concentrations are based on groundwater quality reported at wells MW2A-01, OW3A-85 and OW9A-92/06 between 2004 and 2006.

(3) Highest reported concentration in former waste disposal area (OW4B-91) between 2004 and 2006.

(4) Where a parameter was analyzed for but was not detected at or above the Method Detection Limit (MDL), a value of 1/2 of the MDL was assumed.

(5) Where no ODWS criteria exists, the generation of the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment

(6) Ratio is elevated but undefined since average is set at zero

Standards for Use under Part XV.I of the Environmental Protection Act, March 2004 (Part XV.I Standards)

NV: No value

HR: Health Related Parameters

NHR: Non Health Related Parameters

RUC: Reasonable Use Criteria

RUC for NHR Parameters = (ODWS - Average Background Level) x 0.5 + Average Background Level

RUC for HR and NV Parameters = (ODWS - Average Background Level) x 0.25 + Average Background Level

TABLE 5
BACKGROUND WELLS SUMMARY OF RUC GROUNDWATER ASSESSMENT [1]
2006 ANNUAL OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

	SHALLOW OVERBURDEN				RUC	
	OW3B-85		*OW9B-92*		*(Trigger Level)*	**ODWS**
	May-06	*Jul-06*	*May-06*	*Jul-06*		
General Chemistry						
Chloride (Cl)	6	13	28	27	***134.665***	250
Sulfates (SO4)	31	41	**3,440**	**4,040**	***1217.590***	500
PAHS						
Benzo(A) Pyrene	-	<0.01	-	<0.01	0.003	0.01
Naphtalene	-	<0.05	-	<0.05	5.250	21
Phenanthrene	-	<0.05	-	<0.05	15.750	63
Pyrene	-	<0.05	-	<0.05	10.000	40.0
Metals						
Boron	<0.01	<0.01	0.23	0.24	1.350	5
Chromium	-	<0.005	-	<0.005	0.013	0.05
Iron	**0.64**	**1.3**	<0.05	0.11	0.384	0.3
Lead	-	<0.0005	-	<0.0005	0.003	0.01
VOCs						
Benzene	-	<0.1	-	<0.1	1.250	5
Toluene	-	<0.1	-	<0.1	12.000	24
Ethylbenzene	-	<0.2	-	<0.2	1.200	2.4

	DEEP OVERBURDEN/SHALLOW BEDROCK						RUC	
	MW2A-01			*OW3A-85*		*OW9A-06*	*(Trigger Level)*	**ODWS**
	May-06	*Jul-06*	*Dec-06*	*May-06*	*Jul-06*	*Dec-06*		
General Chemistry								
Chloride (Cl)	18	14	12	7	7	24	132.836	250
Sulfates (SO4)	**2,800**	**2,440**	**2,430**	260	**995**	**2520**	470.567	500
PAHS								
Benzo(A) Pyrene	-	0.01	0.01	<0.01	-	<0.01	0.006	0.01
Naphtalene	-	<0.05	<0.05	<0.05	-	<0.05	5.251	21
Phenanthrene	-	<0.05	<0.05	<0.05	-	<0.05	15.750	63
Pyrene	-	<0.05	<0.05	<0.05	-	<0.05	10.000	40.0
Metals								
Boron	0.37	0.38	0.44	0.34	0.27	0.46	1.550	5
Chromium	-	<0.005	-	-	<0.005	-	0.013	0.05
Iron	<0.05	<0.05	<0.3	**1.9**	0.36	**1.2**	0.558	0.3
Lead	-	<0.0005	-	-	0.0015	-	0.003	0.01
VOCs								
Benzene	<0.1	-	-	-	<0.1	<0.1	1.250	5
Toluene	<0.1	-	-	-	<0.1	<0.1	12.000	24
Ethylbenzene	<0.2	-	-	-	<0.2	<0.2	1.200	2.4

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
-	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.

TABLE 6
SUMMARY OF RUC GROUNDWATER ASSESSMENT [1]
SHALLOW OVERBURDEN IN 2006
2006 ANNUAL OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	IMMEDIATELY WEST OF SITE									RUC	
	MW1-03			MW2-03			MW3-03			(Trigger Level)	ODWS
	May-06	Jul-06	Dec-06	May-06	Jul-06	Dec-06	May-06	Jul-06	Dec-06		
General Chemistry											
Chloride (Cl)	28	27	21	70	65	57	25	27	40	134.665	250
Sulfates (SO4)	190	184	195	191	189	184	366	342	484	1217.590	500
PAHS											
Benzo(A) Pyrene	-	**0.04**	-	-	<0.05	-	-	**0.01**	-	0.003	0.01
Naphtalene	-	0.18	-	-	<0.05	-	-	0.06	-	5.250	21
Phenanthrene	-	<0.05	-	-	<0.05	-	-	0.1	-	15.750	63
Pyrene	-	<0.05	-	-	<0.05	-	-	<0.05	-	10.000	40.0
Metals											
Boron	0.052	0.05	0.061	0.035	0.031	0.043	0.031	0.047	0.048	1.350	5
Chromium	-	<0.005	-	-	<0.005	-	-	<0.005	-	0.013	0.05
Iron	<0.05	<0.05	0.23	0.32	**1.7**	<0.05	0.11	**0.9**	0.25	0.384	0.3
Lead	-	0.0005	-	-	<0.0005	-	-	<0.0005	-	0.003	0.01
VOCs											
Benzene	-	<0.1	-	-	<0.1	-	-	<0.1	-		
Toluene	-	<0.2	-	-	<0.2	-	-	<0.2	-	12.000	24
Ethylbenzene	-	<0.1	-	-	<0.1	-	-	<0.1	-	1.200	2.4

	EASTERN PORTION OF THE SITE			RUC	
	MW2C-01			(Trigger Level)	ODWS
	May-06	Jul-06	Dec-06		
General Chemistry					
Chloride (Cl)	15	13	19	134.665	250
Sulfates (SO4)	**1,990**	**2,330**	**2,520**	1217.590	500
PAHS					
Benzo(A) Pyrene	-	-	-	0.003	0.01
Naphtalene	-	-	-	5.250	21
Phenanthrene	-	-	-	15.750	63
Pyrene	-	-	-	10.000	40.0
Metals					
Boron	0.037	0.25	0.31	1.350	5
Chromium		<0.005	-	0.013	0.05
Iron	<0.05	1.7	<0.05	0.384	0.3
Lead	-	<0.0005	-	0.003	0.01
VOCs					
Benzene	-	-	-	1.250	5
Toluene	-	-	-	12.000	24
Ethylbenzene	-	-	-	1.200	2.4

TABLE 6
SUMMARY OF RUC GROUNDWATER ASSESSMENT [1]
SHALLOW OVERBURDEN IN 2006
2006 ANNUAL OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	SOUTHERN BOUNDARY									RUC	
	OW1B-85 / OW1B-06			*OW8B-92 / OW8B-06*			*OW5C-91*			*(Trigger Level)*	ODWS
	May-06	*Jul-06*	*Dec-06*	*May-06*	*Jul-06*	*Dec-06*	*May-06*	*Jul-06*	*Dec-06*		
General Chemistry											
Chloride (Cl)	-	0.3	-	9	8	50	24	23	11	134.665	250
Sulfates (SO4)	10	12	44	287	381	827	780	812	876	1217.590	500
PAHS											
Benzo(A) Pyrene	-	<0.01	-	-	<0.01	-	-	<0.05	-	0.003	0.01
Naphtalene	-	0.07	-	-	0.09	-	-	0.13	-	5.250	21
Phenanthrene	-	<0.05	-	-	<0.05	-	-	<0.05	-	15.750	63
Pyrene	-	<0.05	-	-	<0.05	-	-	<0.05	-	10.000	40.0
Metals											
Boron	0.013	0.017	0.097	0.14	0.12	0.095	0.037	0.032	0.31	1.350	5
Chromium	-	<0.005	-	-	<0.005	-	NA	<0.005	NA	0.013	0.05
Iron	<0.05	<0.05	<0.05	<0.05	<0.05	**1.3**	<0.05	<0.05	<0.05	0.384	0.3
Lead	-	<0.0005	-	-	<0.0005	-	NA	<0.0005	NA	0.003	0.01
VOCs											
Benzene	-	<0.1	-	-	<0.1	-	-	<0.1	-	1.250	5
Toluene	-	<0.2	-	-	<0.2	-	-	<0.2	-	12.000	24
Ethylbenzene	-	<0.1	-	-	<0.1	-	-	<0.1	-	1.200	2.4

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
-	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.

TABLE 7
SUMMARY OF RUC GROUNDWATER ASSESSMENT [1]
DEEP OVERBURDEN/SHALLOW BEDROCK IN 2006
2006 ANNUAL OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE

	SOUTHERN BOUNDARY (DOWNGRADIENT)												RUC	
	OW8A-92/OW8A-06				*OW1A-85/OW1A-06*				*OW5A-91/OW5A-06*				*(Trigger Level)*	ODWS
	Mar-06	*May-06*	*Jul-06*	*Dec-06*	*Mar-06*	*May-06*	*Jul-06*	*Dec-06*	*Mar-06*	*May-06*	*Jul-06*	*Dec-06*		
General Chemistry														
Chloride (Cl)	9	10	10	48/48		6	7	12		13	13/13	61	132.836	250
Sulfates (SO4)	**2,240**	**1,850**	**2,150**	**2,010/2,270**		**1,440**	**1,630**	**2,680**		**1,880**	**2,310/2,350**	**1,640**	470.567	500
PAHS														
Benzo(A) Pyrene	<0.01	<0.01	<0.01	<0.01/**0.03**	<0.01/<0.01	<0.01	<0.01	**0.09**	<0.01	<0.01	<0.01/<0.01	**0.01**	0.006	0.01
Naphtalene	<0.05	<0.05	<0.05	0.09/1	<0.05/0.08	0.25	0.1	0.3	<0.05	<0.05	<0.05/0.05	0.11	5.251	21
Phenanthrene	<0.05	<0.05	<0.05	0.11/0.8	<0.05/0.05	0.17	<0.05	1.6	<0.05	<0.05	<0.05/<0.05	0.13	15.750	63
Pyrene	<0.05	<0.05	<0.05	0.05/0.3	<0.05/<0.05	0.07	<0.05	0.4	<0.05	<0.05	<0.05/<0.05	<0.05	10.000	40.0
Metals														
Boron		0.75	0.63	0.43/0.49		0.22	0.19	0.54		0.47	0.45	0.31	1.550	5
Chromium		-	<0.005	-		-	<0.005	-		-	<0.005	-	0.013	0.05
Iron		**3.2**	**3**	**6.0/6.3**		**3.7**	**1.8**	**7.7**		**3.7**	**4**	**1.6**	0.558	0.3
Lead		-	<0.0005	-		-	<0.0005	-		-	<0.0005	-	0.003	0.01
VOCs														
Benzene	-	-	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	1.250	5
Toluene	-	-	<0.2	-	-	-	<0.2	-	-	-	<0.2	-	12.000	24
Ethylbenzene	-	-	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	1.200	2.4

	EASTERN BOUNDARY OF THE SITE			RUC	
	MW2A-85/MW2A-06			*(Trigger Level)*	ODWS
	May-06	*Jul-06*	*Dec-06*		
General Chemistry					
Chloride (Cl)	18	14	12	132.836	250
Sulfates (SO4)	**2,800**	**2,440**	**2,430**	470.567	500
PAHS					
Benzo(A) Pyrene	-	**0.01**	**0.01**	0.006	0.01
Naphtalene	-	<0.05	<0.05	5.251	21
Phenanthrene	-	<0.05	<0.05	15.750	63
Pyrene	-	<0.05	<0.05	10.000	40.0
Metals					
Boron	0.37	0.38	0.44	1.550	5
Chromium	-	<0.005	-	0.013	0.05
Iron	<0.05	<0.05	<0.3	0.558	0.3
Lead	-	<0.0005	-	0.003	0.01
VOCs					
Benzene	-	<0.1	-	1.250	5
Toluene	-	<0.2	-	12.000	24
Ethylbenzene	-	<0.1	-	1.200	2.4

	OFF-SITE RESIDENTIAL WELLS								RUC	
	1637 Highway 3				*1825 Highway 3*				*(Trigger Level)*	ODWS
	Mar-06	*May-06*	*Jul-06*	*Dec-06*	*Mar-06*	*May-06*	*Jul-06*	*Dec-06*		
General Chemistry										
Chloride (Cl)	-	4	7	4	-	7	9	2	132.836	250
Sulfates (SO4)	-	**1,190**	**1,320**	**1,290**	-	61	342	4	470.567	500
PAHS										
Benzo(A) Pyrene	**0.01**	**0.04**	**0.02**	**0.04**	**0.01**	<0.01	<0.01	<0.01	0.006	0.01
Naphtalene	<0.05	0.08	0.28	0.07	<0.05	<0.05	0.13	<0.05	5.251	21
Phenanthrene	<0.05	<0.05	<0.05	<0.05	0.2	<0.05	<0.05	<0.05	15.750	63
Pyrene	<0.05	0.09	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	10.000	40.0
Metals										
Boron	-	0.094	0.19	0.11		0.044	0.12	0.022	1.550	5
Chromium	-	<0.005	<0.005	-		<0.005	<0.005	-	0.013	0.05
Iron	-	<0.05	<0.05	**29**		<0.05	<0.05	**1.8**	0.558	0.3
Lead	-	<0.0005	<0.0005	-		<0.0005	<0.0005	-	0.003	0.01
VOCs										
Benzene	-	-	<0.1	-	-	-	<0.1	-	1.250	5
Toluene	-	-	<0.2	-	-	-	<0.2	-	12.000	24
Ethylbenzene	-	-	<0.1	-	-	-	<0.1	-	1.200	2.4

Notes:

(1)	All results expressed in mg/L except for VOCs which are expressed in ug/L.
<0.001	The parameter was analyzed for but not detected at or above the method detection limit. The associated value is the method detection limit.
RUC	Reasonable Use Criteria.
ODWS	Ministry of the Environment (MOE) Ontario Drinking Water Standards.
☐	Exceedance of RUC.
-	Not analyzed
41.4/44.1	Duplicate samples were submitted for analysis.

TABLE 9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
JULY 2007 UPDATE
EDWARDS LANDFILL SITE
160 BROOKS ROAD, CAYUGA, ONTARIO

	Well Identification	OW1A-85						OW1A-86		OW3A-85			OW3A-87
	Collection Date	06/07/04	02/26/05	12/01/05	05/30/06	05/29/06	07/19/06	12/12/06	05/10/07	06/07/04	12/01/05	07/19/06	05/10/07
	Sample Identification	GW-18235-08	GW-18235-03	GW-18235-09	GW-18235-01	GW-18235-01	GW-18235-12	GW-18235-09	GW-18235-17	GW-18235-12	GW-18235-04	GW-18235-04	GW-18235-16
Parameter (µg/L)	Ontario Drinking Water Standards[1]												
Naphthalene	21[2]	<0.05	0.05	<0.05	<0.05/0.08	0.25	0.1	0.3	0.1	<0.05	<0.05	<0.05	0.08
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	280[2a]	<0.05	<0.05	<0.05	<0.05/<0.05	0.12	<0.05	0.2	0.2	<0.05	<0.05	<0.05	0.2
Phenanthrene	63[2]	<0.05	0.08	<0.05	<0.05/0.05	0.17	<0.05	1.6	2	<0.05	<0.05	<0.05	0.9
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.1	0.1	<0.05	<0.05	<0.05	0.08
Fluoranthene	130[2]	<0.05	<0.05	<0.05	<0.05/<0.05	0.05	<0.05	0.3	0.2	<0.05	<0.05	<0.05	0.2
Pyrene	40[2]	<0.05	0.06	<0.05	<0.05/<0.05	0.07	<0.05	0.4	0.4	<0.05	<0.05	<0.05	0.2
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	<0.05	<0.05/<0.05	0.06	<0.05	0.1	0.09	<0.05	<0.05	<0.05	<0.05
Chrysene	0.5[2]	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.2	0.2	<0.05	<0.05	<0.05	0.1
Benzo(b/j)fluoranthene	0.2[2]	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	0.2	0.1	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05/<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.01	<0.01	0.01	<0.01	<0.01/<0.01	<0.01	<0.01	0.09	0.04	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.2	NA	<0.1	<0.1	<0.1	NA
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1/<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
F1 (C6-C10 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	<100	NA
F2 (C10-C16 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	<100	NA
F1+F2 (C6-C16 Hydrocarbons)	1000[2a,a]	NA	<200	NA	NA	NA	<200	NA	NA	NA	NA	<200	NA
F3 (C16-C34 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	<100	NA
F4 (C34-C50 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	<100	NA
F3+F4 (C16-C50 Hydrocarbons)	1000[2a,b]	NA	<200	NA	NA	NA	<200	NA	NA	NA	NA	<200	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/l

(b) The sum of F1 and F2 must be below 1000 µg/l

TABLE 9

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
JULY 2007 UPDATE
EDWARDS LANDFILL SITE
160 BROOKS ROAD, CAYUGA, ONTARIO

	Well Identification	OWBA-92					OWBA-06		OW9A-06		Field Blank
	Collection Date	06/07/04	02/28/05	12/01/05	05/30/06	05/29/06	03/29/06	12/1/06	05/16/07	12/12/06	05/16/07	05/16/07
	Sample Identification	GW-18235-10	GW-18235-01	GW-18235-11	GW-18235-02	GW-18235-07	GW-18235-14	GW-18235-11/12	GW-18235-19	GW-18235-05	GW-18235-13	GW-18235-14
Parameter (ug/L)	Ontario Drinking Water Standards [1]											
Naphthalene	21 [2]	<0.05	3.18	0.1	<0.05	<0.05	<0.05	0.09/1	0.4	<0.05	<0.05	<0.05
Acenaphthylene	310 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.06	<0.05	<0.05	<0.05
Acenaphthene	20 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5/<0.2	0.06	<0.05	<0.05	<0.05
Fluorene	280 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/0.3	0.3	<0.05	<0.05	<0.05
Phenanthrene	43 [2]	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	0.11/0.8	0.9	<0.05	<0.05	<0.05
Anthracene	12 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.1	<0.05	<0.05	<0.05
Fluoranthene	150 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.1	<0.05	<0.05	<0.05
Pyrene	40 [2]	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.05/0.3	0.2	<0.05	<0.05	<0.05
Benzo(a)anthracene	0.2 [2]	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	<0.05	<0.05	<0.05	<0.05
Chrysene	0.5 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.1	<0.05	<0.05	<0.05
Benzo(b/j)fluoranthene	0.2 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	0.06	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	21 [2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05/<0.2	<0.05	<0.05	<0.05	<0.05
Benzo(e)pyrene	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01/0.03	0.02	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.3	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.3	NA	<0.1	NA	NA
Benzo(g,h,i)perylene	0.2 [2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1/<0.3	<0.1	<0.1	<0.1	<0.1
F1 (C6-C10 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	NA
F2 (C10-C16 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	NA
F1+F2 (C6-C16 Hydrocarbons)	1000 [2][a]	NA	<200	NA	NA	NA	<200	NA	NA	NA	NA	NA
F3 (C16-C34 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	NA
F4 (C34-C50 Hydrocarbons)		NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	NA
F3+F4 (C16-C50 Hydrocarbons)	1000 [2][b]	NA	<200	NA	NA	NA	<200	NA	NA	NA	NA	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003, revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 ug/l

(b) The sum of F1 and F2 must be below 1000 ug/l

TABLE 19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
JULY 2007 UPDATE
EDWARDS LANDFILL SITE
160 BROOKS ROAD, CAYUGA, ONTARIO

		SW-3					
		11/29/04	05/09/05	12/02/05	05/29/06	12/12/06	05/16/07
		SW-18235-01	SW-18235-08	SW-18235-05/06	SW-18235-30/31	SW-18235-28/29	SW-18235-27
Parameter	*PWQO [a],[b] (µg/L)*						
Naphthalene	7*	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/<0.05	<0.05
Acenaphthylene	NV	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/<0.05	<0.05
Acenaphthene	NV	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/<0.05	<0.05
Fluorene	0.2*	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/<0.05	<0.05
Phenanthrene	0.03*	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/<0.05	<0.05
Anthracene	0.0008*	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/<0.05	<0.05
Fluoranthene	0.0008*	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	0.09/<0.05	0.08
Pyrene	NV	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	0.07/<0.05	0.08
Benzo(a)anthracene	0.0004*	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	0.06/0.06	<0.05
Chrysene	0.0001	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/0.06	<0.05
Benzo(b)fluoranthene	NV	<0.05	NA	NA/NA	NA/NA	NA/NA	NA
Benzo(j)fluoranthene	NV	<0.05	NA	NA/NA	NA/NA	NA/NA	NA
Benzo(b/j)fluoranthene	NV	NA	<0.05	NA/NA	<0.05/<0.05	0.09/<0.05	0.07
Benzo(k)fluoranthene	0.0002*	<0.05	<0.05	<0.05/<0.05	<0.05/<0.05	<0.05/<0.05	<0.05
Benzo(a)pyrene	NV	<0.01	<0.01	<0.01/<0.01	<0.01/<0.01	0.05/<0.01	0.03
Indeno(1,2,3-cd)pyrene	NV	<0.1	<0.1	<0.1/<0.1	<0.1/<0.1	<0.1/<0.1	<0.1
Dibenzo(a,h)anthracene	0.002	<0.1	<0.1	<0.1/<0.1	<0.1/<0.1	<0.1/<0.1	–
Benzo(g,h,i)perylene	0.00002*	<0.1	<0.1	<0.1/<0.1	<0.1/<0.1	<0.1/<0.1	<0.1

Notes:

All results and criteria are reported in µg/L, unless otherwise noted
[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
* indicates Interim PWQO;

1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
J	The result is an estimated value.

TABLE 19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
JULY 2007 UPDATE
EDWARDS LANDFILL SITE
160 BROOKS ROAD, CAYUGA, ONTARIO

		SW-5						
		06/07/04	11/29/04	05/09/05	12/02/05	05/29/06	12/12/06	05/16/07
		SW-18235-01	SW-18235-06/07	SW-18235-05	SW-18235-08	SW-18235-32	SW-18235-25	SW-18235-29
Parameter	*PWQO [a],[b] (µg/L)*							
Naphthalene	7*	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	NV	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.4
Acenaphthene	NV	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	0.2*	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.07
Phenanthrene	0.03*	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.1
Anthracene	0.0008*	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.2
Fluoranthene	0.0008*	<0.05	<0.05 / <0.05	<0.05	0.05	<0.05	<0.05	0.6
Pyrene	NV	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.6
Benzo(a)anthracene	0.0004*	<0.05	<0.05 / <0.05	<0.05	0.07	<0.05	<0.05	0.4
Chrysene	0.0001	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.3
Benzo(b)fluoranthene	NV	<0.05	<0.05 / <0.05	NA	NA	NA	NA	NA
Benzo(j)fluoranthene	NV	<0.05	<0.05 / <0.05	NA	NA	NA	NA	NA
Benzo(b/j)fluoranthene	NV	NA	NA/NA	<0.05	NA	<0.05	<0.05	0.8
Benzo(k)fluoranthene	0.0002*	<0.05	<0.05 / <0.05	<0.05	<0.05	<0.05	<0.05	0.2
Benzo(a)pyrene	NV	<0.01	<0.01 / <0.01	<0.01	0.02	<0.01	0.01	0.4
Indeno(1,2,3-cd)pyrene	NV	<0.1	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.1	0.5
Dibenzo(a,h)anthracene	0.002	<0.1	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.1	–
Benzo(g,h,i)perylene	0.00002*	<0.1	<0.1 / <0.1	<0.1	<0.1	<0.1	<0.1	0.4

Notes:

All results and criteria are reported in µg/L, unless otherwise noted
[a] MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
* indicates Interim PWQO;

1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
J	The result is an estimated value.

TABLE 19

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - PAHs
JULY 2007 UPDATE
EDWARDS LANDFILL SITE
160 BROOKS ROAD, CAYUGA, ONTARIO

		SW-6					
		11/29/04	05/09/05	12/02/05	05/29/06	12/12/06	05/16/07
		SW-18235-05	SW-18235-06	SW-18235-07	SW-18235-33	SW-18235-26	SW-18235-28
Parameter	*PWQO [a],[b] (µg/L)*						
Naphthalene	7*	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Acenaphthylene	NV	<0.05	<0.05	<0.05	<0.05	<0.05	0.2
Acenaphthene	NV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	0.2*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.03*	<0.05	<0.05	<0.05	<0.05	<0.05	0.1
Anthracene	0.0008*	<0.05	<0.05	<0.05	<0.05	<0.05	0.1
Fluoranthene	0.0008*	<0.05	<0.05	0.05	<0.05	0.05	0.4
Pyrene	NV	<0.05	<0.05	<0.05	<0.05	<0.05	0.4
Benzo(a)anthracene	0.0004*	<0.05	<0.05	0.06	0.06	<0.05	0.3
Chrysene	0.0001	<0.05	<0.05	<0.05	<0.05	<0.05	0.2
Benzo(b)fluoranthene	NV	<0.05	NA	NA	NA	NA	NA
Benzo(j)fluoranthene	NV	<0.05	NA	NA	NA	NA	NA
Benzo(b/j)fluoranthene	NV	NA	<0.05	NA	<0.05	<0.05	0.4
Benzo(k)fluoranthene	0.0002*	<0.05	<0.05	<0.05	<0.05	<0.05	0.1
Benzo(a)pyrene	NV	<0.01	<0.01	0.01	<0.01	0.02	0.2
Indeno(1,2,3-cd)pyrene	NV	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Dibenzo(a,h)anthracene	0.002	<0.1	<0.1	<0.1	<0.1	<0.1	--
Benzo(g,h,i)perylene	0.00002*	<0.1	<0.1	<0.1	<0.1	<0.1	0.2

Notes:

All results and criteria are reported in µg/L, unless otherwise noted
[a] MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
[b] If both PWQO and interim PWQO criteria given, PWQO criteria was used to evaluate if there is an exceedance.
* indicates Interim PWQO;

1.5	Does not meet the applicable PWQO criteria
63 U	Estimated value does not meet PWQO criteria
<30	Method detection limit does not meet PWQO criteria
<30	Result below method detection limit
NV	No value
NA	Not analyzed
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
J	The result is an estimated value.

TABLE 5.12

SUMMARY OF RESIDENTIAL WELL ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*1637 Highway 3*								*1751 Highway 3*	
	Collection Date	*05/10/05*	*07/28/05*	*12/02/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*	*05/10/05*	*07/28/05*
	Sample Identification	*RW-18235-03*	*RW-18235-03*	*RW-18235-01*	*RW-18235-23*	*RW-18235-20*	*RW-18235-22*	*RW-18235-22*	*RW-18235-11*	*RW-18235-02*	*RW-18235-02*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]										
Alkalinity (Total as CaCO3)	30-500	**518**	**512**	**513**	239	320	214	370	**516/517**	138	168
Ammonia (as Nitrogen)	NV	1.82	1.37	6.95	1.45	1.89	0.87	0.71	0.84	0.16	0.35
Hardness (CaCO3)	80-100	NA	**2,270**	**2,600**	NA	**1,900**	NA	NA	**3,000**	NA	**1,890**
Nitrate (N)	10	<1	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<1	<0.2
Nitrite (N)	1	NA	<0.3	0.05	NA	<0.01	NA	NA	<0.01	NA	<0.3
Total Kjeldahl Nitrogen (TKN)	NV	NA	1.2	6	NA	2.3	NA	NA	1.1	NA	0.6
Chloride (Cl)	250	20	21.8	19	4	7	4	14	27	1	10.3
Sulfates (SO4)	500	**2,050**	**2,150**	**1,860**	**1,190**	**1,320**	**1,290**	**1,520**	**2,220**	219	**1,960**
Dissolved Organic Carbon (DOC)	5	1.8	1.7	3.5	3.9	3.6	3.1	2.1	1.7	**5.1**	1.6
Total Dissolved Solids (TDS)	500	**3,720**	**3,750**	**3,000**	**1,560**	**1,710**	**2,130**	**1,730**	**1,620**	**3,530**	**3,090**
Total Suspended Solids (TSS)	NV	NA	16	370	NA	43	NA	NA	37	NA	83
Phenol-4AAP	4.2[2]	NA	<0.001	0.04	NA	0.007	NA	NA	<0.001	NA	<0.001
Biological Oxygen Demand (BOD5)	NV	NA	<2	<2	NA	<2	NA	NA	<2	NA	<2
Chemical Oxygen Demand (COD)	NV	7	<4	120	24	18	24	5	<4	11	14
pH (Standard Units)	6.5-8.5	7.76	7.95	7.81	7.9	7.9	8	7.8	7.9/7.9	7.73	7.91
Total Phosphorus (P)	NV	NA	0.114	0.71	NA	0.38	NA	NA	0.086	NA	0.068
Potassium (K)	NV	NA	8.8	NA	NA	2.7	NA	NA	9.3	NA	8.2
Conductivity (umhos/cm)	NV	3,660	3,440	3,130	2,400	2,670	2,340	3,070	3,400/3,400	3,340	3,040
Calcium (Ca)	NV	630	580	650	NA	580	440	460	620	420	370
Turbidity (NTU)	NV	NA	NA	NA	NA	NA	NA	NA	66.2	NA	NA

Notes:
All concentrations are in mg/L unless otherwise noted.

-1 Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.12

SUMMARY OF RESIDENTIAL WELL ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*1825 Highway 3*						
	Collection Date	*05/10/05*	*07/28/05*	*12/02/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*
	Sample Identification	*RW-18235-01*	*RW-18235-01*	*RW-18235-02*	*RW-18235-22*	*RW-18235-19*	*RW-18235-21*	*RW-18235-21*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]							
Alkalinity (Total as CaCO3)	30-500	317	325	159	172	214	91	294
Ammonia (as Nitrogen)	NV	0.33	0.38	0.73	0.39	0.52	0.23	0.15
Hardness (CaCO3)	80-100	NA	**2,190**	**180**	NA	**590**	NA	NA
Nitrate (N)	10	<1	<0.2	0.2	<0.1	0.2	0.2	1.4
Nitrite (N)	1	NA	<0.3	<0.01	NA	0.05	NA	NA
Total Kjeldahl Nitrogen (TKN)	NV	NA	0.5	1.2	NA	0.9	NA	NA
Chloride (Cl)	250	18	16.6	6	7	9	2	11/12
Sulfates (SO4)	500	**1,870**	**1,460**	42	61	342	4	344/329
Dissolved Organic Carbon (DOC)	5	3.2	1.8	4	3.8	4.9	2.7	4.1
Total Dissolved Solids (TDS)	500	**3,360**	**3,750**	250	290	**739**	150	494/**511**
Total Suspended Solids (TSS)	NV	NA	13	50	NA	14	NA	NA
Phenol-4AAP	4.2[2]	NA	<0.001	<0.001	NA	<0.001	NA	NA
Biological Oxygen Demand (BOD5)	NV	NA	<2	<2	NA	<2	NA	NA
Chemical Oxygen Demand (COD)	NV	8	<4	15	12	13	12	9
pH (Standard Units)	6.5-8.5	7.84	7.85	8.33	8.4	8.1	8.1	8.1
Total Phosphorus (P)	NV	NA	0.036	0.29	NA	0.14	NA	NA
Potassium (K)	NV	NA	5.1	NA	NA	7.9	NA	NA
Conductivity (umhos/cm)	NV	3,310	3,360	360	448	1,120	188	1,220
Calcium (Ca)	NV	510	510	44	43	120	27	210
Turbidity (NTU)	NV	NA	NA	NA	NA	NA	NA	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

-1 Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.13

SUMMARY OF RESIDENTIAL WELL ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*1637 Highway 3*							
	Collection Date	*05/10/05*	*07/28/05*	*12/02/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/17/07*	*07/31/07*
	Sample Identification	*RW-18235-03*	*RW-18235-03*	*RW-18235-01*	*RW-18235-23*	*RW-18235-20*	*RW-18235-22*	*RW-18235-22*	*RW-18235-11*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]								
Aluminum	0.1	NA	NA	NA	NA	NA	NA	NA	0.006
Arsenic (As)	0.025	NA	<0.001	NA	<0.001	<0.001	NA	NA	<0.001
Barium (Ba)	1	<0.005	0.0078	<0.05	0.007	0.008	NA	0.008	<0.005
Beryllium (Be)	0.004 [2]	NA	<0.0005	NA	<0.0005	<0.0005	NA	NA	<0.0005
Boron (B)	5	0.67	0.69	0.85	0.094	0.19	0.11	0.50	0.57
Cadmium (Cd)	0.005	NA	<0.0001	NA	<0.0001	<0.0001	NA	NA	<0.0001
Chromium (Cr)	0.05	NA	0.0051	NA	<0.005	<0.005	NA	NA	<0.005
Cobalt (Co)	0.1 [2]	NA	0.001	NA	<0.0025	<0.0025	NA	NA	<0.0005
Copper (Cu)	1	NA	<0.001	NA	<0.001	<0.001	NA	NA	<0.005
Iron (Fe)	0.3	**3.8**	**5.5**	**110**	<0.05	<0.05	**29**	**0.4**	**13**
Lead (Pb)	0.01	NA	<0.0002	NA	<0.0005	<0.0005	NA	NA	<0.0005
Magnesium (Mg)	NV	340	300	240	73	100	90	170	350
Manganese (Mn)	0.05	NA	0.023	NA	0.016	0.02	NA	NA	0.021
Mercury (Hg)	0.001	NA	<0.0001	NA	NA	<0.0001	NA	NA	<0.0001
Molybdenum (Mo)	7.3 [2]	NA	0.0019	NA	<0.001	<0.001	NA	NA	0.002
Nickel (Ni)	0.1 [2]	NA	0.0087	NA	<0.005	<0.005	NA	NA	0.003
Silver (Ag)	0.0012 [2]	NA	<0.0005	NA	0.0001	<0.0001	NA	NA	<0.0001
Sodium (Na)	200	95	85	73	20	29	32	49	96
Thallium (Tl)	0.002 [2]	NA	<0.00005	NA	<0.00005	<0.0005	NA	NA	<0.00005
Vanadium (V)	0.2 [2]	NA	<0.001	NA	<0.001	<0.001	NA	NA	<0.001
Zinc (Zn)	5	NA	<0.05	NA	<0.025	<0.025	NA	NA	<0.03

Notes:

All concentrations are in mg/L unless otherwise noted.

-1 Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

-2 Table 2, Ontario Regulation 153/04, March 2004.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.13

SUMMARY OF RESIDENTIAL WELL ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (METALS)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*1751 Highway 3*		*1825 Highway 3*						
	Collection Date	*05/10/05*	*07/28/05*	*05/10/05*	*07/28/05*	*12/02/05*	*05/29/06*	*07/19/06*	*12/12/06*	*05/17/07*
	Sample Identification	*RW-18235-02*	*RW-18235-02*	*RW-18235-01*	*RW-18235-01*	*RW-18235-02*	*RW-18235-22*	*RW-18235-19*	*RW-18235-21*	*RW-18235-21*
Parameter (mg/L)	*Ontario Drinking Water Standards* [1]									
Aluminum	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (As)	0.025	NA	0.0093	NA	0.0013	NA	<0.001	<0.001	NA	NA
Barium (Ba)	1	0.007	0.015	0.01	0.0079	0.02	0.01	0.015	NA	0.022
Beryllium (Be)	0.004 [2]	NA	<0.0005	NA	<0.0005	NA	<0.0005	<0.0005	NA	NA
Boron (B)	5	0.51	0.52	0.43	0.51	0.042	0.044	0.12	0.022	0.23
Cadmium (Cd)	0.005	NA	0.0004	NA	<0.0001	NA	<0.0001	<0.0001	NA	NA
Chromium (Cr)	0.05	NA	**0.11**	NA	0.0084	NA	<0.005	<0.005	NA	NA
Cobalt (Co)	0.1 [2]	NA	0.0033	NA	0.0024	NA	<0.0005	<0.0005	NA	NA
Copper (Cu)	1	NA	0.0046	NA	<0.001	NA	<0.001	<0.001	NA	NA
Iron (Fe)	0.3	**29**	**40**	**0.3**	**0.73**	**9.7**	<0.05	<0.05	**1.8**	0.22
Lead (Pb)	0.01	NA	0.0022	NA	<0.0002	NA	<0.0005	<0.0005	NA	NA
Magnesium (Mg)	NV	360	280	300	280	17	24	69	4.8	120
Manganese (Mn)	0.05	NA	**2.2**	NA	**0.15**	NA	0.006	**0.11**	NA	NA
Mercury (Hg)	0.001	NA	<0.0001	NA	<0.0001	NA	NA	<0.0001	NA	NA
Molybdenum (Mo)	7.3 [2]	NA	0.001	NA	0.0053	NA	0.002	0.002	NA	NA
Nickel (Ni)	0.1 [2]	NA	0.055	NA	0.0096	NA	<0.001	<0.001	NA	NA
Silver (Ag)	0.0012 [2]	NA	0.0005	NA	<0.0005	NA	0.0002	<0.00001	NA	NA
Sodium (Na)	200	120	98	110	100	11	15	30	1.6	46
Thallium (Tl)	0.002 [2]	NA	<0.00005	NA	<0.00005	NA	<0.00005	<0.0005	NA	NA
Vanadium (V)	0.2 [2]	NA	<0.001	NA	<0.001	NA	<0.001	<0.001	NA	NA
Zinc (Zn)	5	NA	0.081	NA	<0.05	NA	<0.005	<0.005	NA	NA

Notes:

All concentrations are in mg/L unless otherwise noted.

-1 Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

-2 Table 2, Ontario Regulation 153/04, March 2004.

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criter

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

TABLE 5.14

SUMMARY OF RESIDENTIAL WELL ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*1637 Highway 3*							
	Collection Date	*07/28/05*	*12/02/05*	*03/30/06*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*	*07/31/07*
	Sample Identification	*RW-18235-03*	*RW-18235-01*	*RW-18235-07*	*RW-18235-23*	*RW-18235-20*	*RW-18235-22*	*RW-18235-22*	*RW-18235-11*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]								
Naphthalene	21[2]	0.16	0.1	<0.05	0.08	0.28	0.07	0.2	0.04[3]/<0.05/<0.05
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02[3]<0.05/<0.05
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02[3]<0.05/<0.05
Fluorene	280[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02[3]<0.05/<0.05
Phenanthrene	63[2]	<0.05	0.41	0.05	0.07	<0.05	0.07	0.1	<0.02[3]<0.05/<0.05
Anthracene	12[2]	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02[3]<0.05/<0.05
Fluoranthene	130[2]	<0.05	1.1	<0.05	0.1	<0.05	0.14	0.2	0.04[3]/<0.05/<0.05
Pyrene	40[2]	<0.05	0.66	<0.05	0.09	<0.05	<0.05	0.2	0.04[3]/<0.05/<0.05
Benzo(a)anthracene	0.2[2]	<0.05	**0.42**	<0.05	0.05	<0.05	0.07	0.09	<0.02[3]<0.05/<0.05
Chrysene	0.5[2]	<0.05	0.2	<0.05	<0.05	<0.05	<0.05	0.08	<0.02[3]<0.05/<0.05
Benzo(b/j)fluoranthene	0.2[2]	<0.05	**0.38**	<0.05	0.05	<0.05	0.06	0.1	<0.02[3]<0.05/<0.05
Benzo(k)fluoranthene	21[2]	<0.05	0.17	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02[3]<0.05/<0.05
Benzo(a)pyrene	0.01	<0.01	**0.34**	**0.01**	**0.04**	**0.02**	**0.04**	**0.07**	<0.01[3]/<0.01/**0.01**
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02[3]/<0.1/<0.1
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.02[3]/<0.1
Benzo(g,h,i)perylene	0.2[2]	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02[3]/<0.1/<0.1
F1 (C6-C10 Hydrocarbons)	1000[2](a)	<100	NA	NA	NA	<100	NA	NA	NA
F2 (C10-C16 Hydrocarbons)		<100	NA	NA	NA	<100	NA	NA	NA
F3 (C16-C34 Hydrocarbons)	1000[2](b)	<100	NA	NA	NA	<100	NA	NA	NA
F4 (C34-C50 Hydrocarbons)		<100	NA	NA	NA	<100	NA	NA	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004.

(3) Split Sample, analysed by a second laboratory

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/l

(b) The sum of F1 and F2 must be below 1000 µg/l

ALS Split Sample, analysed by ALS Laboratory Group

TABLE 5.14

SUMMARY OF RESIDENTIAL WELL ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (PAHs AND PHCs)
2007 - 2009 OPERATIONS MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*1751 Highway 3*	*1825 Highway 3*						
	Collection Date	*07/28/05*	*07/28/05*	*12/02/05*	*03/30/06*	*05/29/06*	*07/19/06*	*12/12/06*	*05/16/07*
	Sample Identification	*RW-18235-02*	*RW-18235-01*	*RW-18235-02*	*RW-18235-06*	*RW-18235-22*	*RW-18235-19*	*RW-18235-21*	*RW-18235-21*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]								
Naphthalene	21[2]	0.19	2.58	<0.05	<0.05	<0.05	0.13	<0.05	<0.05
Acenaphthylene	310[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	20[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	280[2]	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05
Phenanthrene	63[2]	<0.05	<0.05	<0.05	0.2	<0.05	<0.05	<0.05	<0.05
Anthracene	12[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	130[2]	0.06	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	40[2]	0.06	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	0.2[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.5[2]	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05
Benzo(b/j)fluoranthene	0.2[2]	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	21[2]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.01	**0.03**	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
Benzo(g,h,i)perylene	0.2[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F1 (C6-C10 Hydrocarbons)	1000[2][a]	<100	<100	NA	NA	NA	<100	<100	NA
F2 (C10-C16 Hydrocarbons)		<100	<100	NA	NA	NA	<100	<100	NA
F3 (C16-C34 Hydrocarbons)	1000[2][b]	<100	<100	NA	NA	NA	<100	<100	NA
F4 (C34-C50 Hydrocarbons)		<100	<100	NA	NA	NA	<100	<100	NA

Notes:

All concentrations are in ug/L unless otherwise noted.

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006

(2) Table 2, Ontario Regulation 153/04, March 2004.

(3) Split Sample, analysed by a second laboratory

NV No value

NA Not Analyzed

U The analyte was analyzed for but not detected above the reported sample quantitation limit.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O.Reg 153/04 crite

<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria

<30 Result below method detection limit

(a) The sum of F1 and F2 must be below 1000 µg/l

(b) The sum of F1 and F2 must be below 1000 µg/l

ALS Split Sample, analysed by ALS Laboratory Group

TABLE 5.15

SUMMARY OF RESIDENTIAL WELL ANALYTICAL RESULTS - DEEP OVERBURDEN/SHALLOW BEDROCK (VOCs)
2007 - 2009 OPERATIONS AND MONITORING REPORT
EDWARDS LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Well Identification	*1637 Highway 3*			*1751 Highway 3*	*1825 Highway 3*	
	Collection Date	*07/28/05*	*07/19/06*	*07/31/07*	*07/28/05*	*07/28/05*	*07/19/06*
	Sample Identification	*RW-18235-03*	*RW-18235-20*	*RW-18235-11*	*RW-18235-02*	*RW-18235-01*	*RW-18235-19*
Parameter (ug/L)	*Ontario Drinking Water Standards* [1]						
1,1-Dichloroethane	70[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,1-Dichloroethylene	14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,1,1-Trichloroethane	200[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,1,1,2-Tetrachloroethane	5[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,1,2-Trichloroethane	5[2]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-Tetrachloroethane	1[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dibromoethane (EDB)	1[2]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.2
1,2-Dichloroethane	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
cis-1,2-Dichloroethylene	70[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-1,2-Dichloroethylene	100[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichloropropane	5[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	630[2]	<0.1	<0.2	<0.2	<0.1	<0.1	<0.2
cis-1,3-Dichloropropene	1.4[2][3]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,3-Dichloropropene	1.4[2][3]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,4-Dichlorobenzene	5	<0.1	<0.2	<0.2	<0.1	<0.1	<0.2
2-Hexanone	NV	<5	<5	<5	<5	<5	<5
Acetone	3,000[2]	<10	<10	<10	<10	<10	<10
Benzene	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromodichloromethane	5[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromoform	5[2]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromomethane	10[2](a)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorobenzene	30[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloroethane	NV	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chloroform	5[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloromethane	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	5[2]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dichloromethane(Methylene Chloride)	50[2]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	2.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methyl-ethyl ketone - (2-Butanone)	350[2]	<5	<5	<5	<5	<5	<5
Methyl t-butyl ether (MTBE)	700[2]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methyl isobutyl ketone - (MIBK)	350[2]	<5	<5	<5	<5	<5	<5
Styrene	100[2]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tetrachloroethylene	30	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	24	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Trichloroethylene	50	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichlorofluoromethane (FREON 11)	NV	<0.2	NA	<0.2	<0.2	<0.2	NA
Vinyl Chloride	2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	300	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p+m-Xylene	300	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylene	300	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Notes:

All concentrations are in ug/L unless otherwise noted.

(1)	Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2)	Table 2, Ontario Regulation 153/04, March 2004.
(3)	Criteria for 1,3-dichloropropene
NV	No value
NA	Not Analyzed
U	The analyte was analyzed for but not detected above the reported sample quantitation limit.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit
(a)	value applies to fine and medium textured soils

TABLE 5.3

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*LCS*	*LCS*	*LCS*	*LCS*	*LCS*	*LCS*	*LCS*
				Sample Date:	*3/13/2012*	*5/1/2012*	*6/12/2012*	*7/10/2012*	*9/10/2012*	*11/30/2012*	*12/14/2012*
Parameter	*Units*	*ODWS* [1]		*PWQO* [2]							
Field Parameters											
Dissolved oxygen (DO), field	ug/L	-		4,000-8,000	300	-	4420	-	90	-	760
Conductivity, field	uS/cm	-		-	5050	8680	7780	8340	6990	5860	4680
pH, field	s.u.	6.5-8.5	OG	6.5-8.5	7.21	7	7.7	8.3	7.08	7.81	6.84
Temperature, field	Deg C	15	AO	qualitative	12.5	20	24	22.8	20.5	18.3	13.9
General Chemistry											
Alkalinity, total (as CaCO3)	ug/L	30,000-500,000	OG	25% of natural	2590000	3090000	2410000	2380000	2080000	1310000	1200000
Ammonia-N	ug/L	-		-	121000	248000	220000	221000	204000	94100	81900
Biochemical oxygen demand (BOD5)	ug/L	-		-	79000	72000	85000	72000	-	26000	26000
Calcium	ug/L	-		-	253000	219000	-	230000	236000	311000	308000
Chemical oxygen demand (COD)	ug/L	-		-	648000	810000	683000	711000	598000	326000	262000
Chloride	ug/L	250,000	AO	-	946000	1260000	995000	1010000	692000	982000	580000
Conductivity	uS/cm	-		-	6770	7850	7080	6980	5660	3100	4820
Dissolved organic carbon (DOC)	ug/L	5,000	AO	-	221000	268000	174000	252000	150000	86300	71500
Hardness	ug/L	80,000-100,000	OG	-	1640000	-	1720000	1710000	1580000	-	1410000
Nitrate (as N)	ug/L	10,000	MAC	-	< 250	< 500	< 500	< 500000	< 250	< 2000	< 50
Nitrite (as N)	ug/L	1,000	MAC	-	< 250	-	< 500	< 500000	< 250	-	< 50
pH	s.u.	6.5-8.5	OG	-	7.9	8.2	8.0	8.2	8.2	7.6	7.8
Phenols	ug/L	-		-	45	-	44	43	52	-	6
Potassium	ug/L	-		-	173000	-	-	215000	215000	-	-
Sulfate	ug/L	-		-	98600	93700	443000	564000	625000	1490000	740000
Total dissolved solids (TDS)	ug/L	500,000	AO	-	3790000	4460000	4280000	4410000	3790000	3010000	2940000
Total kjeldahl nitrogen (TKN)	ug/L	-		-	265000	-	292000	239000	201000	-	93000
Total phosphorus	ug/L	-		30	1800	-	2400	4890	4250	-	1300
Total suspended solids (TSS)	ug/L	-		-	28000	30000	180000	912000	493000	36000	13000
Un-ionized ammonia	ug/L	-		20	-	20400	14550	26000	17100	1840	2740
Metals											
Arsenic	ug/L	25	IMAC	5	0.041	-	18	25.6	0.035	-	10.1
Barium	ug/L	1,000	MAC	-	0.322	239	277	450	0.349	198	209
Boron	ug/L	5,000	IMAC	200	7.38	12100	12200	13900	8.85	6950	6110
Cadmium	ug/L	5	MAC	0.1-0.5	< 0.0001	-	< 0.1	< 0.10	< 0.0001	-	< 0.10
Chromium	ug/L	50	MAC	1/8.9	0.076	-	28	56.6	0.045	-	25.2
Cobalt	ug/L	-		0.9	-	-	-	-	-	-	3.16
Copper	ug/L	1,000	AO	5	0.004	-	3	5.04	0.008	-	4.02
Iron	ug/L	300	AO	300	1.07	144	137	2100	11.8	3350	-
Lead	ug/L	10	MAC	5/10/20/25	0.001	-	< 1	< 1.0	0.005	-	< 1.0
Magnesium	ug/L	-		-	245	290000	278	276000	241	147000	156000
Mercury	ug/L	1	MAC	0.2	< 0.0001	-	< 0.1	< 0.05	< 0.0001	-	< 0.1
Sodium	ug/L	20	AO	-	645	843000	790	814000	586	348000	-
Zinc	ug/L	5,000	AO	20	0.047	-	10	276	0.044	-	10.6
Volatiles											
1,4-Dichlorobenzene	ug/L	5	MAC	4	< 1.00	-	< 0.10	-	< 1.00	-	< 1.00
Benzene	ug/L	5	MAC	100	< 2.00	-	1.3	-	< 2.00	-	< 2.00
Ethylbenzene	ug/L	2.4	AO	8	< 1.00	-	4.5	-	2.3	-	7.1
Methylene chloride	ug/L	50	MAC	100	< 3.00	-	< 0.30	-	< 3.00	-	-
Toluene	ug/L	24	AO	0.8	4	-	1.9	-	2.5	-	8.2
Vinyl chloride	ug/L	2	MAC	600	< 1.70	-	< 0.17	-	< 1.70	-	< 1.70
PAHs											
Benzo(a)pyrene	ug/L	0.01	MAC	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Naphthalene	ug/L	-		7	4.5	-	11	-	2.6	-	5.3

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW1-03*	*MW1-03*	*MW1-03*	*MW1B-07*	*MW1B-07*	*MW1B-07*	*MW1D-07*	*MW1D-07*	*MW1S-07*	*MW1S-07*	*MW2-03*	*MW2-03*	*MW2-03*	*MW2C-01*	*MW2C-01*	*MW2C-01*	*MW3-03*
				Sample Date:	*5/1/2012*	*7/11/2012*	*11/30/2012*	*5/1/2012*	*7/11/2012*	*11/30/2012*	*5/3/2012*	*7/11/2012*	*5/3/2012*	*7/11/2012*	*5/1/2012*	*7/11/2012*	*11/30/2012*	*5/3/2012*	*7/10/2012*	*11/30/2012*	*5/1/2012*
Parameters	***Units***	***ODWS*** [1]																			
Field Parameters																					
Conductivity, field	uS/cm	-			1689	1665	1254	1528	1665	1536	3430	3420	4230	4320	1450	1635	1255	4910	5450	4580	1277
pH, field	s.u.	6.5-8.5	OG		7.3	7.12	6.72	7.05	7.21	7.21	7.74	8.12	7.04	7.21	7.2	7.44	7.37	7.46	7.32	7.45	7.0
Temperature, field	Deg C	15	AO		9.1	11.6	11.1	9	13.2	9.9	11.9	13.0	11.3	10.5	8.9	11.50	11.3	**16.1**	10.8	8.6	8.6
General Chemistry																					
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		376	396	415	**542**	**643**	**621**	159	116	425	415	372	370	342	370	**820**	**814**	463
Ammonia-N	mg/L	-			< 0.02	< 0.02	< 0.02	0.06	0.036	0.05	2.03	3.72	0.11	0.808	< 0.02	< 0.02	< 0.02	< 0.02	0.493	< 0.02	0.02
Calcium	mg/L	-			207	183	178	128	141	179	502	506	489	503	183	192	210	475	187	183	141
Chemical oxygen demand (COD)	mg/L	-			11	< 5	7	21	14.7	6	94	15	< 5	< 5	15	6.23	16	< 5	13	< 5	14
Chloride	mg/L	250	AO		156	160	90.6	6.98	12.4	9.15	15.6	18.1	13	13.2	121	184	131	18.8	21.7	18.4	33.1
Conductivity	uS/cm	-			1480	1450	1300	1230	1410	1480	2890	2850	3640	3650	1240	1390	1260	4130	4470	4500	1040
Dissolved organic carbon (DOC)	mg/L	5.0	AO		4.3	3.8	4.4	**20.8**	**15**	**6.9**	4.2	3.0	2.6	2	**5.9**	**6**	**7.8**	2.1 J	**6.1**	4.8	**12.8**
Nitrate (as N)	mg/L	10.0	MAC		< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	< 0.10	< 0.05	< 0.25	< 0.05	< 0.05	< 0.05	0.05	< 0.20	< 0.25	0.7	< 0.05
Nitrite (as N)	mg/L	1.0	MAC		-	< 0.05	-	-	< 0.05	-	-	**11.10**	-	**5.13**	-	< 0.05	-	-	< 0.25	-	-
pH	s.u.	-			8.14	7.89	7.96	8.22	7.76	7.97	8.58	8.24	8	7.82	8.20	7.89	8.01	8.08	8.34	8.05	8.13
Phenol	mg/L	-			-	-	-	-	-	-	-	0.04	-	< 0.001	-	-	-	-	-	-	-
Phenolics (total)	mg/L	-			-	< 0.001	-	-	< 0.001	-	-	-	-	-	-	< 0.001	-	-	< 0.001	-	-
Potassium	mg/L	-			-	2.98	-	-	2.51	-	-	30.20	-	4.76	-	2.08	-	-	12.6	-	-
Sulfate	mg/L	500	AO		282	269	228	236	251	308	**1990**	**1960**	**2510**	**2490**	185	202	183	**3040**	**3020**	**2750**	107
Total dissolved solids (TDS)	mg/L	500	AO		**940**	**1030**	**858**	**858**	**944**	**1010**	**2890**	**2890**	**3770**	**3780**	**864**	**864**	**816**	**4390**	**4400**	**4380**	**690**
Total kjeldahl nitrogen (TKN)	mg/L	-			-	0.25	-	-	0.757	-	-	3.82	-	0.984	-	0.586	-	-	0.61	-	-
Total phosphorus	mg/L	-			-	0.084	-	-	0.392	-	-	1.19	-	0.032	-	0.096	-	-	0.098	-	-
Metals																					
Arsenic	mg/L	0.025	IMAC		-	< 0.003	-	-	< 0.003	-	-	< 0.003	-	0.008	-	< 0.003	-	-	< 0.003	-	-
Barium	mg/L	1.0	MAC		0.091	0.0877	0.083	0.04	0.04	0.05	0.015	0.009	0.007	0.004	0.043	0.0562	0.061	0.006	0.011	0.01	0.02
Boron	mg/L	5.0	IMAC		0.045	0.0487	0.047	0.059	0.05	0.07	**9.72**	**10**	0.655	0.584	0.027	0.0288	0.025	0.272	0.37	0.277	0.05
Cadmium	mg/L	0.005	MAC		-	< 0.0001	-	-	< 0.0001	-	-	< 0.0001	-	< 0.0001	-	< 0.0001	-	-	< 0.0001	-	-
Chromium	mg/L	0.05	MAC		-	< 0.003	-	-	< 0.003	-	-	< 0.003	-	< 0.003	-	0.0033	-	-	< 0.003 J	-	-
Copper	mg/L	1.0	AO		-	0.002	-	-	< 0.0008	-	-	< 0.0008	-	0.002	-	0.00318	-	-	0.00478	-	-
Iron	mg/L	0.30	AO		< 0.010	< 0.01	< 0.010	**1.57**	**1.33**	**0.63**	0.015	< 0.01	**2.39**	**1.8**	< 0.010	< 0.01	< 0.010	< 0.010	0.0623	< 0.010	**1.13**
Lead	mg/L	0.01	MAC		-	< 0.001	-	-	< 0.001	-	-	< 0.001	-	< 0.001	-	< 0.001	-	-	< 0.001	-	-
Magnesium	mg/L	-			59.1	53.3	48.9	86.1	105	119	175	184	333	334	42.4	43	43.9	436	611	575	42.1
Manganese	mg/L	0.05	AO		-	0.01	-	-	**0.45**	-	-	0.040	-	0.0376	-	0.0087	-	-	< 0.002	-	-
Mercury	mg/L	0.001	MAC		-	< 0.00005	-	-	< 0.00005	-	-	< 0.00005	-	< 0.00005	-	< 0.00005	-	-	< 0.00005	-	-
Silver	mg/L	-			-	< 0.0001	-	-	< 0.0001	-	-	< 0.0001	-	< 0.0001	-	< 0.0001	-	-	< 0.0001	-	-
Sodium	mg/L	20	AO		**68.5**	**62**	**46.9**	**55.5**	**52.8**	**68.2**	**39.4**	**43.1**	**106**	**103**	**38.2**	**49.8**	**57**	**166**	**300**	**282**	**46.5**
Zinc	mg/L	5.0	AO		-	0.0361	-	-	< 0.005	-	-	0.013	-	0.0102	-	0.0205	-	-	0.0188	-	-

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW3-03*	*MW3-03*	*MW6B-07*	*MW6B-07*	*MW6B-07*	*OW1B-06*	*OW1B-06*	*OW1B-06*	*OW3B-07*	*OW3B-07*	*OW5B-06*	*OW5B-06*	*OW5B-06*	*OW8B-06*	*OW8B-06*	*OW8B-06*	*OW9B-06*
				Sample Date:	*7/11/2012*	*11/30/2012*	*5/2/2012*	*7/11/2012*	*11/30/2012*	*5/1/2012*	*7/10/2012*	*11/30/2012*	*5/3/2012*	*7/10/2012*	*5/1/2012*	*7/10/2012*	*11/30/2012*	*5/2/2012*	*7/10/2012*	*11/30/2012*	*5/3/2012*
Parameters	***Units***	***ODWS*** [1]																		
Field Parameters																				
Conductivity, field	uS/cm	-			1422	1113	2830	3270	2740	1814	2170	2240	1254	1249	1422	1684	1316	1863	1938	1890	1875
pH, field	s.u.	6.5-8.5	OG		7.3	7.47	**8.58**	7.58	7.55	7.83	7.59	7.78	6.99	7.06	7.7	7.41	6.88	7.35	7.56	7.66	7.51
Temperature, field	Deg C	15	AO		12.2	10.8	9.7	13.4	10.1	8.6	12.2	10.2	11.9	13.1	8.3	11.2	9.8	9.3	12.1	10.8	10.3
General Chemistry																				
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		496	429	472	484	486	**741**	**765**	**831**	452	390	**510**	**551**	481	**660**	**622**	**649**	**629**
Ammonia-N	mg/L	-			< 0.02	< 0.02	< 0.02	0.141	0.06	< 0.02	< 0.02	< 0.02	0.05	0.025	< 0.02	< 0.02	< 0.02	0.04	< 0.02	< 0.02	< 0.02
Calcium	mg/L	-			136	138	221	209	210	78.6	70.1	74.8	214	204	106	90.1	82.7	74.6	68.6	80	63.3
Chemical oxygen demand (COD)	mg/L	-			15.3	19	11	< 5	7	8	9	13	19	25	17	14	14	8	7	8	< 5
Chloride	mg/L	250	AO		41.6	56.1	52.4	51.6	48.8	19	19.9	19.7	14.2	15.9	19.3	19.9	17.3	59.7	65.8	62.1	30.9
Conductivity	uS/cm	-			1180	1240	2890	2720	2740	1900	2020	2270	1080	996	1390	1430	1360	1700	1580	1730	1580
Dissolved organic carbon (DOC)	mg/L	5.0	AO		**8.8**	**11.2**	3.3	4.3	3.7	4.6	4	2.6	**9.7**	**11.8**	**11.6**	**11**	**5.6**	3.3	**6.4**	2.1	**6.6**
Nitrate (as N)	mg/L	10.0	MAC		< 0.05	0.22	< 0.05	< 0.05	< 0.10	0.2	< 0.05	0.21	0.15	< 0.05	0.35	0.264	0.92	< 0.05	< 0.05	0.17	< 0.05
Nitrite (as N)	mg/L	1.0	MAC		< 0.05	-	-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	< 0.05	-	-
pH	s.u.	-			7.85	7.9	8.21	7.95	8.17	8.46	8.44	8.17	7.74	8.04	8.36	8.39	8.28	8.31	8.4	8.14	8.21
Phenol	mg/L	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenolics (total)	mg/L	-			< 0.001	-	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	< 0.001	-	-
Potassium	mg/L	-			1.69	-	-	3.14	-	-	5.33	-	-	2.24	-	3.43	-	-	4.18	-	-
Sulfate	mg/L	500	AO		185	253	**1490**	**1510**	**1550**	**573**	**673**	**700**	200	214	362	372	307	307	326	339	363
Total dissolved solids (TDS)	mg/L	500	AO		**796**	**736**	**2540**	**2560**	**2590**	**1510**	**1500**	**1690**	**754**	**814**	**956**	**986**	**984**	**1100**	**1010**	**1160**	**1000**
Total kjeldahl nitrogen (TKN)	mg/L	-			0.883	-	-	0.908	-	-	0.5	-	-	0.75	-	0.39	-	-	0.59	-	-
Total phosphorus	mg/L	-			0.127	-	-	0.064	-	-	0.126	-	-	0.347	-	0.796	-	-	0.043	-	-
Metals																				
Arsenic	mg/L	0.025	IMAC		< 0.003	-	-	< 0.003	-	-	< 0.003	-	-	< 0.003	-	< 0.003	-	-	< 0.003	-	-
Barium	mg/L	1.0	MAC		0.034	0.04	0.01	0.0132	0.013	0.016	0.0173	0.017	0.188	0.166	0.044	0.0525	0.039	0.02	0.02	0.023	0.031
Boron	mg/L	5.0	IMAC		0.0434	0.03	0.062	0.0612	0.069	0.12	0.0973	0.104	0.022	0.0378	0.038	0.046	0.055	0.85	0.70	0.848	0.095
Cadmium	mg/L	0.005	MAC		< 0.0001	-	-	< 0.0001	-	-	< 0.0001	-	-	< 0.0001	-	< 0.0001	-	-	< 0.0001	-	-
Chromium	mg/L	0.05	MAC		< 0.003	-	-	< 0.003	-	-	< 0.003 J	-	-	< 0.003 J	-	< 0.003 J	-	-	0.0037 J	-	-
Copper	mg/L	1.0	AO		0.00284	-	-	0.00503	-	-	0.00283	-	-	0.00532	-	0.00392	-	-	0.002	-	-
Iron	mg/L	0.30	AO		**0.359**	< 0.010	< 0.010	0.0765	< 0.010	0.109	0.0725	< 0.010	0.246	< 0.01	< 0.010	0.0679	< 0.010	< 0.010	0.039	0.063	< 0.010
Lead	mg/L	0.01	MAC		< 0.001	-	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	< 0.001	-	-
Magnesium	mg/L	-			65.4	78.7	320	324	314	254	262	278	21.9	19.4	127	135	119	155	156	163	152
Manganese	mg/L	0.05	AO		0.0492	-	-	0.0252	-	-	0.0128	-	-	**0.155**	-	0.0057	-	-	0.0107	-	-
Mercury	mg/L	0.001	MAC		< 0.00005	-	-	< 0.00005	-	-	< 0.00005	-	-	< 0.00005	-	< 0.00005	-	-	< 0.00005	-	-
Silver	mg/L	-			< 0.0001	-	-	0.00017	-	-	< 0.0001	-	-	< 0.10	-	< 0.0001	-	-	< 0.0001	-	-
Sodium	mg/L	20	AO		**46.3**	**53.7**	**83.4**	**81.5**	**84.8**	**89.4**	**90.7**	**97.9**	**21.6**	18.6	**66.2**	**65.2**	**55.3**	**97.5**	**89.5**	**97.3**	**105**
Zinc	mg/L	5.0	AO		0.0224	-	-	0.014	-	-	0.0387	-	-	< 0.005	-	0.0088	-	-	0.0767	-	-

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
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<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*OW9B-06*	*OW9B-06*
				Sample Date:	*7/10/2012*	*11/30/2012*
Parameters	***Units***	***ODWS*** [1]				
Field Parameters						
Conductivity, field	uS/cm	-			1904	1736
pH, field	s.u.	6.5-8.5	OG		7.56	7.63
Temperature, field	Deg C	15	AO		12.3	9.7
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		**580**	**615**
Ammonia-N	mg/L	-			< 0.02	< 0.02
Calcium	mg/L	-			61.4	69.4
Chemical oxygen demand (COD)	mg/L	-			8	7
Chloride	mg/L	250	AO		34.2	34.9
Conductivity	uS/cm	-			1550	1690
Dissolved organic carbon (DOC)	mg/L	5.0	AO		**7.1**	3.3
Nitrate (as N)	mg/L	10.0	MAC		< 0.05	0.23
Nitrite (as N)	mg/L	1.0	MAC		< 0.05	-
pH	s.u.	-			8.45	8.32
Phenol	mg/L	-			-	-
Phenolics (total)	mg/L	-			< 0.001	-
Potassium	mg/L	-			4.71	-
Sulfate	mg/L	500	AO		393	391
Total dissolved solids (TDS)	mg/L	500	AO		**1090**	**1110**
Total kjeldahl nitrogen (TKN)	mg/L	-			0.25	-
Total phosphorus	mg/L	-			0.041	-
Metals						
Arsenic	mg/L	0.025	IMAC		< 0.003	-
Barium	mg/L	1.0	MAC		0.0257	0.025
Boron	mg/L	5.0	IMAC		0.111	0.125
Cadmium	mg/L	0.005	MAC		< 0.0001	-
Chromium	mg/L	0.05	MAC		0.0034 J	-
Copper	mg/L	1.0	AO		0.00179	-
Iron	mg/L	0.30	AO		0.0149	< 0.010
Lead	mg/L	0.01	MAC		< 0.001	-
Magnesium	mg/L	-			146	163
Manganese	mg/L	0.05	AO		< 0.002	-
Mercury	mg/L	0.001	MAC		< 0.00005	-
Silver	mg/L	-			< 0.0001	-
Sodium	mg/L	20	AO		**103**	**130**
Zinc	mg/L	5.0	AO		< 0.005	-

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
\- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Parameters	*Units*	*ODWS* [1]		*MW1A-07* 5/3/2012	*MW1A-07* 7/11/2012	*MW1A-07* 11/30/2012	*MW2A-01* 5/3/2012	*MW2A-01* 11/30/2012	*MW2A-01* 11/30/2012 *Duplicate*	*MW4A-09* 5/2/2012	*MW4A-09* 7/11/2012	*MW4A-09* 11/30/2012	*MW5A-09* 5/2/2012	*MW5A-09* 7/11/2012	*MW5A-09* 11/30/2012	*MW6A-07* 5/2/2012	*MW6A-07* 7/11/2012	*MW6A-07* 7/11/2012 *Duplicate*	*MW6A-07* 11/30/2012	*MW6A-07* 11/30/2012 *Duplicate*	*OW1A-06* 5/1/2012
Field Parameters																					
Conductivity, field	uS/cm	-		717	764	662	4960	4300	-	4020	4160	3400	4510	4660	4480	3750	4270	-	3360	-	4360
pH, field	s.u.	6.5-8.5	OG	**12.31**	**11.96**	**11.06**	7.03	7.18	-	7.03	7.41	6.62	7.0	7.3	7.52	7.6	7.1	-	**6.47**	-	7.12
Temperature, field	Deg C	15	AO	14.9	14.0	8.3	11.2	8.5	-	10.9	14.3	6.7	10.1	10.2	8.4	10.9	11.4	-	8.5	-	10.0
General Chemistry																					
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	96	97	85	**824**	341	344	369	380	381	389	384	368	426	422	424	406	408	416
Ammonia-N	mg/L	-		0.17	0.45	0.35	< 0.02	0.05	0.09	< 0.02	0.1	0.6	0.22	0.39	0.4	0.25	0.47	0.95	0.38	0.48	0.15
Calcium	mg/L	-		42.8	45.7	40.7	182	559	470	501	518	489	484	494	476	511	534	536	505	494	515
Chemical oxygen demand (COD)	mg/L	-		< 5	5.6	< 5	10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	8	5	6	6	< 5	< 5	8
Chloride	mg/L	250	AO	18.6	18.2	18.5	17.3	15.9	16.1	14.3	14.2	15.5	16.4	16.1	17.1	12.2	12.8	12.3	13.2	13.2	13.9
Conductivity	uS/cm	-		610	687	605	4450	4040	4080	3640	3550	3560	4050	3930	3950	3870	3710	3710	3710	3720	3830
Dissolved organic carbon (DOC)	mg/L	5.0	AO	**10.2**	2.2	1.8	**7.8**	1.5	1.7	4.8	**5.5**	1.9	2.2	2.3	2	3.8	**5.5**	3.4	1.9	2	**44.60**
Nitrate (as N)	mg/L	10.0	MAC	< 0.05	< 0.05	< 0.05	< 0.20	< 0.25	0.25	< 0.05	< 0.05	< 0.25	< 0.05	< 0.05	< 0.25	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.05	-	-	-	-	-	< 0.05	-	-	< 0.05	-	-	< 0.05	< 0.05	-	-	-
pH	s.u.	-		10.9	10.9	10.4	8.14	8.04	8.04	8.01	7.81	7.98	7.94	7.77	8.11	8.01	7.79	7.78	7.97	7.94	7.98
Phenol	mg/L	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenolics (total)	mg/L	-		-	0.001	-	-	-	-	-	< 0.001	-	-	< 0.001	-	-	< 0.001	< 0.001	-	-	-
Potassium	mg/L	-		-	6.2	-	-	-	-	-	6.55	-	-	5.44	-	-	5.21	5.10	-	-	-
Sulfate	mg/L	500	AO	99.7	115	125	**2850**	**2990**	**2960**	**2330**	**2430**	**2720**	**2700**	**2820**	**2780**	**2520**	**2530**	**2470**	**2580**	**2700**	**2770**
Total dissolved solids (TDS)	mg/L	500	AO	280	318	270	**4380**	**4540**	**4460**	**3480**	**3570**	**3790**	**4030**	**4070**	**4250**	**3770**	**3790**	**3760**	**4010**	**3910**	**3860**
Total kjeldahl nitrogen (TKN)	mg/L	-		-	1.3	-	-	-	-	-	0.754	-	-	0.85	-	-	0.95	0.79	-	-	-
Total phosphorus	mg/L	-		-	0.405	-	-	-	-	-	0.675	-	-	0.59	-	-	4.06	3.02	-	-	-
Metals																					
Arsenic	mg/L	0.025	IMAC	-	< 0.003	-	-	-	-	-	< 0.003	-	-	0.012	-	-	< 0.003	< 0.003	-	-	-
Barium	mg/L	1.0	MAC	0.214	0.114	0.129	0.016	0.005	0.005	0.006	0.0061	0.008	0.01	0.0077	0.009	0.01	0.002 J	0.006 J	0.007	0.007	0.009
Boron	mg/L	5.0	IMAC	0.03	0.04	0.037	0.310	0.36	0.381	0.403	0.389	0.361	0.60	0.58	0.643	0.51	0.20 J	0.47 J	0.477	0.478	0.709
Cadmium	mg/L	0.005	MAC	-	< 0.0001	-	-	-	-	-	< 0.0001	-	-	< 0.0001	-	-	< 0.0001	< 0.0001	-	-	-
Chromium	mg/L	0.05	MAC	-	< 0.003	-	-	-	-	-	< 0.003	-	-	< 0.003	-	-	< 0.003	< 0.003	-	-	-
Copper	mg/L	1.0	AO	-	0.003	-	-	-	-	-	0.00197	-	-	0.0030	-	-	< 0.0008 J	0.00161 J	-	-	-
Iron	mg/L	0.30	AO	0.098	0.024	0.011	0.045	< 0.010	0.023	0.031	0.0573	0.241	**4.25**	**3.31**	**4.27**	**4.89**	**1.62 J**	**3.89 J**	**3.84**	**3.96**	**2.59**
Lead	mg/L	0.01	MAC	-	< 0.001	-	-	-	-	-	< 0.001	-	-	< 0.001	-	-	< 0.001	< 0.001	-	-	-
Magnesium	mg/L	-		0.09	0.20	< 0.05	596	476	406	267	295	278	380	383	368	331	338	340	332	324	423
Manganese	mg/L	0.05	AO	-	< 0.002	-	-	-	-	-	**0.175**	-	-	0.04	-	-	0.05 J	**0.12 J**	-	-	-
Mercury	mg/L	0.001	MAC	-	< 0.00005	-	-	-	-	-	< 0.00005	-	-	< 0.00005	-	-	< 0.00005	< 0.00005	-	-	-
Silver	mg/L	-		-	< 0.0001	-	-	-	-	-	< 0.0001	-	-	0.00	-	-	0.0001	0.0001	-	-	-
Sodium	mg/L	20	AO	**52.2**	**56.0**	**54.5**	**276**	**147**	**127**	**127**	**118**	**119**	**133**	**129**	**135**	**117**	**114**	**116**	**114**	**111**	**149**
Zinc	mg/L	5.0	AO	-	0.02	-	-	-	-	-	0.0073	-	-	0.018	-	-	0.0081 J	0.0298 J	-	-	-

Notes:

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TABLE 5.5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*OW1A-06*	*OW1A-06*	*OW3A-07*	*OW3A-07*	*OW5A-06*	*OW5A-06*	*OW5A-06*	*OW5A-06*	*OW5A-06*	*OW8A-06*	*OW8A-06*	*OW8A-06*	*OW9A-06*	*OW9A-06*	*OW9A-06*
				Sample Date:	*7/10/2012*	*11/30/2012*	*5/3/2012*	*7/10/2012*	*5/1/2012*	*7/10/2012*	*7/10/2012*	*11/30/2012*	*11/30/2012*	*5/2/2012*	*7/10/2012*	*11/30/2012*	*5/3/2012*	*7/10/2012*	*11/30/2012*
Parameters	*Units*	*ODWS* [1]									*Duplicate*		*Duplicate*						
Field Parameters																			
Conductivity, field	uS/cm	-			4350	4340	2130	2530	3700	3920	-	3340	-	4110	4130	4250	4340	4350	3480
pH, field	s.u.	6.5-8.5	OG		7.13	7.42	8.0	7.28	7.04	7.17	-	7.2	-	7.03	7.09	7.21	6.89	6.91	6.74
Temperature, field	Deg C	15	AO		10.4	8.8	11.5	12.6	10.2	10.8	-	8.3	-	10.8	11.4	8.5	11.2	11.3	8.7
General Chemistry																			
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		394	406	411	385	410	357	370	399	388	421	416	420	402	375	403
Ammonia-N	mg/L	-			0.51	0.23	0.02	0.074	0.35 J	0.556	0.588	0.34	0.27	0.26	0.92	0.3	0.05	0.58	0.1
Calcium	mg/L	-			432	508	321	310	587	532	543	595	510	502	475	483	489	493	517
Chemical oxygen demand (COD)	mg/L	-			< 5	7	10	14	12 J	10	11	8	< 5	< 5	8.00	< 5	< 5	< 5	< 5
Chloride	mg/L	250	AO		16.4	< 0.50	6.09	7.34	7.52	8.88	9.08	18.8	18.8	12.1	21.7	24.8	14.7	16.6	12.8
Conductivity	uS/cm	-			3710	3860	2130	2020	3210	3100	3180	3220	3220	3820	3510	3720	3720	3570	3790
Dissolved organic carbon (DOC)	mg/L	5.0	AO		3.0	2.2	**5.3**	**6.1**	3.4	2.9	3	2.5	2.6	**6.6**	2.3	3.3	2.3	**5.4**	2.4
Nitrate (as N)	mg/L	10.0	MAC		< 0.25	< 0.25	< 0.05	< 0.1	< 0.05	< 0.2	< 0.2	< 0.10	< 0.10	< 0.05	< 0.5	< 0.25	< 0.20	< 0.2	< 0.25
Nitrite (as N)	mg/L	1.0	MAC		< 0.25	-	-	< 0.1	-	< 0.2	< 0.2	-	-	-	< 0.5	-	-	< 0.2	-
pH	s.u.	-			8.20	8.01	7.98	8.09	8.15	8.08	8.21	8.09	8.14	7.94	8.17	8.01	7.96	8.21	7.91
Phenol	mg/L	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenolics (total)	mg/L	-			0.001	-	-	< 0.001	-	< 0.001	< 0.001	-	-	-	< 0.001	-	-	0.001	-
Potassium	mg/L	-			5.13	-	-	3.8	-	3.67	3.75	-	-	-	5.54	-	-	5.54	-
Sulfate	mg/L	500	AO		**2790**	**2770**	**1130**	**1110**	**1900**	**2210**	**2130**	**2230**	**2260**	**2550**	**2520**	**2180**	**2810**	**2690**	**2640**
Total dissolved solids (TDS)	mg/L	500	AO		**3980**	**4010**	**1840**	**1880**	**3100**	**3170**	**2950**	**3300**	**3370**	**3828**	**3520**	**3940**	**3790**	**3850**	**4110**
Total kjeldahl nitrogen (TKN)	mg/L	-			0.64	-	-	0.47	-	1.17	0.74	-	-	-	0.77	-	-	0.54	-
Total phosphorus	mg/L	-			0.35	-	-	0.102	-	1.08	1.06	-	-	-	2.82	-	-	0.048	-
Metals																			
Arsenic	mg/L	0.025	IMAC		0.0077	-	-	< 0.003	-	0.0147	0.0129	-	-	-	0.0048	-	-	< 0.003	-
Barium	mg/L	1.0	MAC		0.0057	0.005	0.131	0.129	0.007	0.0074	0.0084	0.007	0.007	0.01	0.0074	0.006	0.009	0.0054	0.005
Boron	mg/L	5.0	IMAC		0.628	0.57	0.445	0.471	0.424	0.47	0.423	0.432	0.446	0.53	0.54	0.529	0.55	0.499	0.448
Cadmium	mg/L	0.005	MAC		< 0.001	-	-	< 0.0001	-	< 0.0001	< 0.0001	-	-	-	0.00015	-	-	< 0.0001	-
Chromium	mg/L	0.05	MAC		< 0.003 J	-	-	< 0.003 J	-	< 0.003 J	< 0.003 J	-	-	-	0.0054 J	-	-	< 0.003 J	-
Copper	mg/L	1.0	AO		0.00209	-	-	0.0034	-	0.001	0.002	-	-	-	0.0022	-	-	0.00157	-
Iron	mg/L	0.30	AO		**3.01**	**2.91**	0.03	0.0925	**4.37**	**4.93**	**5.14**	**4.98**	**5.05**	**5.4**	**5.1**	**4.69**	**0.666**	**0.662**	**0.547**
Lead	mg/L	0.01	MAC		< 0.001	-	-	< 0.001	-	< 0.001	< 0.001	-	-	-	< 0.001	-	-	< 0.001	-
Magnesium	mg/L	-			372	410	117	115	241	215	221	241	208	327	326	312	354	354	362
Manganese	mg/L	0.05	AO		**0.123**	-	-	**0.808**	-	**0.07**	**0.07**	-	-	-	**0.0963**	-	-	**0.181**	-
Mercury	mg/L	0.001	MAC		< 0.00005	-	-	< 0.00005	-	< 0.00005	< 0.00005	-	-	-	< 0.00005	-	-	< 0.00005	-
Silver	mg/L	-			0.00032	-	-	< 0.0001	-	0.00026 J	0.00012 J	-	-	-	< 0.0001	-	-	< 0.0001	-
Sodium	mg/L	20	AO		**134**	**144**	**72.9**	**69.6**	**110**	**88**	**90.4**	**103**	**90.2**	**117**	**118**	**110**	**113**	**113**	**116**
Zinc	mg/L	5.0	AO		0.0178	-	-	0.0157	-	< 0.005 J	0.01 J	-	-	-	0.0134	-	-	0.0054	-

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the repo sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 crite
<30 Method detection limit does not meet ODWS/O.Reg 153/04 c
<30 Result below method detection limit

TABLE 5.6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Parameters	*Units*	*Sample Location:* / *Sample Date:*	*ODWS* [1]		*MW1D-07* 5/3/2012	*MW1D-07* 7/11/2012	*MW1S-07* 5/3/2012	*MW1S-07* 7/11/2012	*MW2D-07* 5/3/2012	*MW2D-07* 7/10/2012	*MW2S-07* 5/3/2012	*MW2S-07* 7/10/2012	*MW2S-07* 7/10/2012 Duplicate	*OW8D-07* 5/2/2012	*OW8D-07* 7/11/2012	*OW8D-07* 11/30/2012	*OW8S-07* 5/2/2012	*OW8S-07* 7/11/2012	*OW8S-07* 11/30/2012
Field Parameters																			
Conductivity, field	uS/cm	-			3430	3420	4230	4320	4200	4310	4400	4500	-	3140	3700	3620	4120	4500	4440
pH, field	s.u.	6.5-8.5	OG		7.74	8.12	7.04	7.21	7.04	7.06	6.88	6.98	-	7.98	7.38	7.84	6.96	7.03	7.24
Temperature, field	Deg C	15	AO		11.9	13.0	11.3	10.5	11.7	10.74	12.1	10.5	-	10.6	11.2	8	11.1	10.6	8.2
General Chemistry																			
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		159	116	425	415	367	393	403	406	402	159	220	170	419	401	397
Ammonia-N	mg/L	-			2.03	3.72	0.11	0.808	0.27	0.595	0.05	0.56	0.44	9.49	3.22	1.52	0.12	0.582	0.19
Calcium	mg/L	-			502	506	489	503	505	475	484	465	464	509	507	515	498	496	488
Chemical oxygen demand (COD)	mg/L	-			94	15	< 5	< 5	< 5	7	< 5	6	7	74	35	100	8	< 5	5
Chloride	mg/L	250	AO		15.6	18.1	13	13.2	14.9	14.7	21.9	15.2	13.6	23.6	26.3	33.4	15.1	15.7	15.1
Conductivity	uS/cm	-			2890	2850	3640	3650	3610	3790	3770	3840	3860	2890	3060	3100	3960	3770	3840
Dissolved organic carbon (DOC)	mg/L	5.0	AO		4.2	3.0	2.6	2	1.7	**8.9**	**13**	1.9	2	1.3	**7.3**	3.5	**24.5**	2.3	1.1
Nitrate (as N)	mg/L	10.0	MAC		< 0.10	< 0.05	< 0.25	< 0.05	< 0.20	< 0.2	< 0.20	< 0.2	< 0.2	< 0.05	< 0.05	< 0.25	< 0.05	< 0.05	< 0.25
Nitrite (as N)	mg/L	1.0	MAC		-	**11.10**	-	**5.13**	-	< 0.2	-	< 0.2	< 0.2	-	< 0.05	-	-	< 0.05	-
pH	s.u.	-			8.58	8.24	8	7.82	8.11	8.18	7.98	8.11	8.13	8.50	8.09	8.18	7.91	7.54	8.03
Phenols	mg/L	-			-	0.04	-	< 0.001	-	< 0.001	-	< 0.001	< 0.001	-	0.066	-	-	< 0.001	-
Potassium	mg/L	-			-	30.20	-	4.76	-	7.29	-	5.79	6.01	-	26.2	-	-	5.45	-
Sulfate	mg/L	500	AO		**1990**	**1960**	**2510**	**2490**	**2610**	**2630**	**2630**	**2590**	**2600**	**2040**	**2080**	**2280**	**2540**	**2650**	**2880**
Total dissolved solids (TDS)	mg/L	500	AO		**2890**	**2890**	**3770**	**3780**	**3590**	**3810**	**3830**	**3960**	**3960**	**2990**	**3100**	**3150**	**3920**	**3850**	**4000**
Total kjeldahl nitrogen (TKN)	mg/L	-			-	3.82	-	0.984	-	0.69	-	0.50	0.56	-	3.56	-	-	0.705	-
Total phosphorus	mg/L	-			-	1.19	-	0.032	-	0.165	-	0.04	0.04	-	0.14	-	-	0.078	-
Metals																			
Arsenic	mg/L	0.025	IMAC		-	< 0.003	-	0.008	-	< 0.003	-	< 0.003	< 0.003	-	0.0034	-	-	0.0048	-
Barium	mg/L	1.0	MAC		0.015	0.009	0.007	0.004	0.007	0.0075	0.004	0.005	0.005	0.006	0.004	0.012	0.005	0.0052	0.006
Boron	mg/L	5.0	IMAC		**9.72**	**10**	0.655	0.584	1.96	1.23	0.492	0.481	0.462	**9.41**	**11.1**	**10**	0.516	0.53	0.557
Cadmium	mg/L	0.005	MAC		-	< 0.0001	-	< 0.0001	-	< 0.0001	-	< 0.0001	< 0.0001	-	< 0.0001	-	-	< 0.0001	-
Chromium	mg/L	0.05	MAC		-	< 0.003	-	< 0.003	-	< 0.003 J	-	< 0.003 J	< 0.003 J	-	< 0.003	-	-	< 0.003	-
Copper	mg/L	1.0	AO		-	< 0.0008	-	0.002	-	0.00152	-	0.002	0.002	-	< 0.0008	-	-	0.0043	-
Iron	mg/L	0.30	AO		0.015	< 0.01	**2.39**	**1.8**	**0.803**	**1.53**	**0.556**	**0.625**	**0.658**	0.02	< 0.01	< 0.010	**2.12**	**1.9**	**1.86**
Lead	mg/L	0.01	MAC		-	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001	< 0.001	-	< 0.001	-	-	< 0.001	-
Magnesium	mg/L	-			175	184	333	334	334	342	362	358	357	197	206	194	366	366	350
Manganese	mg/L	0.05	AO		-	0.040	-	0.0376	-	**0.174**	-	**0.174**	**0.173**	-	0.0031	-	-	**0.166**	-
Mercury	mg/L	0.001	MAC		-	< 0.00005	-	< 0.00005	-	< 0.00005	-	< 0.00005	< 0.00005	-	< 0.00005	-	-	< 0.00005	-
Silver	mg/L	-			-	< 0.0001	-	< 0.0001	-	< 0.0001	-	< 0.0001	< 0.0001	-	< 0.0001	-	-	0.00026	-
Sodium	mg/L	20	AO		**39.4**	**43.1**	**106**	**103**	**109**	**110**	**114**	**114**	**115**	**45**	**33.4**	**47**	**121**	**115**	**116**
Zinc	mg/L	5.0	AO		-	0.013	-	0.0102	-	0.0089	-	0.01 J	< 0.005 J	-	< 0.005	-	-	0.0073	-

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Locati			*SW1*	*SW1*	*SW1*	*SW1*	*SW1*	*SW1*	*SW3*	*SW3*	*SW3*	*SW4*	*SW4*	*SW4*	*SW5*	*SW5*	*SW5*	*SW6*	*SW6*	*SW6*	*SW7*	*SW7*	*SW7*	*SW8*	*SW8*	*SW8*
Sample Date:			*3/13/2012*	*3/13/2012*	*5/2/2012*	*5/2/2012*	*12/4/2012*	*12/4/2012*	*3/13/2012*	*5/2/2012*	*12/4/2012*	*3/13/2012*	*5/2/2012*	*12/4/2012*	*3/13/2012*	*5/1/2012*	*12/4/2012*	*3/13/2012*	*5/2/2012*	*12/4/2012*	*3/13/2012*	*5/2/2012*	*12/4/2012*	*3/13/2012*	*5/2/2012*	*12/4/2012*
				Duplicate		*Duplicate*		*Duplicate*																		
Parameters	***Units***	***PWQO*** [1]																								
Field Parameters																										
Conductivity, field	uS/cm	-	100	-	143.5	-	312	-	910	1222	950	510	545	582	2810	1764	2130	740	206	1245	340	353	418	50	97.7	213
Dissolved oxygen (DO), field	mg/L	<4	8.32	-	8.97	-	**2.06**	-	7.53	9.6	4.1	8.74	11.6	7.29	**1.68**	**0.56**	**0.69**	**1.79**	5.9	**2.73**	9.13	**3.45**	**0.08**	5.78	5.54	**2.42**
Flow rate	L/sec	-	-	-	No Flow	-	No Flow	-	7.7	No Flow	No Flow	42	0.1	2	No Flow	No Flow	No Flow	No Flow	No Flow	No Flow	No Flow	No Flow	No Flow	No Flow	No Flow	No Flow
pH, field	s.u.	6.5-8.5	7.55	-	8.12	-	7.21	-	8.28	7.9	7.54	7.68	**9.0**	8.13	6.95	7.16	7.52	7.61	7.2	7.17	7.03	6.97	7.11	7.01	7.58	7.33
Temperature, field	Deg C	qualitative	11.5	-	14.9	-	8.5	-	11.0	12.6	8.9	18.0	22.3	12.4	18.7	10.1	9.7	16.1	15.4	9.0	14.6	18.8	10.1	16.5	15.4	9.2
General Chemistry																										
Alkalinity, total (as CaCO3)	ug/L	25% of natural	25000	24000	41000	39900	60900	58600	227000	308000	214000	105000	138000	112000	717000	549000	257000	211000	67600	195000	87000	83500	88500	10000	34300	20800
Ammonia-N	ug/L	-	< 20	< 20	< 20	< 20	< 20	25	< 20	< 20	< 20	40	< 20	29	50	< 20	40	< 20	< 20	60	< 20	< 20	107	< 20	< 20	85
Biochemical oxygen demand (total BOD5)	ug/L	-	< 5000	< 5000	< 5000	< 5000	< 5000	< 5000	7000	10000	< 5000	< 5000	< 5000	< 5000	65000	< 5000	8000	15000	< 5000	< 5000	6000	< 5000	6000	< 5000	< 5000	< 5000
Chemical oxygen demand (COD)	ug/L	-	45000	41000	47800	48100	78000	73100	29000	31100	28000	38000	46500	42100	655000	221000	84500	79000	68600	55500	14000	73100	112000	51000	51900	69500
Chloride	ug/L	-	10800	8480	12500	12400	39700	39600	25700	102000	45700	28400	36400	22100	136000	129000	49100	22000	7190	26700	9440	4210	14000	3390	410	2490
Conductivity	uS/cm	-	99	99	146	146	286	277	982	1110	860	445	504	532	2410	1640	1280	692	238	927	297	227	368	49	84	144
Nitrate (as N)	ug/L	-	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	410	101	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	60	< 50	< 50
Nitrite (as N)	ug/L	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
pH	s.u.	6.5-8.5	7.15	7.06	7.49	7.36	7.27	7.28	8.32	8.32	8.09	8.12	**8.68**	7.99	7.89	7.71	8.01	8.07	7.57	8.03	7.71	7.59	7.67	6.78	7.22	6.76
Phenols	ug/L	5	< 1	< 1	< 1	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	**25**	2	2	< 1	1	< 1	< 1	< 1	3	< 1	< 1	**6**
Sulfate	ug/L	-	9770	9800	7480	7570	21900	21800	345000	153000	221000	91600	63800	145000	607000	226000	478000	158000	42500	323000	55800	24900	83200	8400	3790	40800
Total dissolved solids (TDS)	ug/L	-	152000	138000	100000	96000	224000	228000	700000	694000	596000	414000	302000	396000	1890000	1220000	1210000	472000	162000	698000	210000	174000	288000	208000	160000	144000
Total kjeldahl nitrogen (TKN)	ug/L	-	1060	970	840	890	1350	1930	830	1510	390	2210	2030	1180	5260	4150	2160	1360	2120	2060	2270	1620	2620	1840	1970	1900
Total phosphorus	ug/L	30	**80**	**100**	**64**	**69**	**359**	**367**	**60**	**154**	**30**	**490**	**119**	**144**	**1040**	**346**	**311**	**130**	**199**	**147**	**230**	**170**	**748**	**230**	**476**	**610**
Total suspended solids (TSS)	ug/L	-	24000	18000	< 10000	< 10000	21000	21000	20000	54000	< 10000	202000	15000	25000	688000	228000	65000	39000	106000	16000	61000	25000	47000	48000	62000	< 10000
Un-ionized ammonia	ug/L	20	-	-	< 20	< 20	< 20	< 20	-	< 20	< 20	-	< 20	< 20	-	< 20	< 20	-	< 20	< 20	-	< 20	< 20	-	< 20	< 20
Metals																										
Arsenic	ug/L	5	-	-	< 3.0	< 3.0	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	**7.5**	4.4	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0
Barium	ug/L	-	-	-	13.5	13.0	36.2	33	-	97.0	67.3	-	21.3	34.8	-	114	64.2	-	23.1	44.5	-	15.4	29.1	-	33.4	33.1
Boron	ug/L	200	-	-	16	15.9	24.1	22.2	-	**205**	185	-	69.3	81.2	-	106	132	-	41	85.1	-	70.2	55.5	-	20.6	22.6
Cadmium	ug/L	0.2	-	-	< 0.10	< 0.10	0.15	0.11	-	< 0.10	< 0.10	-	< 0.10	< 0.10	-	< 0.10	< 0.10	-	< 0.10	< 0.10	-	< 0.10	0.13	-	< 0.10	0.16
Chromium	ug/L	-	-	-	< 3.0	< 3.0	< 3.0	< 3.0	-	3.10	< 3.0	-	< 3.0	< 3.0	-	9.8	4.1	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0
Copper	ug/L	5	-	-	1.64	1.51	2.7	2.64	-	4.09	2.43	-	3.88	2.95	-	**5.15**	3.02	-	2.19	1.86	-	1.37	2.71	-	4.13	3.29
Iron	ug/L	300	**976**	**1020**	**828**	**801**	**4190**	**3910**	**519**	**1180**	87.2	**1740**	**662**	**569**	**16400**	**3950**	**3990**	**2270**	**1200**	**1630**	**1180**	**781**	**3000**	**1060**	**1910**	**1320**
Lead	ug/L	5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	-	2.30	< 1.0	-	< 1.0	< 1.0	-	3.6	2.6	-	2.20	2.1	-	< 1.0	< 1.0	-	2.2	1.2
Mercury	ug/L	0.2	-	-	< 0.1	< 0.1	< 0.05	< 0.05	-	< 0.1	< 0.05	-	< 0.1	< 0.05	-	< 0.05	< 0.05	-	< 0.1	< 0.05	-	< 0.1	< 0.05	-	< 0.1	< 0.05
Zinc	ug/L	30	-	-	9.4 J	**30.7 J**	**94.1 J**	29.3 J	-	21.5	8.4	-	**193**	< 5.0	-	23.2	20.8	-	**189**	15.3	-	7.9	11.5	-	20.8	13.8
Volatile Organic Compounds																										
Ethylbenzene	ug/L	8	-	-	< 0.20	-	-	-	-	< 0.10	-	-	< 0.20	-	-	< 0.20	-	-	< 0.20	-	-	< 0.20	-	-	< 0.20	-
Benzo(a)pyrene	ug/L	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	-	< 0.01	< 0.01	-	0.04	< 0.01	-	< 0.01	< 0.01	-	< 0.01	< 0.01	-	< 0.01	< 0.01
Naphthalene	ug/L	7	-	-	< 0.12	< 0.12	< 0.20	< 0.20	-	< 0.12	< 0.20	-	< 0.12	< 0.20	-	< 0.12	< 0.20	-	< 0.12	< 0.20	-	< 0.12	< 0.20	-	< 0.12	< 0.20

Notes:

(1) MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

\- Not Analyzed/No value

J value is estimated

U not present at or above the associated value.

UJ estimated reporting limit.

TABLE 5.9

SUMMARY OF TDS POND ANALYTICAL RESULTS
2012 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Sample Location:			*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*
	Sample Date:			*1/20/2012*	*1/26/2012*	*3/2/2012*	*5/1/2012*	*9/10/2012*	*9/25/2012*	*11/2/2012*	*11/6/2012*	*12/14/2012*
Parameters	***Units***	***PWQO*** [1]	***TRIGGER*** [2]									
Field Parameters												
Conductivity, field	uS/cm	-	-	1200	1240	960	1068	583	583	834	799	-
Dissolved oxygen (DO), field	mg/L	4-8	-	11.73	9.73	10.21	9.79	9.41	9.41	9.52	9.39	-
pH, field	s.u.	6.5-8.5	6.5-8.5	8.01	7.91	7.47	**8.54**	8.3	8.3	**8.67**	8.43	-
Temperature, field	Deg C	15	-	1	0.7	4.5	11	14.8	14.8	7.3	3.7	-
General Chemistry												
Alkalinity, total (as CaCO3)	ug/L	-	-	248000	192000	232000	216000	59000	62400	77800	82000	86000
Ammonia-N	ug/L	-	-	430	250	40	< 20	< 0.02	< 20	< 20	23	< 20
Biochemical oxygen demand (total BOD5)	ug/L	-	-	8000	-	24000	< 5000	-	-	-	< 5000	< 5000
Calcium	ug/L	-	-	-	-	109000	-	130	123000	-	90800	90300
Chemical oxygen demand (COD)	ug/L	-	-	26500	27800	56000	39000	31	13800	19709	16040	17400
Chloride	ug/L	-	-	19200	17600	23400	18600	16.7	14900	9300	9470	10400
Conductivity	uS/cm	-	-	1080	963	996	868	919	959	683	693	785
Dissolved organic carbon (DOC)	ug/L	-	-	13000	14500	33600	11200	-	< 500	-	3700	-
Hardness	ug/L	-	-	-	475000	523000	496000	507	509000	341000	366000	372000
Nitrate (as N)	ug/L	-	-	302	280	< 50	< 50	0.84	1980	929	930	452
Nitrite (as N)	ug/L	-	-	< 50	< 50	< 50	< 50	< 0.05	< 50	< 50	< 50	< 50
pH	s.u.	6.5-8.5	6.5-8.5	8.29	8.09	8.2	8.37	8.33	7.64	8.03	8.15	7.96
Phenolics (total)	ug/L	1	-	< 1	< 1	< 1	< 1	< 0.001	< 1.00	< 1	< 1.00	< 1
Potassium	ug/L	-	-	-	-	5830	7590	4.13	4630	-	-	-
Sulfate	ug/L	-	-	364000	353000	352000	326000	465	464000	282000	276000	318000
Total dissolved solids (TDS)	ug/L	-	-	796000	698000	688000	654000	824	782000	542000	512000	606000
Total kjeldahl nitrogen (TKN)	ug/L	-	-	1430	1530	1730	730	1.37	617	461	395	849
Total phosphorus	ug/L	30	320	32	31	70	40	0.22	57	< 20	< 20	< 20
Total suspended solids (TSS)	ug/L	-	25,000	12500	14000	24000	13000	14	24500	**28000**	10000	< 10000
Un-ionized ammonia	ug/L	20	20	**42**	< 20	0.94	< 20	< 0.02	< 20	< 20	< 20	< 20
Metals												
Arsenic	ug/L	5	-	< 3.0	< 3.0	< 3	< 3	< 0.003	< 3.0	< 3.0	< 3.0	< 3.0
Barium	ug/L	-	-	73.7	61.8	55	82	0.053	53.8	43.1	39	42.8
Boron	ug/L	200	1,500	348	295	379	616	0.299	149	87	95.2	104
Cadmium	ug/L	0.2	-	< 0.10	< 0.10	< 0.1	< 0.1	< 0.0001	< 0.10	< 0.10	< 0.10	< 0.10
Chromium	ug/L	-	-	< 3.0	< 3.0	< 3	< 3	< 0.003	< 3.0	< 3.0	< 3.0	< 3.0
Copper	ug/L	5	-	2.47	2.72	2	< 2	0.003	2.08	2.18	1.31	1.68
Iron	ug/L	300	4,350	181	228	361	161	0.113	343	146	18.8	33.9 J
Lead	ug/L	5	-	< 1.0	< 1.0	< 1	< 1	< 0.001	< 1.0	< 1.0	< 1.0	< 1.0
Magnesium	ug/L	-	-	-	-	60900	55500	44.2	49000	31100	33800	35500
Mercury	ug/L	0.2	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.0001	< 0.05	< 0.05	< 0.05	< 0.1
Sodium	ug/L	-	-	-	-	28600	22900	21.8	25600	15300	-	-
Zinc	ug/L	30	110	8.5	69.4	80	52	< 0.005	13.3	**230**	< 5.0	< 5.0

Notes:

(1) MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).
(2) TDS Trigger Parameters as per the Industrial Sewage Works ECA
1.5 Does not meet the applicable Trigger Criteria
63 U Estimated value does not meet Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit
- Not Analyzed/No value
J value is estimated
U not present at or above the associated value.
UJ estimated reporting limit.

TABLE 5.3

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					***Leachate Storage Tank***	***Leachate Collection System***
Sample Date:					***6/24/2013***	***7/16/2013***
Parameters	***Units***	***ODWS*** [1] a		***PWQO*** [2] b		
Field Parameters						
Conductivity, field	uS/cm	-		-	5820	-
Dissolved oxygen (DO), field	ug/L	-		4000 - 8000	6910	-
pH, field	s.u.	6.5-8.5	OG	6.5-8.5	6.69	-
Temperature, field	Deg C	15	AO	-	**32**[a]	-
General Chemistry						
Alkalinity, total (as CaCO3)	ug/L	30000-500000	OG	25% of natural	**2640000**[a]	**2420000**[a]
Ammonia-N	ug/L	-		-	112000	129000
Biochemical oxygen demand (BOD)	ug/L	-		-	379000	245000
Chemical oxygen demand (COD)	ug/L	-		-	1060000	1220000
Chloride	ug/L	250000	AO	-	**569000**[a]	**605000**[a]
Conductivity	umhos/cm	-		-	5900	5330
Dissolved organic carbon (DOC)	ug/L	5000	AO	-	**305000**[a]	**198000**[a]
Hardness	ug/L	80000-100000	OG	-	**2000000**[a]	**1750000**[a]
Nitrate (as N)	ug/L	10000	MAC	-	< 1000	< 1000
Nitrite (as N)	ug/L	1000	MAC	-	< 1000	< 1000
pH, lab	s.u.	6.5-8.5	OG	6.5-8.5	6.87	7.42
Phenolics (total)	ug/L	-		1	**1010**[b]	**1040**[b]
Phosphorus	ug/L	-		10, 20, 30	**17.4**[b]	**1290**[b]
Sulfate	ug/L	500000	AO	-	107000	61000
Total dissolved solids (TDS)	ug/L	500000	AO	-	**3730000**[a]	**3460000**[a]
Total kjeldahl nitrogen (TKN)	ug/L	-		-	143000	112000
Total suspended solids (TSS)	ug/L	-		-	16700	44000
Turbidity	NTU	5.0	MAC	-	-	**353**[a]
Nitrite/Nitrate	ug/L	10000	MAC	-	< 2000	-
Metals						
Aluminum	ug/L	100	OG	75	-	**220**[ab]
Arsenic	ug/L	25	IMAC	5	**53**[ab]	**69**[ab]
Barium	ug/L	1000	MAC	-	259	239
Beryllium	ug/L	-		11	-	< 5
Boron	ug/L	5000	IMAC	200	**6450**[ab]	**6620**[ab]
Cadmium	ug/L	5	MAC	0.2	< 0.9	< 0.9
Calcium	ug/L	-		-	425000	338000
Chromium	ug/L	50	MAC	1	**17.7**[b]	**21.6**[b]
Cobalt	ug/L	-		0.9	-	< 5
Copper	ug/L	1000	AO	5	< 10	< 10
Iron	ug/L	300	AO	300	< 500	< 500
Lead	ug/L	10	MAC	5	< 5	< 5
Magnesium	ug/L	-		-	228000	219000
Manganese	ug/L	50	AO	-	-	**262**[a]
Mercury	ug/L	1	MAC	0.2	< 0.1	< 0.1
Molybdenum	ug/L	-		40	-	< 5
Nickel	ug/L	-		25	-	**46**[b]
Phosphorus	ug/L	-		10	-	-
Potassium	ug/L	-		-	-	118000
Silver	ug/L	-		0.1	-	< 1
Sodium	ug/L	200000	AO	-	-	**419000**[a]
Thallium	ug/L	-		0.3	-	< 3
Vanadium	ug/L	-		6	-	**17**[b]
Zinc	ug/L	5000	AO	20	**80**[b]	**72**[b]

TABLE 5.3

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*Leachate Storage Tank*	*Leachate Collection System*
Sample Date:					*6/24/2013*	*7/16/2013*
Parameters	*Units*	*ODWS* [1]		*PWQO* [2]		
		a		b		
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	ug/L	-		20	-	< 2.5
1,1,1-Trichloroethane	ug/L	-		10	-	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-		70	-	< 2.5
1,1,2-Trichloroethane	ug/L	-		800	-	< 2.5
1,1-Dichloroethane	ug/L	-		200	-	< 0.50
1,1-Dichloroethene	ug/L	14	MAC	40	-	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-		5	-	< 2.5
1,2-Dichlorobenzene	ug/L	200	MAC	2.5	-	< 0.50
1,2-Dichloroethane	ug/L	5	IMAC	100	-	< 0.50
1,2-Dichloropropane	ug/L	-		0.7	-	< 0.50
1,3-Dichlorobenzene	ug/L	-		2.5	-	< 0.50
1,4-Dichlorobenzene	ug/L	5	MAC	4	< 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-		400	-	153
2-Hexanone	ug/L	-		-	-	< 150
4-Methyl-2-pentanone (MIBK)	ug/L	-		-	-	< 20
Acetone	ug/L	-		-	-	250
Benzene	ug/L	5	MAC	100	3.88	1.47
Bromodichloromethane	ug/L	-		200	-	< 2.0
Bromoform	ug/L	-		60	-	< 5.0
Bromomethane (Methyl bromide)	ug/L	-		0.9	-	< 0.50
Carbon tetrachloride	ug/L	5	MAC	-	-	< 0.50
Chlorobenzene	ug/L	80	MAC	15	-	< 2.5
Chloroethane	ug/L	-		-	-	< 1.0
Chloroform (Trichloromethane)	ug/L	-		-	-	< 1.0
Chloromethane (Methyl chloride)	ug/L	-		700	-	< 1.0
cis-1,2-Dichloroethene	ug/L	-		200	-	< 0.50
cis-1,3-Dichloropropene	ug/L	-			-	< 0.50
Dibromochloromethane	ug/L	-		40	-	< 10
Ethylbenzene	ug/L	2.4	AO	8	**11.2**[ab]	**4.7**[a]
m&p-Xylenes	ug/L	-		2	-	< 5.0
Methyl tert butyl ether (MTBE)	ug/L	-		200	-	< 2.0
Methylene chloride	ug/L	50	MAC	100	14.7	< 5.0
o-Xylene	ug/L	-		40	-	3.2
Styrene	ug/L	-		4	-	< 2.5
Tetrachloroethene	ug/L	30	MAC	50	-	< 2.5
Toluene	ug/L	24	AO	0.8	**11.2**[b]	**10.3**[b]
trans-1,2-Dichloroethene	ug/L	-		200	-	< 0.50
trans-1,3-Dichloropropene	ug/L	-		7	-	< 2.5
Trichloroethene	ug/L	5	MAC	20	-	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-		-	-	< 5.0
Vinyl chloride	ug/L	2	MAC	600	< 0.50	< 0.50

TABLE 5.3

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*Leachate Storage Tank*	*Leachate Collection System*
Sample Date:					*6/24/2013*	*7/16/2013*
Parameters	*Units*	*ODWS* [1] a		*PWQO* [2] b		
Semi-volatile Organic Compounds						
Acenaphthene	ug/L	-		-	-	< 2.0
Acenaphthylene	ug/L	-		-	-	< 2.0
Anthracene	ug/L	-		0.0008	-	< 0.031
Benzo(a)anthracene	ug/L	-		0.0004	-	< 0.020
Benzo(a)pyrene	ug/L	0.01	MAC	-	-	< 0.010
Benzo(b)fluoranthene	ug/L	-		-	-	< 0.020
Benzo(g,h,i)perylene	ug/L	-		0.00002	-	< 0.020
Benzo(k)fluoranthene	ug/L	-		0.0002	-	< 0.020
Chrysene	ug/L	-		0.0001	-	< 0.024
Dibenz(a,h)anthracene	ug/L	-		0.002	-	< 0.020
Fluoranthene	ug/L	-		0.0008	-	< 0.020
Fluorene	ug/L	-		0.2	-	< 2.0
Indeno(1,2,3-cd)pyrene	ug/L	-		-	-	< 0.020
Naphthalene	ug/L	-		7	**7.76**[b]	6.2
Phenanthrene	ug/L	-		0.03	-	< 0.15
Pyrene	ug/L	-		-	-	< 0.020

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (GENERAL CHEMISTRY)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

		Sample Location:		*MW1-03*	*MW1-03*	*MW2-03*	*MW2-03*	*MW3-03*	*MW3-03*	*MW3-03*	*MW1B-07*	*MW1B-13*	*MW2B-07*	*MW2B-07*	*MW2C-01*	*MW2C-01*
		Sample Date:		*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*6/12/2013 Duplicate*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***														
Field Parameters																
Conductivity, field	uS/cm	-	-	1470	1490	1350	1290	1360	-	1190	1440	3290	2740	2750	4680	4600
pH, field	s.u.	6.5-8.5	OG	7.59	7.80	7.46	7.42	7.85	-	7.38	7.90	7.71	7.78	7.38	7.72	7.35
Temperature, field	Deg C	15	AO	10.7	12.8	10.8	11.1	10.9	-	11.4	12.5	11.7	10.4	11.5	11.1	10.9
General Chemistry																
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	407	389	349	354	451	450	452	**562**	461	**604**	-	**804**	**808**
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.082	< 0.050	< 0.050	0.228	< 0.050	< 0.050	< 0.050	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	< 2.0	-	-	< 2.0	-	16.9	-	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	17	19	17	21	21	27	21	32	106	11	19	23	19
Chloride	mg/L	250	AO	99.7	96	157	143	81.9	86.4	68	6.2	104	< 20	20	< 20	< 20
Conductivity	umhos/cm	-	-	1320	1310	1300	1280	1130	1130	1260	1500	3110	2410	-	4380	4500
Dissolved organic carbon (DOC)	mg/L	5.0	AO	4.4	4.3	**7.0**	**6.6**	**11.0**	**11.5**	**7.2**	**8.4**	**9.3**	**5.6**	5.0	**6.5**	**6.1**
Hardness	mg/L	80-100	OG	-	**705**	-	**636**	-	-	**596**	-	**1960**	-	**1480**	-	**3010**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.50	0.12	< 0.50	< 0.10	< 0.10	< 0.50	< 0.10	< 1.0	1.2	1.4	1.9	< 1.0
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.50	-	< 0.50	-	-	< 0.50	-	< 1.0	-	< 1.0	-	< 1.0
pH, lab	s.u.	6.5-8.5	OG	7.66	7.85	7.64	7.9	7.64	7.65	7.84	7.63	7.85	7.83	-	7.81	7.83
Phenolics (total)	mg/L	-	-	-	< 0.0010	-	< 0.0018	-	-	< 0.0010	-	< 0.0010	-	< 0.0061	-	< 0.0010
Phosphorus	mg/L	-	-	-	< 0.0498	-	< 0.0452	-	-	0.102	-	0.531	-	1.24	-	< 0.0769
Sulfate	mg/L	500	AO	220	211	137	147	80.2	78.1	224	350	**1530**	**1060**	**1150**	**2780**	**2880**
Total dissolved solids (TDS)	mg/L	500	AO	**948**	**886**	**834**	**836**	**736**	**754**	**898**	**1100**	**3090**	**2030**	-	**4370**	**4790**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.15	-	0.23	-	-	0.25	-	1.35	-	0.21	-	0.23
Total suspended solids (TSS)	mg/L	-	-	-	80.0	-	99.0	-	-	186	-	3300	-	-	-	186
Turbidity	NTU	5.0	MAC	3.14	**16.5**	4.95	**14.1**	**10.3**	**11.3**	**18.0**	**7.40**	**17.2**	**10.1**	-	4.80	**21.0**

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (GENERAL CHEMISTRY)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Sample Location:			*MW6B-07*	*MW6B-07*	*OW1B-06*	*OW1B-06*	*OW3B-13*	*OW3B-13*	*OW5B-06*	*OW5B-06*	*OW8B-06*	*OW8B-06*	*OW9B-06*	*OW9B-06*
	Sample Date:			*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***													
Field Parameters															
Conductivity, field	uS/cm	-	-	2920	2730	1640	1770	1430	1540	1550	1810	1760	1680	1890	1800
pH, field	s.u.	6.5-8.5	OG	7.78	7.69	7.75	7.68	7.76	7.65	7.86	7.55	7.88	7.50	7.98	7.66
Temperature, field	Deg C	15	AO	12.6	13.5	11.7	13.0	14.6	12.2	11.6	11.1	12.1	12.8	11.7	12.7
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	468	444	**543**	**665**	449	477	471	495	**558**	**545**	**608**	**572**
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	< 0.050	< 0.050	0.247	0.182	< 0.050	< 0.050	0.086	< 0.050	< 0.050	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	13	25	27	17	86	55	34	17	11	13	21	15
Chloride	mg/L	250	AO	65	65	< 20	20	40.6	28	30.1	32	60.7	61	37	39
Conductivity	umhos/cm	-	-	2770	2750	1670	1840	1390	1370	1540	1650	1660	1590	1790	1750
Dissolved organic carbon (DOC)	mg/L	5.0	AO	**6.0**	4.9	4.0	4.6	**8.4**	**26.5**	**8.6**	**7.7**	3.7	4.6	4.1	4.6
Hardness	mg/L	80-100	OG	-	**1880**	-	**1080**	-	**869**	-	**923**	-	**820**	-	**872**
Nitrate (as N)	mg/L	10.0	MAC	< 1.0	< 1.0	< 1.0	< 0.50	< 0.10	< 0.50	0.48	0.63	< 0.10	< 0.50	< 1.0	< 0.50
Nitrite (as N)	mg/L	1.0	MAC	-	< 1.0	-	< 0.50	-	< 0.50	-	< 0.50	-	< 0.50	-	< 0.50
pH, lab	s.u.	6.5-8.5	OG	7.77	7.81	7.86	7.94	7.79	7.52	7.78	7.87	7.84	8.00	7.98	7.94
Phenolics (total)	mg/L	-	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010
Phosphorus	mg/L	-	-	-	< 0.0174	-	< 0.0524	-	1.14	-	< 0.0747	-	< 0.0232	-	< 0.0550
Sulfate	mg/L	500	AO	**1660**	**1550**	447	**516**	352	397	448	497	338	342	460	446
Total dissolved solids (TDS)	mg/L	500	AO	**2660**	**2690**	**1210**	**1370**	**1030**	**1100**	**1200**	**1330**	**1100**	**1090**	**1220**	**1210**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.15	-	< 0.15	-	0.69	-	0.36	-	2.14	-	< 0.15
Total suspended solids (TSS)	mg/L	-	-	-	62.8	-	82.0	-	3930	-	203	-	45.2	-	86.0
Turbidity	NTU	5.0	MAC	4.36	**5.95**	**6.86**	**11.5**	**21.0**	**38.0**	**11.4**	**30.0**	2.50	**8.04**	**5.85**	**12.7**

Notes:

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(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	MW1-03	MW1-03	MW2-03	MW2-03	MW3-03	MW3-03	MW3-03	MW1B-07	MW1B-13	MW2B-07	MW2B-07	MW2C-01	MW2C-01
				Sample Date:	6/12/2013	7/16/2013	6/12/2013	7/16/2013	6/12/2013	6/12/2013 Duplicate	7/16/2013	6/12/2013	7/16/2013	6/12/2013	7/16/2013	6/12/2013	7/16/2013
Parameters	***Units***	***ODWS(1)***															
Metals																	
Aluminum (dissolved)	mg/L	0.10	OG		-	< 0.010	-	< 0.010	-	-	< 0.010	-	< 0.10	-	< 0.010	-	< 0.10
Arsenic (dissolved)	mg/L	0.025	IMAC		-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	< 0.010	-	< 0.0010	-	< 0.010
Barium (dissolved)	mg/L	1.0	MAC		0.0817	0.0706	0.0669	0.0563	0.058	0.0568	0.0402	0.0661	0.111	0.0619	0.0399	0.0326	< 0.020
Beryllium (dissolved)	mg/L	-	-		-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.0050	-	< 0.00050	-	< 0.0050
Boron (dissolved)	mg/L	5.0	IMAC		0.042	0.035	0.026	0.027	0.045	0.048	0.037	0.069	0.10	0.073	0.063	0.264	0.30
Cadmium (dissolved)	mg/L	0.005	MAC		-	0.000116	-	< 0.000090	-	-	< 0.000090	-	< 0.00090	-	< 0.000090	-	< 0.00090
Calcium (dissolved)	mg/L	-	-		195	204	195	197	166	165	154	153	248	148	159	201	195
Chromium (dissolved)	mg/L	0.05	MAC		-	< 0.00054	-	< 0.00050	-	-	< 0.00051	-	< 0.0050	-	< 0.00166	-	< 0.0050
Cobalt (dissolved)	mg/L	-	-		-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	0.0153	-	< 0.00050	-	< 0.0050
Copper (dissolved)	mg/L	1.0	AO		-	< 0.0010	-	0.0019	-	-	0.0021	-	< 0.010	-	< 0.0010	-	< 0.010
Iron (dissolved)	mg/L	0.30	AO		< 0.05	< 0.050	< 0.05	< 0.050	< 0.05	< 0.05	< 0.050	**1.83**	< 0.50	< 0.05	< 0.050	< 0.05	< 0.50
Lead (dissolved)	mg/L	0.01	MAC		-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.0050	-	< 0.00050	-	< 0.0050
Magnesium (dissolved)	mg/L	-	-		46.3	47.4	33.3	34.9	28.4	28.8	51.3	87.5	326	237	291	466	609
Manganese (dissolved)	mg/L	0.05	AO		-	< 0.0010	-	0.0321	-	-	0.0172	-	**1.28**	-	< 0.0010	-	< 0.010
Mercury (dissolved)	mg/L	0.001	MAC		-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010
Molybdenum (dissolved)	mg/L	-	-		-	0.00114	-	0.00142	-	-	0.00135	-	0.0157	-	0.00334	-	0.0052
Nickel (dissolved)	mg/L	-	-		-	< 0.0010	-	0.0015	-	-	0.0011	-	0.027	-	< 0.0010	-	< 0.010
Potassium (dissolved)	mg/L	-	-		-	2.0	-	1.8	-	-	1.2	-	10	-	6.3	-	12
Silver (dissolved)	mg/L	-	-		-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	0.0014	-	< 0.00010	-	< 0.0010
Sodium (dissolved)	mg/L	200	AO		45	48.3	55.9	46.3	47.7	46.8	43.9	52.9	152	113	132	**416**	**297**
Thallium (dissolved)	mg/L	-	-		-	< 0.00030	-	< 0.00030	-	-	< 0.00030	-	< 0.0030	-	< 0.00030	-	< 0.0030
Vanadium (dissolved)	mg/L	-	-		-	< 0.00050	-	< 0.00050	-	-	< 0.00050	-	< 0.0050	-	0.00051	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO		-	0.0085	-	< 0.0030	-	-	< 0.0030	-	< 0.030	-	< 0.0030	-	< 0.030

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
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<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW6B-07*	*MW6B-07*	*OW1B-06*	*OW1B-06*	*OW3B-13*	*OW3B-13*	*OW5B-06*	*OW5B-06*	*OW8B-06*	*OW8B-06*	*OW9B-06*	*OW9B-06*
				Sample Date:	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***														
Metals																
Aluminum (dissolved)	mg/L	0.10	OG		-	< 0.10	-	< 0.010	-	< 0.10	-	< 0.010	-	< 0.010	-	< 0.010
Arsenic (dissolved)	mg/L	0.025	IMAC		-	< 0.010	-	< 0.0010	-	< 0.010	-	< 0.0010	-	< 0.0010	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC		0.0111	< 0.020	0.0508	0.0207	0.0719	0.086	0.0571	0.0864	0.0232	0.0206	0.0245	0.0212
Beryllium (dissolved)	mg/L	-	-		-	< 0.0050	-	< 0.00050	-	< 0.0050	-	< 0.00050	-	< 0.00050	-	< 0.00050
Boron (dissolved)	mg/L	5.0	IMAC		0.059	< 0.10	0.025	0.047	0.072	0.10	0.049	0.045	1.09	0.91	0.101	0.112
Cadmium (dissolved)	mg/L	0.005	MAC		-	< 0.00090	-	< 0.000090	-	< 0.00090	-	< 0.000090	-	< 0.000090	-	< 0.000090
Calcium (dissolved)	mg/L	-	-		226	226	143	103	199	194	210	174	119	97.9	88.8	116
Chromium (dissolved)	mg/L	0.05	MAC		-	< 0.0050	-	< 0.00080	-	< 0.0050	-	< 0.00105	-	< 0.00074	-	< 0.00099
Cobalt (dissolved)	mg/L	-	-		-	< 0.0050	-	< 0.00050	-	0.0144	-	< 0.00050	-	< 0.00050	-	< 0.00050
Copper (dissolved)	mg/L	1.0	AO		-	< 0.010	-	< 0.0010	-	< 0.010	-	0.0014	-	< 0.0010	-	< 0.0010
Iron (dissolved)	mg/L	0.30	AO		0.054	< 0.50	< 0.05	< 0.050	< 0.05	< 0.50	0.225	< 0.050	0.172	< 0.050	< 0.05	< 0.050
Lead (dissolved)	mg/L	0.01	MAC		-	< 0.0050	-	< 0.00050	-	< 0.0050	-	< 0.00050	-	< 0.00050	-	< 0.00050
Magnesium (dissolved)	mg/L	-	-		278	320	97.2	200	68.9	93.6	81.3	137	123	140	142	170
Manganese (dissolved)	mg/L	0.05	AO		-	< 0.010	-	< 0.0010	-	**1.54**	-	< 0.0010	-	< 0.0010	-	< 0.0010
Mercury (dissolved)	mg/L	0.001	MAC		-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010
Molybdenum (dissolved)	mg/L	-	-		-	< 0.0050	-	0.00326	-	0.0098	-	0.00362	-	0.00496	-	0.00347
Nickel (dissolved)	mg/L	-	-		-	< 0.010	-	< 0.0010	-	0.020	-	< 0.0010	-	0.0012	-	< 0.0010
Potassium (dissolved)	mg/L	-	-		-	< 10	-	3.4	-	< 10	-	2.4	-	3.5	-	4.8
Silver (dissolved)	mg/L	-	-		-	< 0.0010	-	< 0.00010	-	< 0.0010	-	< 0.00010	-	< 0.00010	-	< 0.00010
Sodium (dissolved)	mg/L	200	AO		73.8	83.6	51	71.0	26.4	29.8	49	61.0	98.3	91.9	117	130
Thallium (dissolved)	mg/L	-	-		-	< 0.0030	-	< 0.00030	-	< 0.0030	-	< 0.00030	-	< 0.00030	-	< 0.00030
Vanadium (dissolved)	mg/L	-	-		-	< 0.0050	-	< 0.00050	-	< 0.0050	-	< 0.00050	-	< 0.00050	-	< 0.00050
Zinc (dissolved)	mg/L	5.0	AO		-	< 0.030	-	< 0.0030	-	< 0.030	-	< 0.0030	-	0.0080	-	0.0048

Notes:

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<30 Result below method detection limit

TABLE 5.4C

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs and PAHs)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Sample Location:			*MW1-03*	*MW2-03*	*MW2B-07*	*MW2C-01*	*MW3-03*	*MW6B-07*	*MW1B-13*	*OW1B-06*	*OW3B-13*	*OW5B-06*	*OW8B-06*	*OW9B-06*
	Sample Date:			*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*
Parameters	***Units***	***Criteria***													
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane	mg/L	0.0011	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.001	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2-Trichloroethane	mg/L	0.0047	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethane	mg/L	0.005	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethene	mg/L	0.014	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dibromoethane (Ethylene dibromide)	mg/L	0.0002	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichlorobenzene	mg/L	0.2	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloroethane	mg/L	0.005	IMAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloropropane	mg/L	0.005	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,3-Dichlorobenzene	mg/L	0.059	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L	1.8	(2)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.158	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Hexanone	mg/L	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/L	0.64	(2)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acetone	mg/L	2.7	(2)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	**3.06**	< 0.03	0.039	< 0.03	< 0.03	< 0.03
Benzene	mg/L	0.005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bromodichloromethane	mg/L	0.016	(2)	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromoform	mg/L	0.025	(2)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane (Methyl bromide)	mg/L	0.00089	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbon tetrachloride	mg/L	0.005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorobenzene	mg/L	0.08	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chloroethane	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform (Trichloromethane)	mg/L	0.0024	(2)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloromethane (Methyl chloride)	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1,2-Dichloroethene	mg/L	0.0016	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
cis-1,3-Dichloropropene	mg/L	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dibromochloromethane	mg/L	0.025	(2)	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylbenzene	mg/L	0.0024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
m&p-Xylenes	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Methyl tert butyl ether (MTBE)	mg/L	0.015	(2)	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene chloride	mg/L	0.05	MAC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
o-Xylene	mg/L	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Styrene	mg/L	0.0054	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethene	mg/L	0.030	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toluene	mg/L	0.024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.01	< 0.0005	0.0006	< 0.0005	< 0.0005	< 0.0005
trans-1,2-Dichloroethene	mg/L	0.0016	(2)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichloroethene	mg/L	0.005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichlorofluoromethane (CFC-11)	mg/L	0.15	(2)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	mg/L	0.002	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Semi-volatile Organic Compounds															
Acenaphthene	mg/L	0.0041	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Acenaphthylene	mg/L	0.001	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Anthracene	mg/L	0.0024	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000027	< 0.00002	< 0.00002
Benzo(a)anthracene	mg/L	0.001	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000057	< 0.00002	< 0.00002	< 0.00002
Benzo(a)pyrene	mg/L	0.00001	MAC	< 0.00001	< 0.00001	**0.000014**	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	**0.000065**	< 0.00001	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/L	0.0001	(2)	< 0.00002	< 0.00002	0.000023	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000085	< 0.00002	< 0.00002	< 0.00002
Benzo(g,h,i)perylene	mg/L	0.0002	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000046	< 0.00002	< 0.00002	< 0.00002
Benzo(k)fluoranthene	mg/L	0.0001	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000028	< 0.00002	< 0.00002	< 0.00002
Chrysene	mg/L	0.0001	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000065	< 0.00002	< 0.00002	< 0.00002
Dibenz(a,h)anthracene	mg/L	0.0002	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluoranthene	mg/L	0.00041	(2)	< 0.00002	< 0.00002	0.000033	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000098	< 0.00002	< 0.00002	< 0.00002
Fluorene	mg/L	0.12	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Indeno(1,2,3-cd)pyrene	mg/L	0.0002	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000037	< 0.00002	< 0.00002	< 0.00002
Naphthalene	mg/L	0.011	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.000044	< 0.00002	0.000076	< 0.00002	< 0.00002	< 0.00002
Phenanthrene	mg/L	0.001	(2)	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000035	< 0.00002	0.000117	< 0.00002	< 0.00002	< 0.00002
Pyrene	mg/L	0.0041	(2)	< 0.00002	< 0.00002	0.000029	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000097	< 0.00002	< 0.00002	< 0.00002

Notes:

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(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
\- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.5A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (GENERAL CHEMISTRY)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW1A-07*	*MW1A-13*	*MW2A-01*	*MW2A-01*	*MW4A-09*	*MW4A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW6A-07*	*MW6A-07*
				Sample Date:	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*7/16/2013 Duplicate*	*6/12/2013*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***													
Field Parameters															
Conductivity, field	uS/cm	-	-		611	5330	4760	4180	3780	3620	4180	4000	-	3840	3790
pH, field	s.u.	6.5-8.5	OG		12.69	7.67	7.51	7.31	7.83	7.60	7.55	7.35	-	7.49	7.38
Temperature, field	Deg C	15	AO		12.2	14.6	12.7	11.0	12.2	16.7	11.7	10.3	-	11.7	11.6
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		80	396	401	359	317	323	408	378	397	454	427
Ammonia-N	mg/L	-	-		0.445	6.47	0.089	0.059	< 0.050	< 0.050	0.644	0.632	0.598	0.511	0.515
Biochemical oxygen demand (BOD)	mg/L	-	-		-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-		< 10	34	< 10	< 10	17	17	11	< 10	15	13	17
Chloride	mg/L	250	AO		17.7	102	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Conductivity	umhos/cm	-	-		590	5600	4370	4220	3480	3470	3860	3940	3870	3620	3530
Dissolved organic carbon (DOC)	mg/L	5.0	AO		2.3	6.5	2.5	2.4	2.6	3.4	2.3	2.8	3.4	3.6	3.5
Hardness	mg/L	80-100	OG		-	3520	-	2990	-	2540	-	2920	2880	-	2750
Nitrate (as N)	mg/L	10.0	MAC		< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrite (as N)	mg/L	1.0	MAC		-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	< 1.0	-	< 1.0
pH, lab	s.u.	6.5-8.5	OG		10.94	7.91	7.63	7.64	7.78	7.82	7.44	7.64	7.59	7.40	7.50
Phenolics (total)	mg/L	-	-		-	< 0.0020	-	< 0.0010	-	< 0.0011	-	< 0.0010	< 0.0010	-	< 0.0010
Phosphorus	mg/L	-	-		-	0.998	-	< 0.0241	-	0.968	-	< 0.0737	< 0.0799	-	0.976
Sulfate	mg/L	500	AO		115	4150	3460	3320	2670	2520	2740	2710	2790	2420	2520
Total dissolved solids (TDS)	mg/L	500	AO		282	6290	5000	4900	3820	3840	4280	4350	4340	3880	3870
Total kjeldahl nitrogen (TKN)	mg/L	-	-		-	7.17	-	< 0.15	-	< 0.15	-	0.68	0.62	-	0.52
Total suspended solids (TSS)	mg/L	-	-		-	1560	-	41.2	-	2550	-	250	235	-	2220
Turbidity	NTU	5.0	MAC		6.79	90.0	6.21	3.45	7.18	26.0	10.5	16.4	14.1	6.06	16.8

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.5A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (GENERAL CHEMISTRY)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*OW1A-06*	*OW1A-06*	*OW3A-13*	*OW3A-13*	*OW5A-06*	*OW5A-06*	*OW8A-06*	*OW8A-06*	*OW9A-06*	*OW9A-06*
				Sample Date:	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***												
Field Parameters														
Conductivity, field	uS/cm	-	-		3860	3890	3280	3330	3280	3280	3820	3770	3960	3800
pH, field	s.u.	6.5-8.5	OG		7.49	7.60	7.58	7.37	7.63	7.40	7.88	7.27	7.42	7.28
Temperature, field	Deg C	15	AO		12.6	11.1	15.7	11.11	12.4	11.5	12.1	10.7	12.5	12.1
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		472	450	411	401	471	422	469	460	418	384
Ammonia-N	mg/L	-	-		0.501	0.476	0.590	0.398	0.558	0.522	0.435	0.444	0.212	0.132
Biochemical oxygen demand (BOD)	mg/L	-	-		-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-		17	17	36	30	27	13	15	13	11	13
Chloride	mg/L	250	AO		< 20	< 20	21	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Conductivity	umhos/cm	-	-		3730	3730	3160	3330	3160	3230	3640	3530	3720	3740
Dissolved organic carbon (DOC)	mg/L	5.0	AO		2.5	2.3	7.2	5.9	3.3	3.7	2.6	4.6	2.6	2.4
Hardness	mg/L	80-100	OG		-	2680	-	2400	-	2320	-	2630	-	2800
Nitrate (as N)	mg/L	10.0	MAC		1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.1
Nitrite (as N)	mg/L	1.0	MAC		-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0
pH, lab	s.u.	6.5-8.5	OG		7.67	7.79	7.70	7.71	7.60	7.60	7.39	7.64	7.59	7.57
Phenolics (total)	mg/L	-	-		-	< 0.0010	-	< 0.0042	-	< 0.0010	-	< 0.0010	-	< 0.0010
Phosphorus	mg/L	-	-		-	< 0.0629	-	2.61	-	0.297	-	0.200	-	< 0.0850
Sulfate	mg/L	500	AO		2600	2670	2140	2150	1990	2270	2400	2750	2590	2420
Total dissolved solids (TDS)	mg/L	500	AO		4020	4130	3290	3660	3320	3410	3930	3930	4010	4100
Total kjeldahl nitrogen (TKN)	mg/L	-	-		-	0.59	-	0.60	-	0.62	-	0.62	-	0.28
Total suspended solids (TSS)	mg/L	-	-		-	842	-	5580	-	556	-	904	-	254
Turbidity	NTU	5.0	MAC		7.64	9.70	11.1	26.0	13.3	13.6	8.56	12.7	6.63	12.8

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
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559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
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<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.5B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (METALS)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

	Sample Location:			*MW1A-07*	*MW1A-13*	*MW2A-01*	*MW2A-01*	*MW4A-09*	*MW4A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW6A-07*	*MW6A-07*
	Sample Date:			*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*7/16/2013 Duplicate*	*6/12/2013*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***												
Metals														
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.10	-	< 0.10	-	< 0.10	-	< 0.10	< 0.10	-	< 0.10
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.010	-	< 0.010	-	< 0.010	-	0.012	0.013	-	< 0.010
Barium (dissolved)	mg/L	1.0	MAC	0.0908	< 0.020	0.0165	< 0.020	0.0076	< 0.020	0.0112	< 0.020	< 0.020	0.007	< 0.020
Beryllium (dissolved)	mg/L	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	< 0.0050
Boron (dissolved)	mg/L	5.0	IMAC	0.042	0.54	0.31	0.44	0.315	0.44	0.511	0.67	0.67	0.488	0.51
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00090	-	< 0.00090	-	< 0.00090	-	< 0.00090	< 0.00090	-	< 0.00090
Calcium (dissolved)	mg/L	-	-	48.8	486	473	509	513	570	501	515	510	552	532
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	< 0.0050
Cobalt (dissolved)	mg/L	-	-	-	0.0062	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	< 0.0050
Copper (dissolved)	mg/L	1.0	AO	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	< 0.010	-	< 0.010
Iron (dissolved)	mg/L	0.30	AO	< 0.05	< 0.50	< 0.05	< 0.50	< 0.05	< 0.50	**4.59**	**3.60**	**3.69**	**5.68**	**1.42**
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	< 0.0050
Magnesium (dissolved)	mg/L	-	-	4.32	560	442	418	245	272	332	396	391	267	345
Manganese (dissolved)	mg/L	0.05	AO	-	**0.370**	-	**0.072**	-	0.034	-	0.039	0.040	-	**0.173**
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	< 0.00010	-	< 0.00010
Molybdenum (dissolved)	mg/L	-	-	-	0.108	-	0.0056	-	0.0124	-	0.0053	0.0052	-	< 0.0050
Nickel (dissolved)	mg/L	-	-	-	0.017	-	< 0.010	-	< 0.010	-	< 0.010	< 0.010	-	< 0.010
Potassium (dissolved)	mg/L	-	-	-	36	-	< 10	-	< 10	-	< 10	< 10	-	< 10
Silver (dissolved)	mg/L	-	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	0.0022	0.0021	-	< 0.0010
Sodium (dissolved)	mg/L	200	AO	52.8	**548**	169	137	119	110	127	136	133	107	112
Thallium (dissolved)	mg/L	-	-	-	< 0.0030	-	< 0.0030	-	< 0.0030	-	< 0.0030	< 0.0030	-	< 0.0030
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	< 0.0050	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.030	-	< 0.030	-	< 0.030	-	< 0.030	< 0.030	-	< 0.030

Notes:

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TABLE 5.5B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (METALS)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*OW1A-06*	*OW1A-06*	*OW3A-13*	*OW3A-13*	*OW5A-06*	*OW5A-06*	*OW8A-06*	*OW8A-06*	*OW9A-06*	*OW9A-06*
				Sample Date:	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*	*6/12/2013*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***												
Metals														
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.10	-	< 0.10	-	< 0.10	-	< 0.10	-	< 0.10
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.010	-	< 0.010	-	0.013	-	< 0.010	-	< 0.010
Barium (dissolved)	mg/L	1.0	MAC	0.0062	< 0.020	0.0614	0.033	0.0073	< 0.020	0.0062	< 0.020	0.005	< 0.020
Beryllium (dissolved)	mg/L	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050
Boron (dissolved)	mg/L	5.0	IMAC	0.453	0.57	0.163	0.40	0.33	0.45	0.448	0.52	0.453	0.52
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00090	-	< 0.00090	-	< 0.00090	-	< 0.00090	-	< 0.00090
Calcium (dissolved)	mg/L	-	-	433	342	605	574	584	549	560	567	513	523
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050
Cobalt (dissolved)	mg/L	-	-	-	< 0.0050	-	0.0072	-	< 0.0050	-	< 0.0050	-	< 0.0050
Copper (dissolved)	mg/L	1.0	AO	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010
Iron (dissolved)	mg/L	0.30	AO	**2.48**	**1.76**	< 0.05	< 0.50	**4.08**	**4.02**	**8.11**	**6.13**	< 0.05	< 0.50
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050
Magnesium (dissolved)	mg/L	-	-	331	443	131	235	171	232	289	294	306	362
Manganese (dissolved)	mg/L	0.05	AO	-	**0.108**	-	**0.807**	-	**0.054**	-	**0.090**	-	**0.174**
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010
Molybdenum (dissolved)	mg/L	-	-	-	< 0.0050	-	0.0089	-	0.0054	-	0.0054	-	0.0070
Nickel (dissolved)	mg/L	-	-	-	< 0.010	-	0.014	-	< 0.010	-	< 0.010	-	< 0.010
Potassium (dissolved)	mg/L	-	-	-	< 10	-	< 10	-	< 10	-	< 10	-	< 10
Silver (dissolved)	mg/L	-	-	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010
Sodium (dissolved)	mg/L	200	AO	125	176	110	113	83.1	97.0	109	116	107	120
Thallium (dissolved)	mg/L	-	-	-	< 0.0030	-	< 0.0030	-	< 0.0030	-	< 0.0030	-	< 0.0030
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.030	-	< 0.030	-	< 0.030	-	< 0.030	-	< 0.030

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reporte sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 crite
<30 Result below method detection limit

TABLE 5.5C

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (VOCs and PAHs)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW1A-13*	*MW2A-01*	*MW4A-09*	*MW5A-09*	*MW5A-09*	*MW6A-07*	*OW1A-06*	*OW3A-13*	*OW5A-06*	*OW8A-06*	*OW9A-06*
				Sample Date:	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013 Duplicate*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*
Parameters	***Units***	***Criteria***													
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane	mg/L	0.0011	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.001	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2-Trichloroethane	mg/L	0.0047	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethane	mg/L	0.005	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethene	mg/L	0.014	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dibromoethane (Ethylene dibromide)	mg/L	0.0002	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichlorobenzene	mg/L	0.2	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloroethane	mg/L	0.005	IMAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloropropane	mg/L	0.005	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,3-Dichlorobenzene	mg/L	0.059	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.005	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L	1.8	(2)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Hexanone	mg/L	-	-		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
4-Methyl-2-pentanone (Methyl isobutyl ketone) (M	mg/L	0.64	(2)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acetone	mg/L	2.7	(2)		0.045	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzene	mg/L	0.005	MAC		0.00073	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bromodichloromethane	mg/L	0.016	(2)		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromoform	mg/L	0.025	(2)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane (Methyl bromide)	mg/L	0.00089	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbon tetrachloride	mg/L	0.005	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorobenzene	mg/L	0.08	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chloroethane	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform (Trichloromethane)	mg/L	0.0024	(2)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloromethane (Methyl chloride)	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1,2-Dichloroethene	mg/L	0.0016	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
cis-1,3-Dichloropropene	mg/L	-	-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dibromochloromethane	mg/L	0.025	(2)		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylbenzene	mg/L	0.0024	AO		0.00055	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
m&p-Xylenes	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Methyl tert butyl ether (MTBE)	mg/L	0.015	(2)		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene chloride	mg/L	0.05	MAC		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
o-Xylene	mg/L	-	-		0.0008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Styrene	mg/L	0.0054	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethene	mg/L	0.030	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toluene	mg/L	0.024	AO		0.00201	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,2-Dichloroethene	mg/L	0.0016	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	-	-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichloroethene	mg/L	0.005	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichlorofluoromethane (CFC-11)	mg/L	0.15	(2)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	mg/L	0.002	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Semi-volatile Oragnic Compounds															
Acenaphthene	mg/L	0.0041	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Acenaphthylene	mg/L	0.001	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Anthracene	mg/L	0.0024	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)anthracene	mg/L	0.001	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)pyrene	mg/L	0.00001	MAC		-	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/L	0.0001	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(g,h,i)perylene	mg/L	0.0002	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(k)fluoranthene	mg/L	0.0001	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Chrysene	mg/L	0.0001	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Dibenz(a,h)anthracene	mg/L	0.0002	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluoranthene	mg/L	0.00041	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluorene	mg/L	0.12	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Indeno(1,2,3-cd)pyrene	mg/L	0.0002	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Naphthalene	mg/L	0.011	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Phenanthrene	mg/L	0.001	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Pyrene	mg/L	0.0041	(2)		-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.6A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (GENERAL CHEMISTRY)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW1D-07*	*MW1S-07*	*MW2D-07*	*MW2S-07*	*OW8D-07*	*OW8D-07*	*OW8S-07*
				Sample Date:	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013 Duplicate*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***									
Field Parameters											
Conductivity, field	uS/cm	-	-		3100	3700	3750	3880	3170	-	3860
pH, field	s.u.	6.5-8.5	OG		7.99	7.24	7.30	7.24	8.23	-	7.49
Temperature, field	Deg C	15	AO		11.9	11.0	11.1	10.8	11.8	-	10.7
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	30-500	OG		171	405	385	392	225	219	400
Ammonia-N	mg/L	-	-		3.37	0.416	0.743	0.215	2.79	2.86	0.322
Biochemical oxygen demand (BOD)	mg/L	-	-		68.5	< 2.0	< 2.0	< 2.0	79.8	94.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-		93	11	< 10	< 10	165	141	11
Chloride	mg/L	250	AO		< 20	< 20	< 20	< 20	24	25	< 20
Conductivity	umhos/cm	-	-		2900	3580	3690	3820	3060	3060	3740
Dissolved organic carbon (DOC)	mg/L	5.0	AO		6.1	2.4	2.7	2.4	< 30	< 30	2.3
Hardness	mg/L	80-100	OG		2090	2710	2780	2870	2290	2190	2850
Nitrate (as N)	mg/L	10.0	MAC		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrite (as N)	mg/L	1.0	MAC		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH, lab	s.u.	6.5-8.5	OG		8.24	7.51	7.57	7.52	8.17	8.18	7.57
Phenolics (total)	mg/L	-	-		0.0088	< 0.0010	< 0.0010	< 0.0010	0.0159	0.0252	< 0.0010
Phosphorus	mg/L	-	-		< 0.0225	< 0.0179	0.116	< 0.0084	< 0.0320	< 0.0352	< 0.0103
Sulfate	mg/L	500	AO		2020	2640	2510	2790	2010	2110	2580
Total dissolved solids (TDS)	mg/L	500	AO		3140	3990	4180	4300	3310	3360	4230
Total kjeldahl nitrogen (TKN)	mg/L	-	-		3.70	0.42	0.84	0.27	2.83	3.12	0.53
Total suspended solids (TSS)	mg/L	-	-		72.5	38.0	383	53.2	53.5	70.0	47.0
Turbidity	NTU	5.0	MAC		32.0	8.71	7.36	4.32	30.0	36.0	9.14

Notes:

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J The result is an estimated value.
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559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.6B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (METALS)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW1D-07*	*MW1S-07*	*MW2D-07*	*MW2S-07*	*OW8D-07*	*OW8D-07*	*OW8S-07*
				Sample Date:	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013 Duplicate*	*7/16/2013*
Parameters	***Units***	***ODWS(1)***									
Metals											
Aluminum (dissolved)	mg/L	0.10	OG		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Arsenic (dissolved)	mg/L	0.025	IMAC		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Barium (dissolved)	mg/L	1.0	MAC		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Beryllium (dissolved)	mg/L	-	-		< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Boron (dissolved)	mg/L	5.0	IMAC		10.9	0.58	1.48	0.50	9.47	9.52	0.57
Cadmium (dissolved)	mg/L	0.005	MAC		< 0.00090	< 0.00090	< 0.00090	< 0.00090	< 0.00090	< 0.00090	< 0.00090
Calcium (dissolved)	mg/L	-	-		537	535	526	527	595	570	569
Chromium (dissolved)	mg/L	0.05	MAC		< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Cobalt (dissolved)	mg/L	-	-		< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Copper (dissolved)	mg/L	1.0	AO		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Iron (dissolved)	mg/L	0.30	AO		< 0.50	2.54	1.37	< 0.50	< 0.50	< 0.50	1.96
Lead (dissolved)	mg/L	0.01	MAC		< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Magnesium (dissolved)	mg/L	-	-		181	334	356	377	196	186	347
Manganese (dissolved)	mg/L	0.05	AO		0.046	0.045	0.161	0.164	< 0.010	< 0.010	0.213
Mercury (dissolved)	mg/L	0.001	MAC		< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Molybdenum (dissolved)	mg/L	-	-		< 0.0050	< 0.0050	< 0.0050	0.0052	< 0.0050	< 0.0050	0.0051
Nickel (dissolved)	mg/L	-	-		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Potassium (dissolved)	mg/L	-	-		30	< 10	< 10	< 10	26	26	< 10
Silver (dissolved)	mg/L	-	-		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Sodium (dissolved)	mg/L	200	AO		43.1	116	111	116	30.0	28.4	116
Thallium (dissolved)	mg/L	-	-		< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
Vanadium (dissolved)	mg/L	-	-		< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO		< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Notes:

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<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.6C

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (VOCs and PAHs)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

				Sample Location:	*MW1D-07*	*MW1S-07*	*MW2D-07*	*MW2S-07*	*OW8D-07*	*OW8D-07*	*OW8S-07*
				Sample Date:	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013*	*7/16/2013 Duplicate*	*7/16/2013*
Parameters	***Units***	***Criteria***									
Volatile Organic Compounds											
1,1,1,2-Tetrachloroethane	mg/L	0.0011	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.001	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2-Trichloroethane	mg/L	0.0047	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethane	mg/L	0.005	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethene	mg/L	0.014	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dibromoethane (Ethylene dibromide)	mg/L	0.0002	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichlorobenzene	mg/L	0.2	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloroethane	mg/L	0.005	IMAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloropropane	mg/L	0.005	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,3-Dichlorobenzene	mg/L	0.059	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.005	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L	1.8	(2)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Hexanone	mg/L	-	-		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/L	0.64	(2)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acetone	mg/L	2.7	(2)		0.115	0.09	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzene	mg/L	0.005	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bromodichloromethane	mg/L	0.016	(2)		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromoform	mg/L	0.025	(2)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane (Methyl bromide)	mg/L	0.00089	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbon tetrachloride	mg/L	0.005	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorobenzene	mg/L	0.08	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chloroethane	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform (Trichloromethane)	mg/L	0.0024	(2)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloromethane (Methyl chloride)	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1,2-Dichloroethene	mg/L	0.0016	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
cis-1,3-Dichloropropene	mg/L	-	-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dibromochloromethane	mg/L	0.025	(2)		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylbenzene	mg/L	0.0024	AO		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
m&p-Xylenes	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Methyl tert butyl ether (MTBE)	mg/L	0.015	(2)		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene chloride	mg/L	0.05	MAC		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
o-Xylene	mg/L	-	-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Styrene	mg/L	0.0054	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethene	mg/L	0.030	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toluene	mg/L	0.024	AO		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,2-Dichloroethene	mg/L	0.0016	(2)		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	-	-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichloroethene	mg/L	0.005	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichlorofluoromethane (CFC-11)	mg/L	0.15	(2)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	mg/L	0.002	MAC		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Semi-volatile Organic Compounds											
Acenaphthene	mg/L	0.0041	(2)		< 0.000029	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Acenaphthylene	mg/L	0.001	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Anthracene	mg/L	0.0024	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)anthracene	mg/L	0.001	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)pyrene	mg/L	0.00001	MAC		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/L	0.0001	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(g,h,i)perylene	mg/L	0.0002	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(k)fluoranthene	mg/L	0.0001	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Chrysene	mg/L	0.0001	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Dibenz(a,h)anthracene	mg/L	0.0002	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluoranthene	mg/L	0.00041	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluorene	mg/L	0.12	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Indeno(1,2,3-cd)pyrene	mg/L	0.0002	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Naphthalene	mg/L	0.011	(2)		0.000071	< 0.00002	< 0.00002	< 0.00002	0.000053	0.000061	< 0.00002
Phenanthrene	mg/L	0.001	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Pyrene	mg/L	0.0041	(2)		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002

Notes:

(1) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(2) Table 2, Ontario Regulation 153/04, March 2004
(3) Applicable at point of consumption.
- No Value/Not Analyzed
U The analyte was analyzed for but not detected above the reported sample quantitation limit.
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
559 U Estimated value does not meet the ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.8A

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS (GENERAL CHEMISTRY AND METALS)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:			*SW1*	*SW3*	*SW3*	*SW4*	*SW5*	*SW6*	*SW7*	*SW8*
Sample Date:			*6/13/2013*	*6/13/2013*	*6/13/2013 Duplicate*	*6/13/2013*	*6/13/2013*	*6/13/2013*	*6/13/2013*	*6/13/2013*
Parameters	***Units***	***PWQO*** [1]								
Field Parameters										
Conductivity, field	uS/cm	-	367	620	-	274	783	642	268	226
Dissolved oxygen (DO), field	ug/L	4,000-7,000	4330	5180	-	5910	5920	4000	1210	3280
Flow, field	m/sec	-	0.211	1.125	-	1.11	Not Flowing	0.96	Not Flowing	Not Flowing
pH, field	s.u.	6.5-8.5	7.74	8.10	-	8.30	7.75	7.68	**8.89**	8.11
Temperature, field	Deg C	-	15.4	15.2	-	16.0	14.9	14.5	20.5	17.5
General Chemistry										
Alkalinity, total (as CaCO3)	ug/L	-	100000	76000	73000	65000	74000	145000	141000	84000
Ammonia-N	ug/L	-	< 50	173	150	75	111	204	< 50	67
Biochemical oxygen demand (BOD)	ug/L	-	< 2000	< 2000	< 2000	4200	2000	4000	< 2000	5400
Chemical oxygen demand (COD)	ug/L	-	61000	72000	74000	118000	59000	89000	36000	51000
Chloride	ug/L	-	39600	33100	32500	22500	22400	32000	< 2000	< 2000
Conductivity	umhos/cm	-	360	640	633	260	802	1020	275	171
Dissolved organic carbon (DOC)	ug/L	-	21500	8800	8200	16600	15700	26200	5800	21200
Hardness	ug/L	-	247000	350000	350000	120000	427000	635000	166000	96000
Nitrate (as N)	ug/L	-	< 100	490	490	1980	590	710	< 100	< 100
Nitrite (as N)	ug/L	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
pH, lab	s.u.	6.5-8.5	7.29	7.83	7.82	7.56	7.49	7.42	8.23	7.13
Phenolics (total)	ug/L	1	**8**	**6 J**	**3 J**	**3**	< 1	< 1	< 1	1
Phosphorus	ug/L	10	**164**	**269**	**256**	**645**	**104**	**150**	**52.8**	**136**
Sulfate	ug/L	-	22200	204000	206000	16800	320000	372000	3800	2400
Total dissolved solids (TDS)	ug/L	-	268000	458000	442000	412000	604000	796000	148000	116000
Total kjeldahl nitrogen (TKN)	ug/L	-	940	670	730	1080	960	2640	390	1230
Total suspended solids (TSS)	ug/L	-	29000	160000	166000	423000	50000	393000	69000	26000
Turbidity	NTU	-	31.0	290	306	707	64.0	269	78.0	4.33
Metals										
Aluminum	ug/L	75	**884**	**4970**	**6010**	**23300**	**2200**	**8220**	**737**	**80**
Arsenic	ug/L	5	1.2	3.2	3.5	3.1	1.4	4.2	< 1	1.2
Barium	ug/L	-	52.8	80.9	86.3	158	55.3	125	38.2	9.2
Beryllium	ug/L	11	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5
Boron	ug/L	200	34	104	105	42	88	106	14	37
Cadmium	ug/L	0.2	< 0.09	0.118	0.13	0.174	< 0.09	0.146	< 0.09	< 0.09
Calcium	ug/L	-	80100	108000	107000	30000	113000	166000	48100	28800
Chromium	ug/L	1	**1.65**	**7.5**	**9.15**	**26.5**	**4.3**	**12.8**	0.89	< 0.5
Cobalt	ug/L	0.9	**1.11**	**3.32**	**3.85**	**8.98**	**1.43**	**6.08**	0.66	< 0.5
Copper	ug/L	5	3.5	**14.2**	**15.4**	**19.7**	5	**14.4**	2.4	< 1
Iron	ug/L	300	**3010**	**6800**	**8230**	**24100**	**2920**	**12800**	**899**	**2000**
Lead	ug/L	5	0.98	**12.9**	**13.4**	**9.81**	2.91	**9.08**	1.1	< 0.5
Magnesium	ug/L	-	11500	19400	20000	10900	35000	53300	11100	5740
Manganese	ug/L	-	248	230	245	295	129	432	43.9	59.7
Mercury (dissolved)	ug/L	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	ug/L	40	1.19	6.74	7.02	1.09	5.53	3.56	< 0.5	< 0.5
Nickel	ug/L	25	2.5	9.3	10.4	**25.8**	4.3	15.6	1.4	< 1
Potassium	ug/L	-	2300	6300	6500	6700	6400	9500	1300	< 1000
Silver	ug/L	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	ug/L	-	11400	22300	23000	21400	23200	23900	2370	890
Thallium	ug/L	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Vanadium	ug/L	6	2.05	**11.6**	**13.6**	**34.7**	4.94	**16**	2.07	< 0.5
Zinc	ug/L	20	9.4	**51**	**54.3**	**94.9**	12.8	**56.2**	4.4	< 3

Notes:

(1) MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

1.5 Does not meet the applicable PWQO criteria
63 U Estimated value does not meet PWQO criteria
<30 Method detection limit does not meet PWQO criteria
<30 Result below method detection limit
\- Not Analyzed/No value
J value is estimated
U not present at or above the associated value.
UJ estimated reporting limit.

TABLE 5.8B

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS (VOCs and PAHs)
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:			*SW1*	*SW3*	*SW3*	*SW4*	*SW5*	*SW6*	*SW7*	*SW8*
Sample Date:			*6/13/2013*	*6/13/2013*	*6/13/2013 Duplicate*	*6/13/2013*	*6/13/2013*	*6/13/2013*	*6/13/2013*	*6/13/2013*
Parameters	*Units*	*PWQO* [1]								
Volatile Organic Compounds										
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibron	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (M	ug/L	400	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobu	ug/L	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.44**
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
Semi-volatile Organic Compounds										
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	0.048	0.041	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	< 0.020	**0.039**	**0.035**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	0.0004	< 0.020	**0.112**	**0.098**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	-	< 0.010	0.090	0.083	< 0.010	< 0.010	0.015	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	0.169	0.145	< 0.020	< 0.020	0.022	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	< 0.020	**0.090**	**0.084**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	0.0002	< 0.020	**0.124**	**0.114**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	0.0001	< 0.020	**0.160**	**0.143**	< 0.020	< 0.020	**0.022**	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	0.002	< 0.020	**0.020**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	0.0008	< 0.020	**0.248**	**0.217**	< 0.020	**0.032**	**0.040**	< 0.020	< 0.020
Fluorene	ug/L	0.2	< 0.020	0.022	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	0.107	0.097	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.020	0.050	0.047	< 0.020	0.029	< 0.020	< 0.020	< 0.020
Phenanthrene	ug/L	0.03	< 0.020	**0.090**	**0.080**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	0.187	0.163	< 0.020	0.028	0.031	< 0.020	< 0.020

Notes:

(1) MOE "Water Management Policies Guidlelines Provincial Water Quality Objectives", July 1994 (reprinted Febuary 1999).

1.5 Does not meet the applicable PWQO criteria

63 U Estimated value does not meet PWQO criteria

<30 Method detection limit does not meet PWQO criteria

<30 Result below method detection limit

\- Not Analyzed/No value

J value is estimated

U not present at or above the associated value.

UJ estimated reporting limit.

TABLE 5.10

SUMMARY OF TDS POND ANALYTICAL RESULTS
2013 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*
Sample Date:				*2/18/2013*	*2/22/2013*	*4/3/2013*	*6/13/2013*	*6/19/2013*	*7/19/2013*
Parameters	***Units***	***PWQO*** [1]	***TRIGGER*** [2]						
Field Parameters									
Conductivity, field	uS/cm	-	-	-	752	-	558	579	-
Dissolved oxygen (DO), field	ug/L	-	-	-	-	11400	-	6530	19500
pH, field	s.u.	6.5-8.5	6.5-8.5	-	7.44	**9.43**	8.03	6.92	**9.25**
Temperature, field	Deg C	-	-	-	1.1	5.8	17.4	27.72	35.0
General Chemistry									
Alkalinity, total (as CaCO3)	ug/L	-	-	88000	-	83000	105000	-	101000
Ammonia-N	ug/L	-	-	293	291	50	< 50	-	92
Biochemical oxygen demand (BOD)	ug/L	-	-	-	-	< 2000	-	< 2000	2900
Chemical oxygen demand (COD)	ug/L	-	-	30000	-	34000	57000	-	46000
Chloride	ug/L	-	-	11500	-	12000	19700	-	35000
Conductivity	umhos/cm	-	-	623	-	618	585	-	542
Hardness	ug/L	-	-	347000	-	301000	297000	-	275000
Nitrate (as N)	ug/L	-	-	470	-	< 500	< 100	-	< 500
Nitrite (as N)	ug/L	-	-	< 100	-	< 500	< 100	-	< 500
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.05	7.76	8.04	8.17	-	**9.14**
Phenolics (total)	ug/L	1	-	< 1	-	< 1	< 1	-	1
Phosphorus	ug/L	10	320	83	15.2	42	86	-	89
Sulphate	ug/L	-	-	209000	-	212000	167000	-	116000
Total dissolved solids (TDS)	ug/L	-	-	458000	-	412000	384000	-	344000
Total kjeldahl nitrogen (TKN)	ug/L	-	-	640	-	320	670	-	1340
Total suspended solids (TSS)	ug/L	-	25000	**58000**	13600	14000	**87000**	-	**58000**
Un-ionized ammonia	ug/L	20	20	-	0.88	0.87	< 2.80	-	**68.04**
Metals									
Arsenic	ug/L	5	-	< 10	-	< 1	3.8	-	< 1
Barium	ug/L	-	-	82	-	29.9	62.1	-	57
Boron	ug/L	200	1500	< 100	76	79	114	-	240
Cadmium	ug/L	0.2	-	< 0.9	-	< 0.09	< 0.09	-	< 0.09
Chromium	ug/L	1	-	11	-	0.82	3.72	-	< 5
Copper	ug/L	5	-	11	-	2.5	5.2	-	< 10
Iron	ug/L	300	4350	**7750**	277	356	3620	-	1170
Lead	ug/L	5	-	5.7	-	0.57	2.11	-	< 5
Mercury	ug/L	0.2	-	< 0.1	-	< 0.1	< 0.1	-	< 0.1
Zinc	ug/L	20	110	< 30	7.6	79.4	10.6	-	**201**
Volatile Organic Compounds									
Ethylbenzene	ug/L	8	-	< 0.50	-	< 0.50	< 0.50	-	< 0.50
Toluene	ug/L	0.8	0.8	< 0.50	-	-	-		
Semi-volatile Organic Compounds									
Benzo(a)pyrene	ug/L	-	-	0.024	-	-	< 0.0050	-	< 0.0050
Fluorene	ug/L	0.2	0.2	0.033	-	-	-		
Naphthalene	ug/L	7	7	0.218	-	-	< 0.020	-	< 0.020

Notes:

(1) MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
(2) TDS Trigger Parameters as per the Industrial Sewage Works ECA

1.5 Does not meet the applicable Trigger Criteria
63 U Estimated value does not meet Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit
\- Not Analyzed/No value
J value is estimated
U not present at or above the associated value.
UJ estimated reporting limit.

TABLE 5.3

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*Leachate*		
Sample ID [1] :					*LW-18235-034*	*LW-18235-001*	*LW-18235-001*
Sample Date:					*7/22/2014*	*8/12/2014*	*11/21/2014*
Parameters	*Units*	*ODWS [2] a*	*ODWS Source*	*PWQO [3] b*			
Field Parameters							
Conductivity, field	uS/cm	-	-	-	-	5430	5200
pH, field	s.u.	6.5-8.5	OG	6.5-8.5	-	**9.74[ab]**	7.64
Temperature, field	Deg C	15	AO	-	-	**18.5[a]**	2.6
General Chemistry							
Alkalinity, total (as CaCO3)	µg/L	30000	OG	-	**2730000[a]**	-	**2260000[a]**
Ammonia-N	µg/L	-	-	-	48100	-	68800
Biochemical oxygen demand (BOD)	µg/L	-	-	-	1160000	-	149000
Chemical oxygen demand (COD)	µg/L	-	-	-	2010000	-	673000
Chloride	µg/L	250000	AO	-	**585000[a]**	-	**557000[a]**
Dissolved organic carbon (DOC)	µg/L	5000	AO	-	-	-	**160000[a]**
Dissolved organic carbon (DOC) (dissolved)	µg/L	-	-	-	767000	-	-
Hardness	µg/L	80000	OG	-	**2310000[a]**	-	**1630000[a]**
Nitrate (as N)	µg/L	10000	MAC	-	< 1000	-	< 2000
Nitrite (as N)	µg/L	1000	MAC	-	< 1000	-	< 2000
Phenolics (total)	µg/L	-	-	1	**1280[b]**	-	**526[b]**
Phosphorus	µg/L	-	-	10	**1110[b]**	-	**896[b]**
Sulfate	µg/L	-	AO	-	26000	-	< 40000
Total dissolved solids (TDS)	µg/L	500000	AO	-	**3980000[a]**	-	**2980000[a]**
Total kjeldahl nitrogen (TKN)	µg/L	-	-	-	78600	-	100000
Total suspended solids (TSS)	µg/L	-	-	-	70000	-	24700
Turbidity	NTU	5.0	MAC	-	**446[a]**	-	-
Metals							
Aluminum	µg/L	100	OG	75	**1690[ab]**	-	-
Arsenic	µg/L	25	IMAC	5	**45[ab]**	-	**29[ab]**
Barium	µg/L	1000	MAC	-	385	-	358
Benzo(a)pyrene	µg/L	0.01	MAC	-	-	-	< 0.0050
Beryllium	µg/L	-	-	11	< 5	-	-
Boron	µg/L	5000	IMAC	200	**4970[b]**	-	**5790[ab]**
Cadmium	µg/L	5	MAC	0.2	< 0.9	-	< 0.9
Calcium	µg/L	-	-	-	630000	-	359000
Chromium	µg/L	50	MAC	1	**16[b]**	-	**17.1[b]**
Cobalt	µg/L	-	-	0.9	< 5	-	-
Copper	µg/L	1000	AO	5	< 10	-	< 10
Iron	µg/L	300	AO	300	**2730[ab]**	-	**1820[ab]**
Lead	µg/L	10	MAC	5	< 5	-	< 5
Magnesium	µg/L	-	-	-	179000	-	178000
Manganese	µg/L	50	AO	-	**941[a]**	-	-
Mercury	µg/L	1	MAC	0.2	< 0.1	-	< 0.1
Molybdenum	µg/L	-	-	40	< 5	-	-
Nickel	µg/L	-	-	25	**40[b]**	-	-
Potassium	µg/L	-	-	-	100000	-	-
Silver	µg/L	-	-	0.1	< 1	-	-
Sodium	µg/L	20000	AO	-	**444000[a]**	-	-
Thallium	µg/L	-	-	0.3	< 3	-	-
Vanadium	µg/L	-	-	6	**16.4[b]**	-	-
Zinc	µg/L	5000	AO	30	**402[b]**	-	**70[b]**

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
[3] MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.3

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*Leachate*		
Sample ID [1] *:*					*LW-18235-034*	*LW-18235-001*	*LW-18235-001*
Sample Date:					*7/22/2014*	*8/12/2014*	*11/21/2014*
Parameters	*Units*	*ODWS* [2] *a*	*ODWS Source*	*PWQO* [3] *b*			
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/L	-	-	20	< 0.50	-	-
1,1,1-Trichloroethane	µg/L	-	-	10	< 0.50	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	70	< 0.50	-	-
1,1,2-Trichloroethane	µg/L	-	-	800	< 0.50	-	-
1,1-Dichloroethane	µg/L	-	-	200	< 0.50	-	-
1,1-Dichloroethene	µg/L	14	MAC	40	< 0.50	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	5	< 0.50	-	-
1,2-Dichlorobenzene	µg/L	200	MAC	2.5	< 0.50	-	-
1,2-Dichloroethane	µg/L	5	IMAC	100	< 0.50	-	-
1,2-Dichloropropane	µg/L	-	-	0.7	< 0.50	-	-
1,3-Dichlorobenzene	µg/L	-	-	2.5	< 0.50	-	-
1,4-Dichlorobenzene	µg/L	5	MAC	4	< 0.50	-	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	400	**1000**[b]	-	-
2-Hexanone	µg/L	-	-	-	< 30	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	24	-	-
Acetone	µg/L	-	-	-	550	-	-
Benzene	µg/L	5	MAC	100	4.30	-	3.10
Bromodichloromethane	µg/L	-	-	200	< 2.0	-	-
Bromoform	µg/L	-	-	60	< 1.0	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	0.9	< 0.50	-	-
Carbon tetrachloride	µg/L	5	MAC	-	< 0.50	-	-
Chlorobenzene	µg/L	80	MAC	15	< 0.50	-	-
Chloroethane	µg/L	-	-	-	< 1.0	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	< 1.0	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	700	< 1.0	-	-
cis-1,2-Dichloroethene	µg/L	-	-	200	1.15	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	< 0.50	-	-
Dibromochloromethane	µg/L	-	-	40	< 2.0	-	-
Ethylbenzene	µg/L	2.4	AO	8	**7.26**[a]	-	**6.16**[a]
m&p-Xylenes	µg/L	-	-	2	**8.7**[b]	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	200	< 2.0	-	-
Methylene chloride	µg/L	50	MAC	100	< 5.0	-	< 5.0
o-Xylene	µg/L	-	-	40	4.60	-	-
Styrene	µg/L	-	-	4	< 0.50	-	-
Tetrachloroethene	µg/L	30	MAC	50	< 0.50	-	-
Toluene	µg/L	24	AO	0.8	**14.6**[b]	-	**17.4**[b]
trans-1,2-Dichloroethene	µg/L	-	-	200	< 0.50	-	-
trans-1,3-Dichloropropene	µg/L	-	-	7	< 0.50	-	-
Trichloroethene	µg/L	5	MAC	20	< 0.50	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	< 5.0	-	-
Vinyl chloride	µg/L	2	MAC	600	< 0.50	-	1.19
Semi-volatile Organic Compounds							
Acenaphthene	µg/L	-	-	-	0.36	-	-
Acenaphthylene	µg/L	-	-	-	< 0.20	-	-
Anthracene	µg/L	-	-	0.0008	< 0.20	-	-
Benzo(a)anthracene	µg/L	-	-	0.0004	**0.048**[b]	-	-
Benzo(a)pyrene	µg/L	0.01	MAC	-	< 0.010	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	< 0.020	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.00002	< 0.020	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.0002	< 0.020	-	-
Chrysene	µg/L	-	-	0.0001	**0.038**[b]	-	-
Dibenz(a,h)anthracene	µg/L	-	-	0.002	< 0.020	-	-
Fluoranthene	µg/L	-	-	0.0008	**0.45**[b]	-	-
Fluorene	µg/L	-	-	0.2	**0.27**[b]	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-		< 0.020	-	-
Naphthalene	µg/L	-	-	7	4.73	-	6.00
Phenanthrene	µg/L	-	-	0.03	**0.43**[b]	-	-
Pyrene	µg/L	-	-	-	0.32	-	-

Notes:

(1) Sample ID has been abbreviated.
(2) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(3) MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW1-03*	*MW1-03*	*MW1-03*	*MW2-03*	*MW2-03*	*MW2-03*	*MW2B-07*	*MW2C-01*	*MW2C-01*	*MW2C-01*	*MW3-03*	*MW3-03*
Sample ID [1] :				*GW-18235-1-03*	*GW-18235-033*	*GW-18235-023*	*GW-18235-2-03*	*GW-18235-031*	*GW-18235-021*	*GW-18235-016*	*GW-18235-017*	*GW-18235-021*	*GW-18235-012*	*GW-18235-3-03*	*GW-18235-032*
Sample Date:				*5/30/2014*	*7/22/2014*	*11/21/2014*	*5/30/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/30/2014*	*7/22/2014*
Parameters	***Units***	***ODWS [2]***	***ODWS Source***												
Field Parameters															
Conductivity, field	uS/cm	-	-	-	1480	1330	-	1510	1470	3960	6670	4840	4530	-	1110
pH, field	s.u.	6.5-8.5	OG	-	7.71	7.05	-	7.29	7.02	7.45	7.36	7.02	7.17	-	7.18
Temperature, field	Deg C	15	AO	-	12.6	11.6	-	11.9	12.3	8.9	10.3	10.7	9.3	-	12.6
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	398	425	453	384	427	378	**538**	**887**	**903**	**886**	440	488
Ammonia-N	mg/L	-	-	< 0.050	< 0.092	0.659	< 0.050	< 0.050	< 0.050	0.083	< 0.050	< 0.050	< 0.050	< 0.050	< 0.064
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-	-	-	< 2.0	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	19	< 19	15	43	< 19	22	36	17	< 12	15	45	< 19
Chloride	mg/L	250	AO	140	130	131	232	186	177	25.1	14.7	15	< 20	96.3	92
Dissolved organic carbon (DOC)	mg/L	5.0	AO	2.7	3.4	3.6	**5.1**	**6.3**	**7.0**	2.5	3.8	**5.5**	**6.3**	**7.8**	**6.6**
Hardness	mg/L	80-100	OG	-	**772**	-	-	**726**	-	-	-	**3090**	-	-	**559**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.50	< 0.50	< 0.10	< 0.50	0.10	1.48	0.66	0.61	< 1.0	0.11	< 0.50
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.50	-	-	< 0.50	-	-	-	< 0.50	-	-	< 0.50
Phenolics (total)	mg/L	-	-	-	0.0044	-	-	0.0029	-	-	-	< 0.0010	-	-	0.0070
Phosphorus	mg/L	-	-	-	0.0443	-	-	0.0347	-	-	-	0.0424	-	-	0.0831
Sulfate	mg/L	500	AO	206	209	220	123	141	139	**828**	**2440**	**2710**	**2770**	56.3	151
Total dissolved solids (TDS)	mg/L	500	AO	**913**	**948**	**884**	**948**	**931**	**846**	**1670**	**4520**	**4580**	**4370**	**681**	**787**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.39	-	-	< 0.17	-	-	-	< 0.15	-	-	< 0.58
Total suspended solids (TSS)	mg/L	-	-	-	105	-	-	84.0	-	-	-	209	-	-	130
Turbidity	NTU	5.0	MAC	**11.8**	**17.1**	**5.52**	4.63	**14.2**	**6.71**	**10.9**	**8.96**	**9.55**	**7.18**	**10.3**	**15.3**

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.4A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW3-03*	*MW6B-07*	*MW6B-07*	*MW6B-07*	*MW6B-07*	*MW1B-13*	*MW1B-13*	*MW1B-13*	*OW1B-06*	*OW1B-06*	*OW1B-06*	*OW3B-13*
Sample ID [1] :				*GW-18235-022*	*GW-18235-004*	*GW-18235-007*	*GW-18235-003*	*GW-18235-004*	*GW-18235-008*	*GW-18235-013*	*GW-18235-006*	*GW-18235-021*	*GW-18235-025*	*GW-18235-017*	*GW-18235-010*
Sample Date:				*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*
								Duplicate							
Parameters	*Units*	*ODWS [2]*	*ODWS Source*												
Field Parameters															
Conductivity, field	uS/cm	-	-	1270	4290	2980	2790	-	4570	3420	3000	2720	1950	1900	1490
pH, field	s.u.	6.5-8.5	OG	7.13	7.52	7.11	7.28	-	7.61	6.98	7.01	7.46	7.03	7.23	7.70
Temperature, field	Deg C	15	AO	11.8	8.2	12.5	11.3	-	9.8	15.0	10.1	7.6	12.2	11.3	10.4
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	477	490	491	499	**540**	496	**547**	**531**	**627**	**599**	**659**	361
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.115	< 0.158	0.055	< 0.050	< 0.068	< 0.050	0.085
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	-	-	< 2.0	-	-	< 2.0	-	-
Chemical oxygen demand (COD)	mg/L	-	-	22	19	< 10	< 10	11	32	< 36	22	19	< 10	15	< 10
Chloride	mg/L	250	AO	91.7	69.7	66	72	70	70.4	72	72	21.3	24	23	8.0
Dissolved organic carbon (DOC)	mg/L	5.0	AO	**5.9**	2.6	3.3	3.2	3.4	**7.1**	**9.8**	**8.4**	1.9	3.2	4.0	2.3
Hardness	mg/L	80-100	OG	-	-	**1880**	-	-	-	**1810**	-	-	**1090**	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.50	< 1.0	< 1.0	< 0.10	< 0.50	< 1.0	< 0.10	< 0.50	< 0.50	0.78
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.50	-	-	-	< 0.50	-	-	< 0.50	-	-
Phenolics (total)	mg/L	-	-	-	-	< 0.0010	-	-	-	< 0.0010	-	-	0.0048	-	-
Phosphorus	mg/L	-	-	-	-	< 0.0133	-	-	-	< 0.0030	-	-	0.0958	-	-
Sulfate	mg/L	500	AO	178	**1300**	**1470**	**1570**	**1530**	**1370**	**1460**	**1550**	**582**	**593**	**584**	359
Total dissolved solids (TDS)	mg/L	500	AO	**814**	**2560**	**2580**	**2500**	**2430**	**2650**	**2650**	**2520**	**1420**	**1360**	**1330**	**837**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	< 0.15	-	-	-	< 0.45	-	-	< 0.19	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	44.0	-	-	-	35.0	-	-	245	-	-
Turbidity	NTU	5.0	MAC	**9.92**	**6.20**	3.52	3.96	3.49	**11.2**	3.24	**7.51**	**8.23**	**13.5**	4.68	**9.23**

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 cri
<30 Result below method detection limit

TABLE 5.4A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (INORGANIC CHEMISTRY)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*OW3B-13*	*OW3B-13*	*OW5B-06*	*OW5B-06*	*OW5B-06*	*OW8B-06*	*OW8B-06*	*OW8B-06*	*OW9B-06*	*OW9B-06*	*OW9B-06*
Sample ID [1] :				*GW-18235-015*	*GW-18235-008*	*GW-18235-018*	*GW-18235-022*	*GW-18235-013*	*GW-18235-026*	*GW-18235-029*	*GW-18235-019*	*GW-18235-012*	*GW-18235-017*	*GW-18235-010*
Sample Date:				*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*
Parameters	***Units***	***ODWS [2]***	***ODWS Source***											
Field Parameters														
Conductivity, field	uS/cm	-	-	1090	1280	3930	2800	3050	2400	1750	1670	2670	1930	1880
pH, field	s.u.	6.5-8.5	OG	6.80	7.26	7.34	6.98	7.20	7.55	7.37	7.28	7.63	7.28	7.51
Temperature, field	Deg C	15	AO	18.9	9.9	8.9	11.5	10.0	8.3	12.2	11.8	9.5	13.1	10.4
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	322	462	474	483	**522**	**666**	**677**	**610**	**613**	**648**	**643**
Ammonia-N	mg/L	-	-	< 0.078	0.212	< 0.050	< 0.050	< 0.050	< 0.050	< 0.064	0.341	< 0.050	< 0.051	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	-	-	< 2.0	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 12	15	34	< 32	30	12	< 10	11	< 10	< 12	13
Chloride	mg/L	250	AO	< 10	5.0	76.4	79	118	51.1	54	55	41.9	44	43
Dissolved organic carbon (DOC)	mg/L	5.0	AO	2.9	3.6	**10.0**	**11.1**	**11.8**	1.3	2.4	3.5	2.1	3.2	3.4
Hardness	mg/L	80-100	OG	**753**	-	-	**1670**	-	-	**902**	-	-	**905**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.50	< 0.10	< 0.10	< 0.50	< 1.0	< 0.10	< 0.50	< 0.50	< 0.10	< 0.50	< 0.50
Nitrite (as N)	mg/L	1.0	MAC	< 0.50	-	-	< 0.50	-	-	< 0.50	-	-	< 0.50	-
Phenolics (total)	mg/L	-	-	< 0.0010	-	-	< 0.0010	-	-	0.0051	-	-	< 0.0010	-
Phosphorus	mg/L	-	-	< 0.0046	-	-	0.0984	-	-	< 0.0158	-	-	0.0255	-
Sulfate	mg/L	500	AO	263	259	**1120**	**1290**	**1430**	306	332	328	489	**525**	495
Total dissolved solids (TDS)	mg/L	500	AO	**677**	**786**	**2310**	**2380**	**2650**	**1010**	**1050**	**1000**	**1240**	**1280**	**1230**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	< 0.33	-	-	1.08	-	-	< 0.15	-	-	< 0.29	-
Total suspended solids (TSS)	mg/L	-	-	< 2.0	-	-	162	-	-	58.0	-	-	49.0	-
Turbidity	NTU	5.0	MAC	0.88	**8.12**	**9.12**	**9.68**	**10.0**	**7.88**	**7.31**	3.83	**10.4**	**8.45**	**8.91**

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 cri
<30 Result below method detection limit

TABLE 5.4B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW1-03*	*MW1-03*	*MW1-03*	*MW2-03*	*MW2-03*	*MW2-03*	*MW2B-07*	*MW2C-01*	*MW2C-01*	*MW2C-01*	*MW3-03*	*MW3-03*
Sample ID [1] :				*GW-18235-1-03*	*GW-18235-033*	*GW-18235-023*	*GW-18235-2-03*	*GW-18235-031*	*GW-18235-021*	*GW-18235-016*	*GW-18235-017*	*GW-18235-021*	*GW-18235-012*	*GW-18235-3-03*	*GW-18235-032*
Sample Date:				*5/30/2014*	*7/22/2014*	*11/21/2014*	*5/30/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/30/2014*	*7/22/2014*
Parameters	***Units***	***ODWS [2]***	***ODWS Source***												
Metals															
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.10	-	-	< 0.10	-	-	-	< 0.10	-	-	< 0.10
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010
Barium (dissolved)	mg/L	1.0	MAC	0.0896	0.078	0.075	0.071	0.064	0.062	0.0528	< 0.020	< 0.020	< 0.020	0.0471	0.040
Beryllium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050
Boron (dissolved)	mg/L	5.0	IMAC	0.034	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.046	0.28	0.30	0.27	0.042	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00090	-	-	< 0.00090	-	-	-	< 0.00090	-	-	< 0.00090
Calcium (dissolved)	mg/L	-	-	224	220	193	262	221	208	125	291	270	241	187	156
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050
Cobalt (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050
Copper (dissolved)	mg/L	1.0	AO	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010
Iron (dissolved)	mg/L	0.30	AO	< 0.050	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.050	< 0.50	< 0.50	< 0.50	< 0.050	< 0.50
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050
Magnesium (dissolved)	mg/L	-	-	47.9	54.2	50.1	39.2	42.3	38.3	215	579	586	580	33.1	41.5
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.010	-	-	0.021	-	-	-	< 0.010	-	-	< 0.010
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.00010	-	-	< 0.00010	-	-	-	< 0.00010	-	-	< 0.00010
Molybdenum (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	-	0.0062	-	-	< 0.0050
Nickel (dissolved)	mg/L	-	-	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010
Potassium (dissolved)	mg/L	-	-	-	< 10	-	-	< 10	-	-	-	12	-	-	< 10
Silver (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-	-	-	< 0.0010	-	-	< 0.0010
Sodium (dissolved)	mg/L	20/200	AO	**60.9**	**59.4**	**57.9**	**70.4**	**59.9**	**64.4**	**114**	**295**	**306**	**306**	**48.7**	**49.7**
Thallium (dissolved)	mg/L	-	-	-	< 0.0030	-	-	< 0.0030	-	-	-	< 0.0030	-	-	< 0.0030
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.030	-	-	< 0.030	-	-	-	< 0.030	-	-	< 0.030

Notes:

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\- No Value/Not Analyzed
J The result is an estimated value.
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<30 Result below method detection limit

TABLE 5.4B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW3-03*	*MW6B-07*	*MW6B-07*	*MW6B-07*	*MW6B-07*	*MW1B-13*	*MW1B-13*	*MW1B-13*	*OW1B-06*	*OW1B-06*	*OW1B-06*	*OW3B-13*
Sample ID [1] :				*GW-18235-022*	*GW-18235-004*	*GW-18235-007*	*GW-18235-003*	*GW-18235-004*	*GW-18235-008*	*GW-18235-013*	*GW-18235-006*	*GW-18235-021*	*GW-18235-025*	*GW-18235-017*	*GW-18235-010*
Sample Date:				*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*
								Duplicate							
Parameters	*Units*	*ODWS [2]*	*ODWS Source*												
Metals															
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.10	-	-	-	< 0.10	-	-	< 0.10	-	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010	-	-
Barium (dissolved)	mg/L	1.0	MAC	0.037	0.0114	< 0.020	< 0.020	< 0.020	0.0769	0.085	0.074	0.0289	0.031	< 0.020	0.0541
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	0.052	< 0.10	< 0.10	< 0.10	0.042	< 0.10	< 0.10	0.049	< 0.10	< 0.10	0.039
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00090	-	-	-	< 0.00090	-	-	< 0.00090	-	-
Calcium (dissolved)	mg/L	-	-	149	259	227	204	208	284	210	239	146	135	84.1	181
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	-	0.0220	-	-	< 0.0050	-	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010	-	-
Iron (dissolved)	mg/L	0.30	AO	< 0.50	< 0.050	< 0.50	< 0.50	< 0.50	< 0.050	< 0.50	< 0.50	0.242	< 0.50	**0.64**	< 0.050
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-	-
Magnesium (dissolved)	mg/L	-	-	83.4	282	319	295	296	270	311	273	202	182	228	68.8
Manganese (dissolved)	mg/L	0.05	AO	-	-	0.016	-	-	-	**1.78**	-	-	< 0.010	-	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.00010	-	-	-	< 0.00010	-	-	< 0.00010	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	-	0.0105	-	-	< 0.0050	-	-
Nickel (dissolved)	mg/L	-	-	-	-	< 0.010	-	-	-	0.021	-	-	< 0.010	-	-
Potassium (dissolved)	mg/L	-	-	-	-	< 10	-	-	-	< 10	-	-	< 10	-	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	-	< 0.0010	-	-	< 0.0010	-	-
Sodium (dissolved)	mg/L	20/200	AO	**59.0**	**82.0**	**84.3**	**79.0**	**83.1**	**136**	**144**	**143**	**74.6**	**66.6**	**87.1**	**37.6**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.0030	-	-	-	< 0.0030	-	-	< 0.0030	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.030	-	-	-	< 0.030	-	-	< 0.030	-	-

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 crite
<30 Result below method detection limit

TABLE 5.4B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (METALS)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*OW3B-13*	*OW3B-13*	*OW5B-06*	*OW5B-06*	*OW5B-06*	*OW8B-06*	*OW8B-06*	*OW8B-06*	*OW9B-06*	*OW9B-06*	*OW9B-06*
Sample ID [1] :				*GW-18235-015*	*GW-18235-008*	*GW-18235-018*	*GW-18235-022*	*GW-18235-013*	*GW-18235-026*	*GW-18235-029*	*GW-18235-019*	*GW-18235-012*	*GW-18235-017*	*GW-18235-010*
Sample Date:				*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*
Parameters	*Units*	*ODWS [2]*	*ODWS Source*											
Metals														
Aluminum (dissolved)	mg/L	0.10	OG	< 0.10	-	-	< 0.10	-	-	< 0.10	-	-	< 0.10	-
Arsenic (dissolved)	mg/L	0.025	IMAC	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-
Barium (dissolved)	mg/L	1.0	MAC	0.067	0.064	0.0329	0.034	0.037	0.0205	0.021	< 0.020	0.0239	0.025	0.022
Beryllium (dissolved)	mg/L	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	0.122	0.17	0.24	0.892	0.92	0.73	0.096	0.12	0.12
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00090	-	-	< 0.00090	-	-	< 0.00090	-	-	< 0.00090	-
Calcium (dissolved)	mg/L	-	-	224	204	281	288	353	98.5	99.8	88.2	100	96.4	81.4
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Copper (dissolved)	mg/L	1.0	AO	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-
Iron (dissolved)	mg/L	0.30	AO	< 0.50	< 0.50	< 0.050	< 0.50	< 0.50	< 0.050	< 0.50	< 0.50	< 0.050	< 0.50	< 0.50
Lead (dissolved)	mg/L	0.01	MAC	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Magnesium (dissolved)	mg/L	-	-	47.0	67.9	245	231	246	149	158	157	158	161	142
Manganese (dissolved)	mg/L	0.05	AO	**0.232**	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-
Mercury (dissolved)	mg/L	0.001	MAC	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-
Molybdenum (dissolved)	mg/L	-	-	0.0069	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Nickel (dissolved)	mg/L	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-
Potassium (dissolved)	mg/L	-	-	< 10	-	-	< 10	-	-	< 10	-	-	< 10	-
Silver (dissolved)	mg/L	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-
Sodium (dissolved)	mg/L	20/200	AO	**30.2**	**29.9**	**80.6**	**88.0**	**104**	**85.7**	**89.2**	**87.5**	**153**	**142**	**133**
Thallium (dissolved)	mg/L	-	-	< 0.0030	-	-	< 0.0030	-	-	< 0.0030	-	-	< 0.0030	-
Vanadium (dissolved)	mg/L	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	< 0.030	-	-	< 0.030	-	-	< 0.030	-	-	< 0.030	-

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 crite
<30 Result below method detection limit

TABLE 5.4C

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SHALLOW OVERBURDEN (VOCs AND PAHs)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*MW1-03*	*MW2-03*	*MW2C-01*	*MW3-03*	*MW6B-07*	*MW1B-13*	*OW1B-06*	*OW3B-13*	*OW5B-06*	*OW8B-06*	*OW9B-06*
Sample ID [1] :					*GW-18235-033*	*GW-18235-031*	*GW-18235-021*	*GW-18235-032*	*GW-18235-007*	*GW-18235-013*	*GW-18235-025*	*GW-18235-015*	*GW-18235-022*	*GW-18235-029*	*GW-18235-017*
Sample Date:					*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*
Parameters	*Units*	*ODWS a [2]*	*Table 2 b*	*ODWS Source [3]*											
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane	mg/L	-	0.0011	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	-	0.2	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	-	0.001	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2-Trichloroethane	mg/L	-	0.0047	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethane	mg/L	-	0.005	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethene	mg/L	0.014	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dibromoethane (Ethylene dibromide)	mg/L	-	0.0002	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichlorobenzene	mg/L	0.2	0.003	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloroethane	mg/L	0.005	0.0016	IMAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloropropane	mg/L	-	0.005	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,3-Dichlorobenzene	mg/L	-	0.059	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.005	0.001	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L	-	1.8	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Hexanone	mg/L	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
4-Methyl-2-pentanone (Methyl isobutyl ketone) (M	mg/L	-	0.64	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acetone	mg/L	-	2.7	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzene	mg/L	0.005	0.005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bromodichloromethane	mg/L	-	0.016	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromoform	mg/L	-	0.025	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane (Methyl bromide)	mg/L	-	0.00089	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbon tetrachloride	mg/L	0.005	0.00079	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorobenzene	mg/L	0.08	0.03	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chloroethane	mg/L	-	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform (Trichloromethane)	mg/L	-	0.0024	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloromethane (Methyl chloride)	mg/L	-	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1,2-Dichloroethene	mg/L	-	0.0016	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
cis-1,3-Dichloropropene	mg/L	-	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dibromochloromethane	mg/L	-	0.025	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylbenzene	mg/L	0.0024	0.0024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
m&p-Xylenes	mg/L	-	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Methyl tert butyl ether (MTBE)	mg/L	-	0.015	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene chloride	mg/L	0.05	0.05	MAC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
o-Xylene	mg/L	-	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Styrene	mg/L	-	0.0054	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethene	mg/L	0.030	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toluene	mg/L	0.024	0.024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,2-Dichloroethene	mg/L	-	0.0016	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	-	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichloroethene	mg/L	0.005	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichlorofluoromethane (CFC-11)	mg/L	-	0.15	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	mg/L	0.002	0.0005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Semi-volatile Organic Compounds															
Acenaphthene	mg/L	-	0.0041	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Acenaphthylene	mg/L	-	0.001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Anthracene	mg/L	-	0.0024	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000025	< 0.00002	< 0.00002
Benzo(a)anthracene	mg/L	-	0.001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)pyrene	mg/L	0.00001	0.00001	MAC	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/L	-	0.0001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(g,h,i)perylene	mg/L	-	0.0002	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(k)fluoranthene	mg/L	-	0.0001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Chrysene	mg/L	-	0.0001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Dibenz(a,h)anthracene	mg/L	-	0.0002	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluoranthene	mg/L	-	0.00041	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluorene	mg/L	-	0.12	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Indeno(1,2,3-cd)pyrene	mg/L	-	0.0002	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Naphthalene	mg/L	-	0.011	-	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Phenanthrene	mg/L	-	0.001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Pyrene	mg/L	-	0.0041	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
[3] Table 2, Ontario Regulation 153/04, March 2004
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.5A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW2A-01*	*MW2A-01*	*MW2A-01*	*MW4A-09*	*MW4A-09*	*MW4A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW6A-07*
Sample ID [1] :				*GW-18235-015*	*GW-18235-020*	*GW-18235-011*	*GW-18235-4A-05*	*GW-18235-030*	*GW-18235-020*	*GW-18235-001*	*GW-18235-002*	*GW-18235-001*	*GW-18235-002*	*GW-18235-001*	*GW-18235-003*
Sample Date:				*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/30/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*5/21/2014 Duplicate*	*7/22/2014*	*7/22/2014 Duplicate*	*11/21/2014*	*5/21/2014*
Parameters	*Units*	*ODWS [2]*	*ODWS Source*												
Field Parameters															
Conductivity, field	uS/cm	-	-	6000	4600	3870	-	3750	3540	5790	-	4180	-	3930	4350
pH, field	s.u.	6.5-8.5	OG	7.22	6.91	7.15	-	7.51	7.12	7.40	-	6.78	-	7.46	7.16
Temperature, field	Deg C	15	AO	10.3	11.1	9.4	-	11.4	9.9	10.1	-	10.7	-	9.1	10.5
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	422	380	358	357	369	365	411	413	424	426	431	456
Ammonia-N	mg/L	-	-	0.119	< 0.067	< 0.050	< 0.050	< 0.093	0.085	0.570	0.521	0.608	0.588	0.588	0.424
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-	-	-	< 2.0	< 2.0	-	-
Chemical oxygen demand (COD)	mg/L	-	-	< 10	< 10	< 10	21	< 21	11	< 10	12	< 10	< 10	11	12
Chloride	mg/L	250	AO	12.4	15	< 20	19.9	13	< 20	13.1	12.9	13	13	< 20	9.6
Dissolved organic carbon (DOC)	mg/L	5.0	AO	< 1.0	1.3	1.7	1.9	1.5	2.3	1.8	< 1.0	2.0	1.5	4.0	1.2
Hardness	mg/L	80-100	OG	-	**3180**	-	-	**2530**	-	-	-	**3070**	**2980**	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.50	< 1.0	0.13	< 0.50	< 1.0	< 0.10	< 0.10	< 0.50	< 0.50	< 1.0	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.50	-	-	< 0.50	-	-	-	< 0.50	< 0.50	-	-
Phenolics (total)	mg/L	-	-	-	< 0.0010	-	-	0.0041	-	-	-	< 0.0010	< 0.0010	-	-
Phosphorus	mg/L	-	-	-	0.0385	-	-	0.387	-	-	-	0.295	0.262	-	-
Sulfate	mg/L	500	AO	**2390**	**2950**	**2990**	**2250**	**2330**	**2510**	**2300**	**2250**	**2600**	**2610**	**2850**	**2150**
Total dissolved solids (TDS)	mg/L	500	AO	**4190**	**4670**	**4100**	**3910**	**3790**	**3460**	**3980**	**3890**	**4090**	**4150**	**3990**	**3780**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.15	-	-	< 0.15	-	-	-	< 0.78	< 0.64	-	-
Total suspended solids (TSS)	mg/L	-	-	-	146	-	-	1380	-	-	-	606	588	-	-
Turbidity	NTU	5.0	MAC	**6.33**	**5.25**	**5.44**	**29.0**	**25.0**	**8.09**	**9.53 J**	**5.25 J**	**20.4**	**12.1**	**5.96**	**5.51**

Notes:

(1) Sample ID has been abbreviated.
(2) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.5A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW6A-07*	*MW6A-07*	*MW6A-07*	*MW1A-13*	*MW1A-13*	*MW1A-13*	*OW1A-06*	*OW1A-06*	*OW1A-06*	*OW3A-13*	*OW3A-13*
Sample ID [1] :				*GW-18235-004*	*GW-18235-005*	*GW-18235-002*	*GW-18235-007*	*GW-18235-012*	*GW-18235-005*	*GW-18235-020*	*GW-18235-024*	*GW-18235-015*	*GW-18235-009*	*GW-18235-014*
Sample Date:				*7/22/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*
					Duplicate									
Parameters	***Units***	***ODWS [2]***	***ODWS Source***											
Field Parameters														
Conductivity, field	uS/cm	-	-	3890	-	3650	9200	6470	5710	5790	4120	3820	5870	4220
pH, field	s.u.	6.5-8.5	OG	6.86	-	7.05	7.59	7.24	7.07	7.27	6.85	7.09	7.26	7.01
Temperature, field	Deg C	15	AO	11.1	-	9.4	10.7	11.2	9.0	10.1	10.6	9.6	10.2	10.9
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	471	480	470	**563**	**636**	**620**	477	454	**533**	484	492
Ammonia-N	mg/L	-	-	0.472	0.458	0.405	4.32	3.58	3.74	0.509	0.485	0.507	0.116	< 0.251
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	< 2.0	-	-	< 2.0	-	-	< 2.0	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	< 14	< 12	13	28	< 39	22	14	< 10	< 10	< 10	< 14
Chloride	mg/L	250	AO	16	< 10	< 20	54.1	50	45	11.0	11	< 20	15.0	16
Dissolved organic carbon (DOC)	mg/L	5.0	AO	2.9	3.8	2.5	4.6	4.3	**5.5**	< 1.0	1.5	1.7	< 1.0	2.7
Hardness	mg/L	80-100	OG	**2800**	**2760**	-	-	**3380**	-	-	**2880**	-	-	**2820**
Nitrate (as N)	mg/L	10.0	MAC	< 0.50	< 0.50	< 1.0	0.28	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 0.10	< 0.50
Nitrite (as N)	mg/L	1.0	MAC	< 0.50	< 0.50	-	-	< 0.50	-	-	< 0.50	-	-	< 0.50
Phenolics (total)	mg/L	-	-	< 0.0010	< 0.0010	-	-	< 0.0020	-	-	< 0.0010	-	-	< 0.0010
Phosphorus	mg/L	-	-	0.240	0.252	-	-	< 0.0030	-	-	0.245	-	-	0.0750
Sulfate	mg/L	500	AO	**2480**	**2270**	**2700**	**3620**	**4120**	**4400**	**2270**	**2560**	**2430**	**2180**	**2530**
Total dissolved solids (TDS)	mg/L	500	AO	**3560**	**3560**	**3680**	**6510**	**6680**	**6030**	**3990**	**3940**	**3500**	**3830**	**3960**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	< 0.43	< 0.69	-	-	3.44	-	-	< 0.49	-	-	< 0.31
Total suspended solids (TSS)	mg/L	-	-	1930	1560	-	-	43000	-	-	787	-	-	204
Turbidity	NTU	5.0	MAC	**13.9**	**18.3**	4.97	**7.58**	**7.38**	**6.68**	4.71	**5.72**	**5.19 J**	**10.1**	**7.83**

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 cri
<30 Result below method detection limit

TABLE 5.5A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (INORGANIC CHEMISTRY)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*OW3A-13*	*OW5A-06*	*OW5A-06*	*OW5A-06*	*OW5A-06*	*OW8A-06*	*OW8A-06*	*OW8A-06*	*OW9A-06*	*OW9A-06*	*OW9A-06*
Sample ID [1] :				*GW-18235-007*	*GW-18235-019*	*GW-18235-023*	*GW-18235-014*	*GW-18235-016*	*GW-18235-025*	*GW-18235-028*	*GW-18235-018*	*GW-18235-011*	*GW-18235-016*	*GW-18235-009*
Sample Date:				*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*
								Duplicate						
Parameters	*Units*	*ODWS [2]*	*ODWS Source*											
Field Parameters														
Conductivity, field	uS/cm	-	-	3930	-	3430	3060	-	5540	3970	3660	5720	4050	3740
pH, field	s.u.	6.5-8.5	OG	7.11	-	6.82	7.05	-	7.14	7.03	6.97	7.18	6.84	7.11
Temperature, field	Deg C	15	AO	9.2	-	10.5	9.6	-	10.5	11.0	9.7	10.7	10.9	8.6
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**524**	487	448	471	452	443	455	414	442	437	472
Ammonia-N	mg/L	-	-	< 0.050	0.556	0.533	0.510	0.526	0.437	0.405	0.440	0.180	< 0.193	0.444
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 10	12	< 17	11	< 10	12	< 10	< 10	< 10	< 10	< 10
Chloride	mg/L	250	AO	< 20	4.7	< 10	< 20	< 20	10.8	11	< 20	11.2	12	< 20
Dissolved organic carbon (DOC)	mg/L	5.0	AO	3.0	1.2	2.6	3.1	2.5	< 1.0	1.2	1.9	< 1.0	1.3	1.3
Hardness	mg/L	80-100	OG	-	-	**2400**	-	-	-	**2770**	-	-	**2880**	-
Nitrate (as N)	mg/L	10.0	MAC	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	< 0.10	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.50	-	-	-	< 0.50	-	-	< 0.50	-
Phenolics (total)	mg/L	-	-	-	-	< 0.0010	-	-	-	0.0052	-	-	< 0.0010	-
Phosphorus	mg/L	-	-	-	-	0.510	-	-	-	0.123	-	-	< 0.0087	-
Sulfate	mg/L	500	AO	**2580**	**1730**	**2020**	**2140**	**2040**	**2180**	**2460**	**2470**	**2280**	**2530**	**2590**
Total dissolved solids (TDS)	mg/L	500	AO	**3890**	**3160**	**3070**	**3110**	**3050**	**3810**	**3910**	**3620**	**4000**	**3950**	**3740**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	< 0.71	-	-	-	< 0.57	-	-	< 0.25	-
Total suspended solids (TSS)	mg/L	-	-	-	-	1040	-	-	-	610	-	-	186	-
Turbidity	NTU	5.0	MAC	**11.5**	**12.1**	**11.0**	**11.2**	**9.89 J**	**7.82**	**40.0**	4.60	4.56	4.73	4.31

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 cri
<30 Result below method detection limit

TABLE 5.5B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (METALS)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW2A-01*	*MW2A-01*	*MW2A-01*	*MW4A-09*	*MW4A-09*	*MW4A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW5A-09*	*MW6A-07*
Sample ID [1] :				*GW-18235-015*	*GW-18235-020*	*GW-18235-011*	*GW-18235-4A-09*	*GW-18235-030*	*GW-18235-020*	*GW-18235-001*	*GW-18235-002*	*GW-18235-001*	*GW-18235-002*	*GW-18235-001*	*GW-18235-003*
Sample Date:				*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/30/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*5/21/2014 Duplicate*	*7/22/2014*	*7/22/2014 Duplicate*	*11/21/2014*	*5/21/2014*
Parameters	*Units*	*ODWS [2]*	*ODWS Source*												
Metals															
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.10	-	-	< 0.10	-	-	-	< 0.10	< 0.10	-	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	< 0.010	-	-
Barium (dissolved)	mg/L	1.0	MAC	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Beryllium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-
Boron (dissolved)	mg/L	5.0	IMAC	0.40	0.38	0.30	0.40	0.38	0.38	0.51	0.44	0.64	0.62	0.61	0.41
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00090	-	-	< 0.00090	-	-	-	< 0.00090	< 0.00090	-	-
Calcium (dissolved)	mg/L	-	-	579	539	499	578	586	541	408	482	564	553	509	560
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	< 0.010	-	-
Iron (dissolved)	mg/L	0.30	AO	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.20**	**1.38**	**1.84**	**1.82**	**1.68**	**1.47**
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-
Magnesium (dissolved)	mg/L	-	-	356	446	411	289	260	287	267	312	403	389	376	284
Manganese (dissolved)	mg/L	0.05	AO	-	0.033	-	-	**0.129**	-	-	-	**0.051**	0.049	-	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.00010	-	-	< 0.00010	-	-	-	< 0.00010	< 0.00010	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0075	-	-	0.0161	-	-	-	0.0057	0.0056	-	-
Nickel (dissolved)	mg/L	-	-	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	< 0.010	-	-
Potassium (dissolved)	mg/L	-	-	-	< 10	-	-	< 10	-	-	-	< 10	< 10	-	-
Silver (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-	-
Sodium (dissolved)	mg/L	20/200	AO	**124**	**160**	**135**	**158**	**130**	**116**	**104**	**119**	**141**	**138**	**135**	**107**
Thallium (dissolved)	mg/L	-	-	-	< 0.0030	-	-	< 0.0030	-	-	-	< 0.0030	< 0.0030	-	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.030	-	-	< 0.030	-	-	-	< 0.030	< 0.030	-	-

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.5B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (METALS)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW6A-07*	*MW6A-07*	*MW6A-07*	*MW1A-13*	*MW1A-13*	*MW1A-13*	*OW1A-06*	*OW1A-06*	*OW1A-06*	*OW3A-13*	*OW3A-13*	*OW3A-13*
Sample ID [1] :				*GW-18235-004*	*GW-18235-005*	*GW-18235-002*	*GW-18235-007*	*GW-18235-012*	*GW-18235-005*	*GW-18235-020*	*GW-18235-024*	*GW-18235-015*	*GW-18235-009*	*GW-18235-014*	*GW-18235-007*
Sample Date:				*7/22/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*
Parameters	*Units*	*ODWS [2]*	*ODWS Source*												
Metals															
Aluminum (dissolved)	mg/L	0.10	OG	< 0.10	< 0.10	-	-	< 0.10	-	-	< 0.10	-	-	< 0.10	-
Arsenic (dissolved)	mg/L	0.025	IMAC	< 0.010	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-
Barium (dissolved)	mg/L	1.0	MAC	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.020	< 0.020
Beryllium (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Boron (dissolved)	mg/L	5.0	IMAC	0.51	0.50	0.47	0.49	0.50	0.54	0.53	0.56	0.51	0.48	0.52	0.50
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00090	< 0.00090	-	-	< 0.00090	-	-	< 0.00090	-	-	< 0.00090	-
Calcium (dissolved)	mg/L	-	-	596	588	540	541	525	486	514	514	504	609	590	551
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	-	-	0.0054	-	-	< 0.0050	-	-	0.0050	-
Copper (dissolved)	mg/L	1.0	AO	< 0.010	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-
Iron (dissolved)	mg/L	0.30	AO	**1.77**	**1.76**	**1.29**	< 0.50	< 0.50	< 0.50	**0.71**	**0.52**	**1.42**	< 0.50	< 0.50	< 0.50
Lead (dissolved)	mg/L	0.01	MAC	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Magnesium (dissolved)	mg/L	-	-	318	313	306	443	501	544	370	389	372 J	293	327	324
Manganese (dissolved)	mg/L	0.05	AO	**0.136**	**0.136**	-	-	**0.447**	-	-	**0.117**	-	-	**0.434**	-
Mercury (dissolved)	mg/L	0.001	MAC	< 0.00010	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-
Molybdenum (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	-	-	0.0419	-	-	< 0.0050	-	-	0.0067	-
Nickel (dissolved)	mg/L	-	-	< 0.010	< 0.010	-	-	0.013	-	-	< 0.010	-	-	0.014	-
Potassium (dissolved)	mg/L	-	-	< 10	< 10	-	-	19	-	-	< 10	-	-	< 10	-
Silver (dissolved)	mg/L	-	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-
Sodium (dissolved)	mg/L	20/200	AO	**116**	**116**	**111**	**826**	**797**	**615**	**137**	**144**	**137**	**170**	**186**	**178**
Thallium (dissolved)	mg/L	-	-	< 0.0030	< 0.0030	-	-	< 0.0030	-	-	< 0.0030	-	-	< 0.0030	-
Vanadium (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	< 0.030	< 0.030	-	-	< 0.030	-	-	< 0.030	-	-	< 0.030	-

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 cri
<30 Result below method detection limit

TABLE 5.5B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (METALS)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*OW5A-06*	*OW5A-06*	*OW5A-06*	*OW5A-06*	*OW8A-06*	*OW8A-06*	*OW8A-06*	*OW9A-06*	*OW9A-06*	*OW9A-06*
Sample ID [1] :				*GW-18235-019*	*GW-18235-023*	*GW-18235-014*	*GW-18235-016*	*GW-18235-025*	*GW-18235-028*	*GW-18235-018*	*GW-18235-011*	*GW-18235-016*	*GW-18235-009*
Sample Date:				*5/21/2014*	*7/22/2014*	*11/21/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*	*5/21/2014*	*7/22/2014*	*11/21/2014*
							Duplicate						
Parameters	*Units*	*ODWS [2]*	*ODWS Source*										
Metals													
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.10	-	-	-	< 0.10	-	-	< 0.10	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010	-
Barium (dissolved)	mg/L	1.0	MAC	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Beryllium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-
Boron (dissolved)	mg/L	5.0	IMAC	0.37	0.41	0.37	0.37	0.51	0.51	0.46	0.46	0.47	0.46
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00090	-	-	-	< 0.00090	-	-	< 0.00090	-
Calcium (dissolved)	mg/L	-	-	627	627	599	594	586	588	541	589	576	534
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010	-
Iron (dissolved)	mg/L	0.30	AO	**1.38**	**1.55**	**1.88**	**1.80**	**2.26**	**1.41**	**1.50**	< 0.50	< 0.50	< 0.50
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-
Magnesium (dissolved)	mg/L	-	-	202	203	188	185 J	301	316	316	329	351	341
Manganese (dissolved)	mg/L	0.05	AO	-	**0.091**	-	-	-	**0.093**	-	-	**0.162**	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.00010	-	-	-	< 0.00010	-	-	< 0.00010	-
Molybdenum (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	-	-	0.0055	-
Nickel (dissolved)	mg/L	-	-	-	< 0.010	-	-	-	< 0.010	-	-	< 0.010	-
Potassium (dissolved)	mg/L	-	-	-	< 10	-	-	-	< 10	-	-	< 10	-
Silver (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	< 0.0010	-	-	< 0.0010	-
Sodium (dissolved)	mg/L	20/200	AO	**89.6**	**91.4**	**93.1**	**94.3**	**109**	**113**	**116**	**116**	**123**	**119**
Thallium (dissolved)	mg/L	-	-	-	< 0.0030	-	-	-	< 0.0030	-	-	< 0.0030	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.030	-	-	-	< 0.030	-	-	< 0.030	-

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 cri
<30 Result below method detection limit

TABLE 5.5C

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (VOCs AND PAHs)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*MW2A-01*	*MW4A-09*	*MW5A-09*	*MW5A-09*	*MW6A-07*	*MW6A-07*	*MW1A-13*	*OW1A-06*	*OW3A-13*	*OW5A-06*	*OW8A-06*	*OW9A-06*
Sample ID [1] :					*18235-020*	*18235-030*	*18235-001*	*18235-002*	*18235-004*	*18235-005*	*18235-012*	*18235-024*	*18235-014*	*18235-023*	*18235-028*	*18235-016*
Sample Date:					*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*
								Duplicate								
Parameters	*Units*	*ODWS a*	*[2] Table 2 b*	*[3] ODWS Source*												
Volatile Organic Compounds																
1,1,1,2-Tetrachloroethane	mg/L	-	0.0011	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	-	0.2	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	-	0.001	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2-Trichloroethane	mg/L	-	0.0047	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethane	mg/L	-	0.005	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethene	mg/L	0.014	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dibromoethane (Ethylene dibromide)	mg/L	-	0.0002	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichlorobenzene	mg/L	0.2	0.003	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloroethane	mg/L	0.005	0.0016	IMAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloropropane	mg/L	-	0.005	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,3-Dichlorobenzene	mg/L	-	0.059	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.005	0.001	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L	-	1.8	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Hexanone	mg/L	-	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
4-Methyl-2-pentanone (Methyl isobutyl ketone) (I	mg/L	-	0.64	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acetone	mg/L	-	2.7	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzene	mg/L	0.005	0.005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bromodichloromethane	mg/L	-	0.016	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromoform	mg/L	-	0.025	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane (Methyl bromide)	mg/L	-	0.00089	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbon tetrachloride	mg/L	0.005	0.00079	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorobenzene	mg/L	0.08	0.03	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chloroethane	mg/L	-	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform (Trichloromethane)	mg/L	-	0.0024	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloromethane (Methyl chloride)	mg/L	-	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1,2-Dichloroethene	mg/L	-	0.0016	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
cis-1,3-Dichloropropene	mg/L	-	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dibromochloromethane	mg/L	-	0.025	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylbenzene	mg/L	0.0024	0.0024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
m&p-Xylenes	mg/L	-	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Methyl tert butyl ether (MTBE)	mg/L	-	0.015	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene chloride	mg/L	0.05	0.05	MAC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
o-Xylene	mg/L	-	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Styrene	mg/L	-	0.0054	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethene	mg/L	0.030	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toluene	mg/L	0.024	0.024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,2-Dichloroethene	mg/L	-	0.0016	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	-	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichloroethene	mg/L	0.005	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005

TABLE 5.5C

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BASAL OVERBURDEN/SHALLOW BEDROCK (VOCs AND PAHs)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					***MW2A-01***	***MW4A-09***	***MW5A-09***	***MW5A-09***	***MW6A-07***	***MW6A-07***	***MW1A-13***	***OW1A-06***	***OW3A-13***	***OW5A-06***	***OW8A-06***	***OW9A-06***
Sample ID [1] :					***18235-020***	***18235-030***	***18235-001***	***18235-002***	***18235-004***	***18235-005***	***18235-012***	***18235-024***	***18235-014***	***18235-023***	***18235-028***	***18235-016***
Sample Date:					***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***	***7/22/2014***
								Duplicate								
Parameters	***Units***	***ODWS a*** [2]	***Table 2 b*** [3]	***ODWS Source***												
Trichlorofluoromethane (CFC-11)	mg/L	-	0.15	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	mg/L	0.002	0.0005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Semi-volatile Organic Compounds																
Acenaphthene	mg/L	-	0.0041	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Acenaphthylene	mg/L	-	0.001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Anthracene	mg/L	-	0.0024	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)anthracene	mg/L	-	0.001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)pyrene	mg/L	0.00001	0.00001	MAC	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/L	-	0.0001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(g,h,i)perylene	mg/L	-	0.0002	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(k)fluoranthene	mg/L	-	0.0001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Chrysene	mg/L	-	0.0001	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000025	0.000026	< 0.00002	< 0.00002	0.000066	< 0.00002	0.000032	< 0.00002
Dibenz(a,h)anthracene	mg/L	-	0.0002	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluoranthene	mg/L	-	0.00041	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000021	< 0.00002	< 0.00002	< 0.00002
Fluorene	mg/L	-	0.12	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Indeno(1,2,3-cd)pyrene	mg/L	-	0.0002	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Naphthalene	mg/L	-	0.011	-	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Phenanthrene	mg/L	-	0.001	-	< 0.00002	< 0.00002	0.000025	0.000022	0.000052	0.00005	< 0.00002	0.000022	0.000037	< 0.00002	0.000058	< 0.00002
Pyrene	mg/L	-	0.0041	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.00003	< 0.00002	< 0.00002	< 0.00002

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
[3] Table 2, Ontario Regulation 153/04, March 2004
- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.6A

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (INORGANIC CHEMISTRY)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW1D-07*	*MW1D-07*	*MW1D-07*	*MW1S-07*	*MW1S-07*	*MW2D-07*	*MW2D-07*	*MW2S-07*	*MW2S-07*	*OW8D-07*	*OW8D-07*	*OW8D-07*	*OW8S-07*	*OW8S-07*
Sample ID [1] :				*GW-18235-005*	*GW-18235-009*	*GW-18235-010*	*GW-18235-006*	*GW-18235-011*	*GW-18235-013*	*GW-18235-018*	*GW-18235-014*	*GW-18235-019*	*GW-18235-022*	*GW-18235-023*	*GW-18235-026*	*GW-18235-024*	*GW-18235-027*
Sample Date:				*5/21/2014*	*7/22/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*
						Duplicate								*Duplicate*			
Parameters	*Units*	*ODWS [2]*	*ODWS Source*														
Field Parameters																	
Conductivity, field	uS/cm	-	-	4440	3140	-	5540	3940	5790	4040	5760	4130	4610	-	3290	5780	4120
pH, field	s.u.	6.5-8.5	OG	7.63	7.68	-	7.32	7.27	7.22	6.76	7.14	6.75	7.84	-	7.61	7.23	7.15
Temperature, field	Deg C	15	AO	10.1	11.6	-	10.4	11.2	10.3	10.9	10.5	10.6	10.3	-	11.0	10.4	10.9
General Chemistry																	
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	178	166	172	442	446	435	438	427	428	222	209	218	427	451
Ammonia-N	mg/L	-	-	3.26	2.93	2.77	0.393	0.423	0.464	0.409	0.277	< 0.227	2.76	3.03	2.53	0.307	0.353
Biochemical oxygen demand (BOI	mg/L	-	-	-	36.8	33.1	-	< 2.0	-	< 2.0	-	< 2.0	-	-	55.3	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	74	< 50	< 56	< 10	< 10	< 10	< 10	10	< 10	72	78	< 100	10	< 10
Chloride	mg/L	250	AO	15.5	17	16	11.9	12	11.9	13	11.8	13	24	24	26	12.3	13
Dissolved organic carbon (DOC)	mg/L	-	-	< 1.0	< 10	< 10	< 1.0	1.1	< 1.0	1.1	< 1.0	1.1	< 10	< 10	< 10	< 1.0	1.1
Hardness	mg/L	80-100	OG	-	**2160**	**2160**	-	**2810**	-	**2880**	-	**2910**	-	-	**2250**	-	**2850**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.50	< 0.50	< 0.10	< 0.50	< 0.10	< 0.50	< 0.10	< 0.50	< 1.0	< 1.0	< 0.50	< 0.10	< 0.50
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.50	< 0.50	-	< 0.50	-	< 0.50	-	< 0.50	-	-	< 0.50	-	< 0.50
Phenolics (total)	mg/L	-	-	-	< 0.010	< 0.010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	0.0179	-	0.0046
Phosphorus	mg/L	-	-	-	0.0296	0.0285	-	< 0.0079	-	0.0741	-	< 0.0081	-	-	< 0.0072	-	0.0214
Sulfate	mg/L	500	AO	**1770**	**1960**	**1940**	**2160**	**2460**	**2340**	**2550**	**2320**	**2640**	**2030**	**2020**	**2040**	**2290**	**2500**
Total dissolved solids (TDS)	mg/L	500	AO	**2930**	**2940**	**3040**	**3790**	**3840**	**4020**	**3950**	**4010**	**4100**	**3040**	**3070**	**3120**	**4030**	**4090**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	2.54	3.20	-	< 0.66	-	< 0.58	-	< 0.29	-	-	3.52	-	< 0.39
Total suspended solids (TSS)	mg/L	-	-	-	48.0	49.0	-	172	-	538	-	24.8	-	-	43.5	-	80.0
Turbidity	NTU	5.0	MAC	**44.0**	**63.0**	**32.0**	**6.85**	**9.71**	4.22	4.12	4.25	1.84	**18.1 J**	**31.2 J**	**43.0**	**5.95**	**10.3**

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.6B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BEDROCK (METALS)
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*MW1D-07*	*MW1D-07*	*MW1D-07*	*MW1S-07*	*MW1S-07*	*MW2D-07*	*MW2D-07*	*MW2S-07*	*MW2S-07*	*OW8D-07*	*OW8D-07*	*OW8D-07*	*OW8S-07*	*OW8S-07*
Sample ID [1] :				*GW-18235-005*	*GW-18235-009*	*GW-18235-010*	*GW-18235-006*	*GW-18235-011*	*GW-18235-013*	*GW-18235-018*	*GW-18235-014*	*GW-18235-019*	*GW-18235-022*	*GW-18235-023*	*GW-18235-026*	*GW-18235-024*	*GW-18235-027*
Sample Date:				*5/21/2014*	*7/22/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*5/21/2014*	*7/22/2014*	*5/21/2014*	*7/22/2014*
						Duplicate								*Duplicate*			
Parameters	*Units*	*ODWS [2]*	*ODWS Source*														
Metals																	
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.10	< 0.10	-	< 0.10	-	< 0.10	-	< 0.10	-	-	< 0.10	-	< 0.10
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.010	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	-	< 0.010	-	< 0.010
Barium (dissolved)	mg/L	1.0	MAC	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Beryllium (dissolved)	mg/L			-	< 0.0050	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Boron (dissolved)	mg/L	5.0	IMAC	**10.9**	**9.64**	**8.81**	0.53	0.51	0.73	0.61	0.46	0.48	**8.81**	**8.84**	**8.65**	0.51	0.51
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00090	< 0.00090	-	< 0.00090	-	< 0.00090	-	< 0.00090	-	-	< 0.00090	-	< 0.00090
Calcium (dissolved)	mg/L			627	571	583	602	577	657	559	586	556	597	570	571	573	559
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Cobalt (dissolved)	mg/L			-	< 0.0050	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Copper (dissolved)	mg/L	1.0	AO	-	< 0.010	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	-	< 0.010	-	< 0.010
Iron (dissolved)	mg/L	0.30	AO	< 0.50	< 0.50	< 0.50	**2.54**	**1.48**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.09**	**1.00**
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.0050	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Magnesium (dissolved)	mg/L			178	178	170	326	333	391	361	342	370	188	184	200	338	354
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.010	< 0.010	-	0.040	-	**0.184**	-	**0.157**	-	-	< 0.010	-	**0.275**
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.00010	< 0.00010	-	< 0.00010	-	< 0.00010	-	< 0.00010	-	-	< 0.00010	-	< 0.00010
Molybdenum (dissolved)	mg/L			-	< 0.0050	< 0.0050	-	< 0.0050	-	0.0053	-	0.0054	-	-	< 0.0050	-	0.0051
Nickel (dissolved)	mg/L			-	< 0.010	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	-	-	< 0.010	-	< 0.010
Potassium (dissolved)	mg/L			-	31	29	-	< 10	-	< 10	-	< 10	-	-	27	-	< 10
Silver (dissolved)	mg/L			-	< 0.0010	< 0.0010	-	< 0.0010	-	< 0.0010	-	< 0.0010	-	-	< 0.0010	-	< 0.0010
Sodium (dissolved)	mg/L	20/200	AO	**34.3**	**34.6**	**33.1**	**110**	**112**	**132**	**119**	**111**	**122**	**30.7**	**29.9**	**31.3**	**112**	**117**
Thallium (dissolved)	mg/L			-	< 0.0030	< 0.0030	-	< 0.0030	-	< 0.0030	-	< 0.0030	-	-	< 0.0030	-	< 0.0030
Vanadium (dissolved)	mg/L			-	< 0.0050	< 0.0050	-	< 0.0050	-	< 0.0050	-	< 0.0050	-	-	< 0.0050	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.030	< 0.030	-	< 0.030	-	< 0.030	-	< 0.030	-	-	< 0.030	-	< 0.030

Notes:

[1] Sample ID has been abbreviated.
[2] Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE 5.6C

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*MW1D-07*	*MW1D-07*	*MW1S-07*	*MW2D-07*	*MW2S-07*	*OW8D-07*	*OW8S-07*
Sample ID [1] :					*GW-18235-009*	*GW-18235-010*	*GW-18235-011*	*GW-18235-018*	*GW-18235-019*	*GW-18235-026*	*GW-18235-027*
Sample Date:					*7/22/2014*	*7/22/2014 Duplicate*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*
Parameters	*Units*	*ODWS [2] a*	*Table 2 [3] b*	*ODWS Source*							
Volatile Organic Compounds											
1,1,1,2-Tetrachloroethane	mg/L		0.0011		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L		0.2		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L		0.001		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,2-Trichloroethane	mg/L		0.0047		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethane	mg/L		0.005		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1-Dichloroethene	mg/L	0.014	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dibromoethane (Ethylene dibromide)	mg/L		0.0002		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichlorobenzene	mg/L	0.2	0.003	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloroethane	mg/L	0.005	0.0016	IMAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,2-Dichloropropane	mg/L		0.005		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,3-Dichlorobenzene	mg/L		0.059		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.005	0.001	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L		1.8		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Hexanone	mg/L		-		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/L		0.64		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acetone	mg/L		2.7		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzene	mg/L	0.005	0.005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bromodichloromethane	mg/L		0.016		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromoform	mg/L		0.025		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane (Methyl bromide)	mg/L		0.00089		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbon tetrachloride	mg/L	0.005	0.00079	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorobenzene	mg/L	0.08	0.03	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chloroethane	mg/L		-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform (Trichloromethane)	mg/L		0.0024		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloromethane (Methyl chloride)	mg/L		-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1,2-Dichloroethene	mg/L		0.0016		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
cis-1,3-Dichloropropene	mg/L		-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dibromochloromethane	mg/L		0.025		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylbenzene	mg/L	0.0024	0.0024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
m&p-Xylenes	mg/L		-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Methyl tert butyl ether (MTBE)	mg/L		0.015		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene chloride	mg/L	0.05	0.05	MAC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
o-Xylene	mg/L		-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Styrene	mg/L		0.0054		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethene	mg/L	0.030	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toluene	mg/L	0.024	0.024	AO	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,2-Dichloroethene	mg/L		0.0016		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L		-		< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichloroethene	mg/L	0.005	0.0016	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Trichlorofluoromethane (CFC-11)	mg/L		0.15		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	mg/L	0.002	0.0005	MAC	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005

TABLE 5.6C

SUMMARY OF LEACHATE ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:					*MW1D-07*	*MW1D-07*	*MW1S-07*	*MW2D-07*	*MW2S-07*	*OW8D-07*	*OW8S-07*
Sample ID [1] :					*GW-18235-009*	*GW-18235-010*	*GW-18235-011*	*GW-18235-018*	*GW-18235-019*	*GW-18235-026*	*GW-18235-027*
Sample Date:					*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*	*7/22/2014*
						Duplicate					
Parameters	***Units***	***ODWS [2] a***	***Table 2 [3] b***	***ODWS Source***							
Semi-volatile Organic Compounds											
Acenaphthene	mg/L		0.0041		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Acenaphthylene	mg/L		0.001		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Anthracene	mg/L		0.0024		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)anthracene	mg/L		0.001		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)pyrene	mg/L	0.00001	0.00001	MAC	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/L		0.0001		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(g,h,i)perylene	mg/L		0.0002		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(k)fluoranthene	mg/L		0.0001		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Chrysene	mg/L		0.0001		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Dibenz(a,h)anthracene	mg/L		0.0002		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluoranthene	mg/L		0.00041		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluorene	mg/L		0.12		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Indeno(1,2,3-cd)pyrene	mg/L		0.0002		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Naphthalene	mg/L		0.011		0.000071	0.00007	< 0.00005	< 0.00005	< 0.00005	0.000082	< 0.00005
Phenanthrene	mg/L		0.001		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.000024
Pyrene	mg/L		0.0041		< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002

Notes:

(1) Sample ID has been abbreviated.
(2) Ministry of the Environment (MOE), Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006
(3) Table 2, Ontario Regulation 153/04, March 2004
\- No Value/Not Analyzed
J The result is an estimated value.
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30 Result below method detection limit

TABLE5.8A

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:			*SW1*	*SW1*	*SW1*	*SW1*	*SW1*	*SW3*	*SW3*	*SW3*	*SW3*	*SW3*
Sample ID [1] :			*SW-18235-008*	*SW-18235-009*	*SW-18235-006*	*SW-18235-001*	*SW-18235-002*	*SW-18235-007*	*SW-18235-002*	*SW-18235-003*	*SW-18235-004*	*SW-18235-004*
Sample Date:			*3/21/2014*	*5/21/2014*	*8/12/2014*	*11/21/2014*	*11/21/2014 Duplicate*	*3/21/2014*	*5/21/2014*	*5/21/2014 Duplicate*	*8/12/2014*	*11/21/2014*
Parameters	***Units***	***PWQO [2]***										
Field Parameters												
Conductivity, field	uS/cm	-	83	157	769	347	-	619	980	-	1410	1100
Dissolved oxygen (DO), field	ug/L	-	1970	3380	1310	910	-	9020	3300	-	2720	1760
Flow, field	m/sec	-	0.026	0.049	PONDED	PONDED	-	PONDED	0.134	-	PONDED	PONDED
pH, field	s.u.	6.5-8.5	7.08	8.11	7.02	8.40	-	6.55	7.89	-	7.45	8.20
Temperature, field	Deg C	-	0.1	13.0	19.4	0.4	-	0.1	12.4	-	19.0	0.4
General Chemistry												
Alkalinity, total (as CaCO3)	µg/L	-	24000	28000	98000	147000	145000	164000	195000	203000	228000	280000
Ammonia-N	µg/L	-	78	< 50	69	54	51	109	97	103	< 50	< 50
Biochemical oxygen demand (BOD)	µg/L	-	2300	< 2000	< 2000	5300	4700	< 2000	< 2000	< 2000	2000	< 2000
Chemical oxygen demand (COD)	µg/L	-	56000	80000	58000	76000	74000	21000	52000	45000	32000	24000
Chloride	µg/L	-	3700	4900	103000	65500	64700	25300	51800	51800	68900	101000
Conductivity	umhos/cm	-	-	-	559	-	-	-	-	-	1400	-
Dissolved organic carbon (DOC)	µg/L	-	-	19700	-	23100	24300	-	10400	10000	-	8300
Hardness	µg/L	-	-	38000	-	236000	240000	-	346000	340000	-	608000
Nitrate (as N)	µg/L	-	110	< 100	< 100	< 100	< 100	450	< 100	< 100	< 100	< 100
Nitrite (as N)	µg/L	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
pH, lab	s.u.	6.5-8.5	-	-	7.25	-	-	-	-	-	7.61	-
Phenolics (total)	µg/L	1	**1.7**	< 4.3	< 1.2	< 1	< 1	< 1	< 4.6 J	< 2.4 J	< 1.2	< 1
Phosphorus	µg/L	10	**74**	**109**	**137**	**582 J**	**279 J**	**48.6**	**72.1**	**69.7**	**41.3**	**28.6**
Sulfate	µg/L	-	7400	2800	9100	7300	7200	159000	140000	140000	439000	194000
Total dissolved solids (TDS)	µg/L	-	95000	87000	291000	276000	269000	440000	490000	494000	1010000	726000
Total kjeldahl nitrogen (TKN)	µg/L	-	490	630	980	1250	1160	360	1150	1160	1200	570
Total suspended solids (TSS)	µg/L	-	4800	8800	11600	10100	9200	17200	80500 J	27200 J	17600	8800
Turbidity	NTU	-	26.0	21.4	8.67	24.8	21.4	21.0	54.0	41.0	8.15	13.1
Metals												
Aluminum	µg/L	75	-	**2010**	-	**310**	**280**	-	**1240**	**1130**	-	**420**
Arsenic	µg/L	5	-	< 1	-	< 10	< 10	-	1	1	-	< 10
Barium	µg/L	-	-	19.9	-	46	46	-	54.5	53.3	-	73
Beryllium	µg/L	11	-	< 0.5	-	< 5	< 5	-	< 0.5	< 0.5	-	< 5
Boron	µg/L	200	-	18	-	< 100	< 100	-	61	61	-	< 100
Cadmium	µg/L	0.2	-	< 0.09	-	< 0.9	< 0.9	-	< 0.09	< 0.09	-	< 0.9
Calcium	µg/L	-	-	10600	-	73800	75700	-	95800	93300	-	184000
Chromium	µg/L	1	-	**2.47**	-	< 5	< 5	-	**1.98**	**2.11**	-	< 5
Cobalt	µg/L	0.9	-	0.51	-	< 5	< 5	-	0.71	0.68	-	< 5
Copper	µg/L	5	-	2.2	-	< 10	< 10	-	3.5	3.4	-	< 10
Iron	µg/L	300	**3150**	**2350**	**1820**	**4690**	**4690**	**1190**	**1870**	**1670**	**316**	**630**
Lead	µg/L	5	-	1.08	-	< 5	< 5	-	1.5	1.42	-	< 5
Magnesium	µg/L	-	-	2900	-	12600	12400	-	25900	26000	-	36200
Manganese	µg/L	-	-	29.9	-	794	802	-	226	219	-	315
Mercury	µg/L	0.2	-	< 0.1	-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	< 0.1
Molybdenum	µg/L	40	-	< 0.5	-	< 5	< 5	-	1.98	1.96	-	< 5
Nickel	µg/L	25	-	2.3	-	< 10	< 10	-	2.7	2.6	-	< 10
Potassium	µg/L	-	-	1400	-	< 10000	< 10000	-	3200	3200	-	< 10000
Silver	µg/L	0.1	-	< 0.1	-	< 1	< 1	-	< 0.1	< 0.1	-	< 1
Sodium	µg/L	-	-	1930	-	16700	16300	-	34900	35000	-	60600
Thallium	µg/L	0.3	-	< 0.3	-	< 3	< 3	-	< 0.3	< 0.3	-	< 3
Vanadium	µg/L	6	-	3.17	-	< 5	< 5	-	2.68	2.8	-	< 5
Zinc	µg/L	30	-	**63.2**	-	**1350**	**1340**	-	11	10.6	-	< 30

Notes:

(1) Sample ID has been abbreviated.
(2) MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
- No Value/Not Analyzed
J The result is an estimated value.
1.5 Does not meet the applicable Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit

TABLE5.8A

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:			*SW4*	*SW4*	*SW4*	*SW4*	*SW4*	*SW5*	*SW5*	*SW5*	*SW6*	*SW6*	*SW6*	*SW7*	*SW7*	*SW7*	*SW7*	*SW8*	*SW8*	*SW8*
Sample ID [1] :			*SW-18235-001*	*SW-18235-002*	*SW-18235-001*	*SW-18235-001*	*SW-18235-002*	*SW-18235-009*	*SW-18235-008*	*SW-18235-007*	*SW-18235-005*	*SW-18235-006*	*SW-18235-008*	*SW-18235-006*	*SW-18235-007*	*SW-18235-005*	*SW-18235-003*	*SW-18235-004*	*SW-18235-005*	*SW-18235-009*
Sample Date:			*3/21/2014*	*3/21/2014*	*5/21/2014*	*8/12/2014*	*8/12/2014*	*3/21/2014*	*5/21/2014*	*8/12/2014*	*3/21/2014*	*5/21/2014*	*8/12/2014*	*3/21/2014*	*5/21/2014*	*8/12/2014*	*11/21/2014*	*3/21/2014*	*5/21/2014*	*8/12/2014*
				Duplicate			*Duplicate*													
Parameters	***Units***	***PWQO [2]***																		
Field Parameters																				
Conductivity, field	uS/cm	-	203	-	381	1970	-	134	754	1080	688	1030	1510	95	310	5340	862	89	68	130
Dissolved oxygen (DO), field	ug/L	-	8260	-	6140	2230	-	7610	5010	1420	3630	4280	940	8250	1880	370	1390	8250	3740	2300
Flow, field	m/sec	-	0.349	-	0.340	PONDED	-	PONDED	PONDED	PONDED	PONDED	0.125	PONDED	PONDED	PONDED	PONDED	PONDED	PONDED	0.092	PONDED
pH, field	s.u.	6.5-8.5	7.70	-	8.45	7.38	-	7.16	7.98	7.15	6.64	7.47	7.00	7.38	6.96	6.86	7.94	7.42	7.70	7.36
Temperature, field	Deg C	-	0.5	-	13.3	19.1	-	0.2	15.9	19.7	0.1	13.6	19.7	0.1	13.0	19.6	0.6	0.2	13.0	20.4
General Chemistry																				
Alkalinity, total (as CaCO3)	µg/L	-	50000	50000	103000	311000	317000	23000	131000	219000	116000	125000	176000	< 10000	81000	151000	182000	22000	20000	11000
Ammonia-N	µg/L	-	76	74	< 50	275	278	293	50	311	234	< 50	187	< 50	53	< 50	< 50	152	61	54
Biochemical oxygen demand (BOD)	µg/L	-	< 2000	< 2000	2200	3200	3300	12300	< 2000	3900	2500	< 2000	2200	3900	< 2000	4600	4000	4300	< 2000	13400
Chemical oxygen demand (COD)	µg/L	-	47000	54000	94000	89000	63000	100000	67000	74000	58000	65000	63000	19000	65000	205000	103000	74000	85000	78000
Chloride	µg/L	-	13100	13100	10400	380000	381000	5200	11700	55800	48300	38000	51800	7600	19600	29000	76800	2400	< 2000	< 2000
Conductivity	umhos/cm	-	-	-	-	1940	1940	-	-	1120	-	-	1110	-	-	531	-	-	-	123
Dissolved organic carbon (DOC)	µg/L	-	-	-	15100	-	-	-	16900	-	-	18200	-	-	18300	-	30100	-	19300	-
Hardness	µg/L	-	-	-	136000	-	-	-	251000	-	-	398000	-	-	209000	-	432000	-	30000	-
Nitrate (as N)	µg/L	-	560	560	340	< 100	< 100	700	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	670	< 100	< 100
Nitrite (as N)	µg/L	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
pH, lab	s.u.	6.5-8.5	-	-	-	7.41	7.40	-	-	7.64	-	-	7.67	-	-	7.55	-	-	-	**6.25**
Phenolics (total)	µg/L	1	< 1	< 1	< 2.7	< 1	< 1	**3.2**	< 1.7	< 1.6	< 1	< 1	< 1	< 1	< 1.4	< 1	< 1	**1.6**	< 1.9	< 1
Phosphorus	µg/L	10	**136**	**136**	**279**	**52.1**	**41.9**	**111**	**58.5**	**127**	**163**	**57.5**	**73.2**	**74**	**46.7**	**269**	**234**	**64.5**	**215**	**173**
Sulfate	µg/L	-	19900	19900	22800	98200	98900	19800	112000	298000	208000	253000	333000	15300	137000	79100	237000	12900	< 2000	37700
Total dissolved solids (TDS)	µg/L	-	195000	203000	249000	1100000	1090000	131000	355000	753000	508000	548000	765000	43000	318000	357000	654000	98000	155000	134000
Total kjeldahl nitrogen (TKN)	µg/L	-	620	550	1050	2000	2120	1390	880	1420	540	1120	1310	450	1030	1850	2130	760	1070	1790
Total suspended solids (TSS)	µg/L	-	6000 J	10000 J	58000	31000	26400	24800	4400	42500	28400	9200	12000	128000	2800	6000	10000	24000	9200	65300
Turbidity	NTU	-	104	101	135	24.0	18.6	22.0	8.24	60.7	24.0	11.7	4.95	4.96	1.72	2.12	5.04	28.0	72.0	77.6
Metals																				
Aluminum	µg/L	75	-	-	**7470**	-	-	-	**312**	-	-	**774**	-	-	**130**	-	< 100	-	**4470**	-
Arsenic	µg/L	5	-	-	1.6	-	-	-	1.1	-	-	1	-	-	< 1	-	< 10	-	< 1	-
Barium	µg/L	-	-	-	53.6	-	-	-	66.6	-	-	83.6	-	-	26.7	-	34	-	84	-
Beryllium	µg/L	11	-	-	< 0.5	-	-	-	< 0.5	-	-	< 0.5	-	-	< 0.5	-	< 5	-	< 0.5	-
Boron	µg/L	200	-	-	33	-	-	-	149	-	-	184	-	-	72	-	110	-	130	-
Cadmium	µg/L	0.2	-	-	< 0.09	-	-	-	< 0.09	-	-	< 0.09	-	-	< 0.09	-	< 0.9	-	< 0.09	-
Calcium	µg/L	-	-	-	39500	-	-	-	72800	-	-	116000	-	-	59100	-	115000	-	7990	-
Chromium	µg/L	1	-	-	**7.37**	-	-	-	**1.1**	-	-	**1.48**	-	-	0.74	-	< 5	-	**2.83**	-
Cobalt	µg/L	0.9	-	-	**2.05**	-	-	-	< 0.5	-	-	0.57	-	-	< 0.5	-	< 5	-	0.61	-
Copper	µg/L	5	-	-	**6**	-	-	-	3.3	-	-	2.9	-	-	< 1	-	< 10	-	**6.6**	-
Iron	µg/L	300	**5900**	**5730**	**6380**	**2210**	**2150**	**2180**	**876**	**1980**	**4560**	**1110**	**622**	**798**	**431**	286	**520**	**2140**	**1490**	**2530**
Lead	µg/L	5	-	-	2.62	-	-	-	0.73	-	-	0.87	-	-	< 0.5	-	< 5	-	2.02	-
Magnesium	µg/L	-	-	-	9110	-	-	-	16700	-	-	26300	-	-	15000	-	35300	-	2390	-
Manganese	µg/L	-	-	-	147	-	-	-	69.6	-	-	89.9	-	-	42.6	-	558	-	17.1	-
Mercury	µg/L	0.2	-	-	< 0.1	-	-	-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	< 0.1	-
Molybdenum	µg/L	40	-	-	0.66	-	-	-	0.55	-	-	1.34	-	-	0.69	-	< 5	-	< 0.5	-
Nickel	µg/L	25	-	-	6.5	-	-	-	2.3	-	-	3	-	-	1.7	-	< 10	-	3.5	-
Potassium	µg/L	-	-	-	3700	-	-	-	3600	-	-	5700	-	-	3500	-	12000	-	1700	-
Silver	µg/L	0.1	-	-	< 0.1	-	-	-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 1	-	< 0.1	-
Sodium	µg/L	-	-	-	7370	-	-	-	19600	-	-	27400	-	-	13900	-	39200	-	10800	-
Thallium	µg/L	0.3	-	-	< 0.3	-	-	-	< 0.3	-	-	< 0.3	-	-	< 0.3	-	< 3	-	< 0.3	-
Vanadium	µg/L	6	-	-	**10.9**	-	-	-	1.01	-	-	1.44	-	-	< 0.5	-	< 5	-	3.83	-
Zinc	µg/L	30	-	-	19.8	-	-	-	29.5	-	-	28.4	-	-	4.4	-	< 30	-	**40.6**	-

Notes:

(1) Sample ID has been abbreviated.
(2) MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
\- No Value/Not Analyzed
J The result is an estimated value.
1.5 Does not meet the applicable Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit

TABLE 5.8B

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:			*SW1*	*SW1*	*SW1*	*SW3*	*SW3*	*SW3*
Sample ID [1] :			*SW-18235-005*	*SW-18235-001*	*SW-18235-002*	*SW-18235-002*	*SW-18235-003*	*SW-18235-004*
Sample Date:			*5/21/2014*	*11/21/2014*	*11/21/2014 Duplicate*	*5/21/2014*	*5/21/2014 Duplicate*	*11/21/2014*
Parameters	***Units***	***PWQO [2]***						
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	µg/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	µg/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	µg/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	µg/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	µg/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	µg/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	400	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK	µg/L	-	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	µg/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	µg/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	µg/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	µg/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	µg/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	µg/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	µg/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	µg/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	µg/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	µg/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	µg/L	0.8	< 0.50	**2.15**	**2.23**	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	µg/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	µg/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	µg/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds								
Acenaphthene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	µg/L	0.0008	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	µg/L	0.0004	< 0.020	< 0.020	< 0.020	< 0.020	**0.028**	< 0.020
Benzo(a)pyrene	µg/L	-	< 0.010	< 0.010	< 0.010	0.014	0.026	< 0.010
Benzo(b)fluoranthene	µg/L	-	< 0.020	< 0.020	< 0.020	0.024	0.042	< 0.020
Benzo(g,h,i)perylene	µg/L	0.00002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	µg/L	0.0002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	µg/L	0.0001	< 0.020	< 0.020	< 0.020	**0.020**	**0.035**	< 0.020
Dibenz(a,h)anthracene	µg/L	0.002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	µg/L	0.0008	< 0.020	< 0.020	< 0.020	**0.038**	**0.061**	< 0.020
Fluorene	µg/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	0.022	< 0.020
Naphthalene	µg/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	µg/L	0.03	< 0.020	< 0.020	< 0.020	< 0.020	**0.031**	< 0.020
Pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	0.033	0.054	< 0.020

Notes:

[1] Sample ID has been abbreviated.
[2] MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
- No Value/Not Analyzed
J The result is an estimated value.
1.5 Does not meet the applicable Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit

TABLE 5.8B

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:			*SW4*	*SW5*	*SW6*	*SW7*	*SW7*	*SW8*
Sample ID [1] :			*SW-18235-001*	*SW-18235-005*	*SW-18235-006*	*SW-18235-007*	*SW-18235-003*	*SW-18235-005*
Sample Date:			*5/21/2014*	*5/21/2014*	*5/21/2014*	*5/21/2014*	*11/21/2014*	*5/21/2014*
Parameters	***Units***	***PWQO [2]***						
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	µg/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	µg/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	µg/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	µg/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	µg/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	µg/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	400	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK	µg/L	-	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	µg/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	µg/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	µg/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	µg/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	µg/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	µg/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	µg/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	µg/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	µg/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	µg/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	µg/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	µg/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	µg/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	µg/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds								
Acenaphthene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	µg/L	0.0008	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	µg/L	0.0004	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	µg/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	µg/L	0.00002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	µg/L	0.0002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	µg/L	0.0001	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	µg/L	0.002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	µg/L	0.0008	< 0.020	**0.026**	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	µg/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	µg/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	µg/L	0.03	< 0.020	0.025	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

[1] Sample ID has been abbreviated.
[2] MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
- No Value/Not Analyzed
J The result is an estimated value.
1.5 Does not meet the applicable Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit

TABLE 5.9

SUMMARY OF SOIL GAS MONITORING RESULTS 2014
LANDFILL GAS PROBE MONITORING AND REPORTING
BROOKS ROAD LANDFILL, CAYUGA, ONTARIO

	28-Feb-14							*31-Mar-14*						
Gas Probe Location	***Pressure (in. W.C.)***	***CH_4 (% v/v)***	***CO_2 (% v/v)***	***O_2 (% v/v)***	***Bal (% v/v)***	***Water Level (mBTOR)***	***Probe Status***	***Pressure (in. W.C.)***	***CH_4 (% v/v)***	***CO_2 (% v/v)***	***O_2 (% v/v)***	***Bal (% v/v)***	***Water Level (mBTOR)***	***Probe Status***
GP-1D	1.38	-	-	-	-	0.76	Flooded	0.58	-	-	-	-	2.36	Flooded
GP-1S	0.35	-	-	-	-	1.82	Flooded	0.00	-	-	-	-	1.87	Flooded
GP-2D	0.00	-	-	-	-	0.80	Flooded	0.00	-	-	-	-	1.01	Flooded
GP-2S	0.00	-	-	-	-	1.38	Flooded	0.00	-	-	-	-	1.16	Flooded
GPN-3D	0.00	-	-	-	-	0.58	Flooded	0.00	-	-	-	-	1.92	Flooded
GPN-3S	-0.04	-	-	-	-	1.85	Flooded	0.02	0.0	6.0	2.4	91.5	2.34	Operational

Notes:

- Not Monitored

TABLE 5.9

SUMMARY OF SOIL GAS MONITORING RESULTS 2014
LANDFILL GAS PROBE MONITORING AND REPORTING
BROOKS ROAD LANDFILL, CAYUGA, ONTARIO

	14-Apr-14							*18-Jul-14*						
Gas Probe Location	***Pressure (in. W.C.)***	***CH_4 (% v/v)***	***CO_2 (% v/v)***	***O_2 (% v/v)***	***Bal (% v/v)***	***Water Level (mBTOR)***	***Probe Status***	***Pressure (in. W.C.)***	***CH_4 (% v/v)***	***CO_2 (% v/v)***	***O_2 (% v/v)***	***Bal (% v/v)***	***Water Level (mBTOR)***	***Probe Status***
GP-1D	0.00	-	-	-	-	2.20	Flooded	0.05	-	-	-	-	2.65	Flooded
GP-1S	3.56	-	-	-	-	1.81	Flooded	0.00	24.7	26.1	6.9	42.3	2.25	Operational
GP-2D	0.00	-	-	-	-	1.24	Flooded	1.30	-	-	-	-	1.65	Flooded
GP-2S	0.00	-	-	-	-	1.24	Flooded	0.60	-	-	-	-	1.28	Flooded
GPN-3D	0.00	-	-	-	-	1.89	Flooded	0.00	-	-	-	-	1.85	Flooded
GPN-3S	0.00	-	-	-	-	1.88	Flooded	0.65	-	-	-	-	1.86	Flooded

Notes:

- Not Monitored

TABLE 5.9

SUMMARY OF SOIL GAS MONITORING RESULTS 2014
LANDFILL GAS PROBE MONITORING AND REPORTING
BROOKS ROAD LANDFILL, CAYUGA, ONTARIO

	23-Jul-14							*26-Sep-14*						
Gas Probe Location	***Pressure (in. W.C.)***	***CH_4 (% v/v)***	***CO_2 (% v/v)***	***O_2 (% v/v)***	***Bal (% v/v)***	***Water Level (mBTOR)***	***Probe Status***	***Pressure (in. W.C.)***	***CH_4 (% v/v)***	***CO_2 (% v/v)***	***O_2 (% v/v)***	***Bal (% v/v)***	***Water Level (mBTOR)***	***Probe Status***
GP-1D	-	-	-	-	-	-	-	0.05	-	-	-	-	2.65	Flooded
GP-1S	0.00	9.4	18.2	11	61.4	2.25	Operational	0.00	0	5.5	15	79.5	2.10	Operational
GP-2D	-	-	-	-	-	-	-	1.30	-	-	-	-	1.65	Flooded
GP-2S	-	-	-	-	-	-	-	0.60	-	-	-	-	1.28	Flooded
GPN-3D	-	-	-	-	-	-	-	0.00	-	-	-	-	1.85	Flooded
GPN-3S	-	-	-	-	-	-	-	0.65	-	-	-	-	1.86	Flooded

Notes:

- Not Monitored

TABLE 5.9

SUMMARY OF SOIL GAS MONITORING RESULTS 2014
LANDFILL GAS PROBE MONITORING AND REPORTING
BROOKS ROAD LANDFILL, CAYUGA, ONTARIO

	19-Dec-14						
Gas Probe Location	***Pressure (in. W.C.)***	***CH_4 (% v/v)***	***CO_2 (% v/v)***	***O_2 (% v/v)***	***Bal (% v/v)***	***Water Level (mBTOR)***	***Probe Status***
GP-1D	0.10	-	-	-	-	2.56	Flooded
GP-1S	0.07	-	-	-	-	1.76	Flooded
GP-2D	0.00	-	-	-	-	1.37	Flooded
GP-2S	0.00	-	-	-	-	1.03	Flooded
GPN-3D	0.00	-	-	-	-	2.20	Flooded
GPN-3S	0.00	0	6.3	16.2	78.4	2.14	Operational

Notes:

- Not Monitored

TABLE 5.10

SUMMARY OF TDS POND ANALYTICAL RESULTS
2014 OPERATIONS AND MONITORING REPORT
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Sample Location:				*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*	*TDS Pond*
Sample ID [1] :				*TDS-18235-001*	*SW-18235-01*	*TDS-18235-001*	*W-18235-01*	*POND*	*POND-18235-001*	*SW-018235-01*
Sample Date:				*3/21/2014*	*4/3/2014*	*5/21/2014*	*10/1/2014*	*10/29/2014*	*11/21/2014*	*12/9/2014*
Parameters	***Units***	***PWQO [2] a***	***Trigger [3] b***							
Field Parameters										
Conductivity, field	uS/cm	-	-	341	-	855	-	-	697	685
Dissolved oxygen (DO), field	ug/L	-	-	9590	-	6850	-	-	1670	-
Flow, field	m/sec	-	-	PONDED	-	PONDED	PONDED	PONDED	-	PONDED
pH, field	s.u.	6.5-8.5	6.5-8.5	7.28	6.77	**8.90[ab]**	-	-	8.28	6.78
Temperature, field	Deg C	-	-	0.3	5.3	16.0	-	-	0.8	3.5
General Chemistry										
Alkalinity, total (as CaCO3)	ug/L	-	-	61000	-	91000	-	97000	86000	-
Ammonia-N	ug/L	-	-	122	< 50	< 50	< 50	75	95	-
Biochemical oxygen demand (BOD)	ug/L	-	-	< 2000	-	5400	-	< 2000	3000	-
Chemical oxygen demand (COD)	ug/L	-	-	< 10000	-	52000	-	21000	29000	-
Chloride	ug/L	-	-	6100	-	24800	-	22300	22100	-
Conductivity	umhos/cm	-	-	-	-	669	-	699	-	-
Hardness	ug/L	-	-	164000	-	311000	-	365000	336000	-
Nitrate (as N)	ug/L	-	-	280	-	< 100	-	< 100	< 100	-
Nitrite (as N)	ug/L	-	-	< 100	-	< 100	-	< 100	< 100	-
pH, lab	s.u.	6.5-8.5	6.5-8.5	-	7.77	**8.53[ab]**	8.16	8.20	-	8.05
Phenolics (total)	ug/L	1	-	< 1	-	< 1.7	-	< 1	< 1	-
Phosphorus	ug/L	10	320	**16[a]**	**22.2[a]**	**77.4[a]**	**16.7[a]**	**35.7[a]**	**28.1[a]**	-
Sulfate	ug/L	-	-	110000	-	225000	-	241000	239000	-
Total dissolved solids (TDS)	ug/L	-	-	217000	-	450000	-	453000	449000	-
Total kjeldahl nitrogen (TKN)	ug/L	-	-	310	-	520	-	650	610	-
Total suspended solids (TSS)	ug/L	-	25000	4000	-	**46700[b]**	12000	14700	4400	7600
Un-ionized ammonia	ug/L	20	20	-	< 0.046	-	-	-	-	-
Metals										
Arsenic	ug/L	5	-	< 1	-	< 1	-	< 1	< 10	-
Barium	ug/L	-	-	15.8	-	78.5	-	30.6	28	-
Boron	ug/L	200	1500	21	< 10	127	70	75	< 100	-
Cadmium	ug/L	0.2	-	< 0.09	-	< 0.09	-	< 0.09	< 0.9	-
Calcium	ug/L	-	-	35200	-	67300	-	-	66800	-
Chromium	ug/L	1	-	< 0.5	-	**2.07[a]**	-	0.67	< 5	-
Copper	ug/L	5	-	2.7	-	4	-	1.5	< 10	-
Iron	ug/L	300	4350	160	237	**1760[a]**	**483[a]**	**381[a]**	< 500	-
Lead	ug/L	5	-	< 0.5	-	1.19	-	< 0.5	< 5	-
Magnesium	ug/L	-	-	18600	-	34700	-	-	41000	-
Mercury	ug/L	0.2	-	-	-	< 0.1	-	-	< 0.1	-
Mercury (dissolved)	ug/L	0.2	-	< 0.1	-	-	-	< 0.10	-	-
Zinc	ug/L	30	110	4.3	< 3	27.8	3.1	5.2	< 30	-
Volatile Organic Compounds										
Ethylbenzene	ug/L	8	-	< 0.50	-	< 0.50	< 0.50	< 0.50	< 0.50	-
Toluene	ug/L	0.8	0.8	-	< 0.50	-	-	-	-	-
Semi-volatile Organic Compounds										
Benzo(a)pyrene	ug/L	-	-	< 0.0050	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	-
Fluorene	ug/L	0.2	0.2	-	< 0.020	-	-	-	-	-
Naphthalene	ug/L	7	7	< 0.020	< 0.050	< 0.020	< 0.020	< 0.020	< 0.020	-

Notes:

(1) Sample ID has been abbreviated.
(2) MOE "Water Management Policies Guidelines Provincial Water Quality Objectives", July 1994 (reprinted February 1999).
(3) TDS Trigger Parameters as per the Industrial Sewage Works ECA
\- No Value/Not Analyzed
J The result is an estimated value.
1.5 Does not meet the applicable Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit

Table 5.3

Summary of Leachate Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					**Leachate Storage Tank**
Sample ID:					**LW-18235-0715-DD-001**
Sample Date:					**7/16/2015**
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**	
Field Parameters					
Conductivity, field	uS/cm	-	-	-	5890
pH, field	s.u.	6.5-8.5	6.5-8.5	OG	**6.36[ab]**
Temperature, field	deg C	15	-	AO	**35.2[a]**
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	30	-	OG	**2400[a]**
Ammonia-N	mg/L	-	-	-	132
Biochemical oxygen demand (BOD)	mg/L	-	-	-	80.0
Chemical oxygen demand (COD)	mg/L	-	-	-	590
Chloride	mg/L	250	-	AO	**679[a]**
Conductivity	umhos/cm	-	-	-	6030
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	-	AO	**135[a]**
Hardness	mg/L	80	-	OG	**1740[a]**
Nitrate (as N)	mg/L	10	-	MAC	< 0.40
Nitrite (as N)	mg/L	1	-	MAC	< 0.20
pH, lab	s.u.	6.5-8.5	6.5-8.5	OG	7.45
Phenolics (total)	mg/L	-	0.001	-	**0.247[b]**
Phosphorus	mg/L	-	0.03	-	**0.119[b]**
Sulfate	mg/L	500	-	AO	153
Total dissolved solids (TDS)	mg/L	500	-	AO	**3440[a]**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	120
Total organic carbon (TOC)	mg/L	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	63.2
Turbidity	NTU	5.0	-	MAC	**200[a]**
Metals					
Aluminum	mg/L	0.1	0.075	OG	**0.49[ab]**
Arsenic	mg/L	0.025	0.005	IMAC	**0.046[ab]**
Barium	mg/L	1	-	MAC	0.356
Beryllium	mg/L	-	1.1	-	< 0.0050
Boron	mg/L	5	0.2	IMAC	**8.83[ab]**
Cadmium	mg/L	0.005	0.0005	MAC	**< 0.00090[b]**
Calcium	mg/L	-	-	-	342
Chromium	mg/L	0.05	0.001	MAC	**0.0194[b]**
Cobalt	mg/L	-	0.0009	-	**< 0.0050[b]**
Copper	mg/L	1	0.005	AO	**< 0.010[b]**
Iron	mg/L	0.3	0.3	AO	**0.55[ab]**
Lead	mg/L	0.01	0.005	MAC	< 0.0050
Magnesium	mg/L	-	-	-	217
Manganese	mg/L	0.05	-	AO	**0.279[a]**
Mercury	mg/L	0.001	0.0002	MAC	< 0.000050
Molybdenum	mg/L	-	0.04	-	< 0.0050
Nickel	mg/L	-	0.025	-	**0.068[b]**
Potassium	mg/L	-	-	-	150
Silver	mg/L	-	0.0001	-	**< 0.0010[b]**
Sodium	mg/L	20	-	AO	**634[a]**
Thallium	mg/L	-	0.0003	-	**< 0.0030[b]**
Vanadium	mg/L	-	0.006	-	**0.0180[b]**
Zinc	mg/L	5	0.02	AO	**< 0.030 [b]**
Semi-volatile Organic Compounds					
Acenaphthene	µg/L	-	-	-	0.577
Acenaphthylene	µg/L	-	-	-	< 0.020
Anthracene	µg/L	-	0.0008	-	**< 0.20[b]**
Benzo(a)anthracene	µg/L	-	0.0004	-	**0.041[b]**
Benzo(a)pyrene	µg/L	0.01	-	MAC	< 0.010
Benzo(b)fluoranthene	µg/L	-	-	-	< 0.020
Benzo(g,h,i)perylene	µg/L	-	0.00002	-	**< 0.020[b]**
Benzo(k)fluoranthene	µg/L	-	0.0002	-	**< 0.020[b]**
Chrysene	µg/L	-	0.0001	-	**0.032[b]**

Table 5.3

Summary of Leachate Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					**Leachate Storage Tank**
Sample ID:					**LW-18235-0715-DD-001**
Sample Date:					**7/16/2015**
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**	
Semi-volatile Organic Compounds (cont'd)					
Dibenz(a,h)anthracene	µg/L	-	0.002	-	**< 0.020[b]**
Fluoranthene	µg/L	-	0.0008	-	**1.04[b]**
Fluorene	µg/L	-	0.2	-	**0.423[b]**
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	< 0.020
Naphthalene	µg/L	-	7	-	**7.20[b]**
Phenanthrene	µg/L	-	0.03	-	**1.39[b]**
Pyrene	µg/L	-	-	-	0.517
Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	µg/L	-	20	-	< 0.50
1,1,1-Trichloroethane	µg/L	-	10	-	< 0.50
1,1,2,2-Tetrachloroethane	µg/L	-	70	-	< 0.50
1,1,2-Trichloroethane	µg/L	-	800	-	< 0.50
1,1-Dichloroethane	µg/L	-	200	-	< 0.50
1,1-Dichloroethene	µg/L	14	40	MAC	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	5	-	< 0.50
1,2-Dichlorobenzene	µg/L	200	2.5	MAC	< 0.50
1,2-Dichloroethane	µg/L	5	100	IMAC	1.35
1,2-Dichloropropane	µg/L	-	0.7	-	< 0.50
1,3-Dichlorobenzene	µg/L	-	2.5	-	< 0.50
1,4-Dichlorobenzene	µg/L	5	4	MAC	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	400	-	24
2-Hexanone	µg/L	-	-	-	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	< 20
Acetone	µg/L	-	-	-	32
Benzene	µg/L	5	100	MAC	3.02
Bromodichloromethane	µg/L	-	200	-	< 2.0
Bromoform	µg/L	-	60	-	< 1.0
Bromomethane (Methyl bromide)	µg/L	-	0.9	-	< 0.50
Carbon tetrachloride	µg/L	5	-	MAC	< 0.50
Chlorobenzene	µg/L	80	15	MAC	< 0.50
Chloroethane	µg/L	-	-	-	< 1.0
Chloroform (Trichloromethane)	µg/L	-	-	-	< 1.0
Chloromethane (Methyl chloride)	µg/L	-	700	-	< 1.0
cis-1,2-Dichloroethene	µg/L	-	200	-	< 0.50
cis-1,3-Dichloropropene	µg/L	-	-	-	< 0.50
Dibromochloromethane	µg/L	-	40	-	< 2.0
Ethylbenzene	µg/L	2.4	8	AO	**5.34[a]**
m&p-Xylenes	µg/L	-	2	-	**7.5[b]**
Styrene	µg/L	-	4	-	< 0.50
Tetrachloroethene	µg/L	30	50	MAC	< 0.50
Toluene	µg/L	24	0.8	AO	**9.10[b]**
trans-1,2-Dichloroethene	µg/L	-	200	-	0.63
trans-1,3-Dichloropropene	µg/L	-	7	-	< 0.50
Trichloroethene	µg/L	5	20	MAC	< 0.50
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	< 5.0
Trihalomethanes	µg/L	100	-	MAC	< 3.2
Methyl tert butyl ether (MTBE)	µg/L	-	200	-	< 2.0
Methylene chloride	µg/L	50	100	MAC	< 5.0
o-Xylene	µg/L	-	40	-	3.49
Xylenes (total)	µg/L	300	-	AO	11.0
Vinyl chloride	µg/L	2	600	MAC	< 1.5

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1-03	MW1-03	MW1-03	MW2-03	MW2-03
Sample ID:				GW-18235-0515-DD-024	GW-18235-0715-DD-028	GW-18235-0915-DD-023	GW-18235-0515-DD-020	GW-18235-0515-DD-021
Sample Date:				5/23/2015	7/16/2015	11/12/2015	5/23/2015	5/23/2015 Duplicate
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	1360	1300	1260	1210	-
pH, field	s.u.	6.5-8.5	OG	6.57	**6.07**	7.38	6.54	-
Temperature, field	deg C	15	AO	8.7	11.8	13.2	8.3	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	468	467	409	422	408
Ammonia-N	mg/L	-	-	< 0.050	< 0.064	< 0.050	0.078	0.067
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	-
Chemical oxygen demand (COD)	mg/L	-	-	11	< 10	18	< 10	< 10
Chloride	mg/L	250	AO	108	110	109	161	161
Conductivity	umhos/cm	-	-	1350	1370	1390	1410	1400
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	**6.1**	4.0	**5.2**	**6.2**	**6.8**
Hardness	mg/L	80-100	OG	-	**620**	-	-	-
Nitrate (as N)	mg/L	10.0	MAC	0.061	< 0.10	< 0.10	0.056	0.059
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	-
pH, lab	s.u.	6.5-8.5	OG	7.32	7.76	7.59	7.90	7.84
Phenolics (total)	mg/L	-	-	-	< 0.0016	-	-	-
Phosphorus	mg/L	-	-	-	0.121	-	-	-
Sulfate	mg/L	500	AO	194	215	224	145	145
Total dissolved solids (TDS)	mg/L	500	AO	**837**	**822**	**942 J**	**768**	**797**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.16	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	231	-	-	-
Turbidity	NTU	5.0	MAC	**5.15**	**24.0**	**81.5**	**6.51**	4.15

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2-03	MW2-03	MW2B-07	MW2C-01	MW3-03
Sample ID:				GW-18235-0715-DD-026	GW-18235-0915-DD-021	GW-18235-0915-DD-012	GW-18235-0515-DD-011	GW-18235-0515-DD-022
Sample Date:				7/16/2015	11/12/2015	11/12/2015	5/23/2015	5/23/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	1400	1070	1020	3770	1300
pH, field	s.u.	6.5-8.5	OG	**6.14**	7.55	7.74	6.55	6.54
Temperature, field	deg C	15	AO	12.1	13.0	11.8	10.4	8.7
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	432	336	355	**850**	455
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	0.065	< 0.050	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	-	-	-	-
Chemical oxygen demand (COD)	mg/L	-	-	12	29	21	< 10	13
Chloride	mg/L	250	AO	165	153	9.2	14.1	100
Conductivity	umhos/cm	-	-	1430	1340	1120	4760	1390
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	**5.5**	**5.9**	**5.4**	**5.4**	**6.7**
Hardness	mg/L	80-100	OG	**611**	-	-	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	0.41	0.20	0.033
Nitrite (as N)	mg/L	1.0	MAC	< 0.050	-	-	-	-
pH, lab	s.u.	6.5-8.5	OG	7.56	7.60	7.97	7.86	7.93
Phenolics (total)	mg/L	-	-	< 0.0010	-	-	-	-
Phosphorus	mg/L	-	-	0.0615	-	-	-	-
Sulfate	mg/L	500	AO	168	166	300	**2630**	172
Total dissolved solids (TDS)	mg/L	500	AO	**727**	**830 J**	**591 J**	**4090**	**826**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	< 0.15	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	129	-	-	-	-
Turbidity	NTU	5.0	MAC	**34.0**	**52.6**	**1000**	**13.8**	**6.93**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW3-03	MW3-03	MW3-03	MW6B-07	MW6B-07
Sample ID:				GW-18235-0515-DD-023	GW-18235-0715-DD-027	GW-18235-0915-DD-022	GW-18235-0515-DD-003	GW-18235-0715-DD-003
Sample Date:				5/23/2015	7/16/2015	11/12/2015	5/23/2015	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**	**Duplicate**				
Field Parameters								
Conductivity, field	uS/cm	-	-	-	1200	847	2660	2580
pH, field	s.u.	6.5-8.5	OG	-	**6.04**	7.56	6.58	**6.28**
Temperature, field	deg C	15	AO	-	11.4	12.8	9.1	12.0
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	458	470	419	472	485
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	< 10	12	18	16	< 10
Chloride	mg/L	250	AO	100	93.3	89.4	34.4	66.1
Conductivity	umhos/cm	-	-	1390	1350	1330	2910	2880
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	4.0	**7.3**	**5.8**	3.3	3.4
Hardness	mg/L	80-100	OG	-	**585**	-	-	**1740**
Nitrate (as N)	mg/L	10.0	MAC	0.034	0.11	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	< 0.050
pH, lab	s.u.	6.5-8.5	OG	7.91	7.75	7.73	7.90	7.83
Phenolics (total)	mg/L	-	-	-	< 0.0011	-	-	< 0.0010
Phosphorus	mg/L	-	-	-	0.160	-	-	< 0.0188
Sulfate	mg/L	500	AO	171	139	208	**3840**	**1330**
Total dissolved solids (TDS)	mg/L	500	AO	**776**	**784**	**758 J**	**2470**	**2400**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.33	-	-	0.20
Total suspended solids (TSS)	mg/L	-	-	-	235	-	-	17.2
Turbidity	NTU	5.0	MAC	**7.55**	**37.0**	**102**	3.74	3.74

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW6B-07	MW1B-13	MW1B-13	MW1B-13	OW1B-06
Sample ID:				GW-18235-0915-DD-004	GW-18235-0515-DD-005	GW-18235-0715-DD-007	GW-18235-0915-DD-006	GW-18235-0515-DD-015
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	2570	3040	2680	1990	2020
pH, field	s.u.	6.5-8.5	OG	7.61	**6.47**	**6.49**	7.55	6.53
Temperature, field	deg C	15	AO	12.6	10.4	13.7	12.1	8.0
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	465	487	**516**	466	**549**
Ammonia-N	mg/L	-	-	< 0.050	0.064	< 0.093	0.122	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	-
Chemical oxygen demand (COD)	mg/L	-	-	< 10	23	< 10	21	< 10
Chloride	mg/L	250	AO	68.1	65.5	66.0	57.5	31.9
Conductivity	umhos/cm	-	-	2880	3020	3000	2630	1880
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	3.7	**7.0**	**6.2**	**6.2**	3.2
Hardness	mg/L	80-100	OG	-	-	**1660**	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	0.12	< 0.10	< 0.10	0.068
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.050	-	-
pH, lab	s.u.	6.5-8.5	OG	7.67	7.91	7.78	7.73	8.07
Phenolics (total)	mg/L	-	-	-	-	< 0.0011	-	-
Phosphorus	mg/L	-	-	-	-	0.219	-	-
Sulfate	mg/L	500	AO	**1370**	**1430**	**1410**	**1250**	**545**
Total dissolved solids (TDS)	mg/L	500	AO	**2460**	**2380**	**2440**	**2100 J**	**1140**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.47	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	1080	-	-
Turbidity	NTU	5.0	MAC	**10.4**	**10.7**	**17.5**	**335**	**7.01**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW1B-06	OW1B-06	OW3B-13	OW3B-13	OW3B-13
Sample ID:				GW-18235-0715-DD-019	GW-18235-0915-DD-016	GW-18235-0515-DD-007	GW-18235-0715-DD-009	GW-18235-0915-DD-008
Sample Date:				7/16/2015	11/12/2015	5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	1800	1720	1330	1240	1140
pH, field	s.u.	6.5-8.5	OG	**6.38**	7.60	6.63	**6.40**	7.46
Temperature, field	deg C	15	AO	10.9	12.3	10.7	14.3	12.1
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**771**	**555**	428	434	419
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	0.089	< 0.052	0.377
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 10	16	< 10	< 10	14
Chloride	mg/L	250	AO	26.1	51.4	7.37	5.3	3.9
Conductivity	umhos/cm	-	-	2090	1950	1270	1150	1150
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	3.7	3.8	4.3	3.5	3.2
Hardness	mg/L	80-100	OG	**1140**	-	-	**542**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	0.227	< 0.10	0.30
Nitrite (as N)	mg/L	1.0	MAC	< 0.050	-	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.89	7.76	8.05	7.87	7.54
Phenolics (total)	mg/L	-	-	< 0.0035	-	-	< 0.0010	-
Phosphorus	mg/L	-	-	0.0771	-	-	0.261	-
Sulfate	mg/L	500	AO	**602**	**583**	334	289	251
Total dissolved solids (TDS)	mg/L	500	AO	**1280**	**1350 J**	**769**	**670**	**685 J**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	< 0.15	-	-	0.19	-
Total suspended solids (TSS)	mg/L	-	-	102	-	-	963	-
Turbidity	NTU	5.0	MAC	**26.0**	**55.8**	**6.62**	**28.0**	**1000**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW5B-06	OW5B-06	OW5B-06	OW8B-06	OW8B-06
Sample ID:				GW-18235-0515-DD-012	GW-18235-0715-DD-015	GW-18235-0915-DD-013	GW-18235-0515-DD-017	GW-18235-0715-DD-024
Sample Date:				5/23/2015	7/16/2015	11/12/2015	5/23/2015	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	3260	2970	2680	1710	1590
pH, field	s.u.	6.5-8.5	OG	**6.47**	**6.21**	7.45	6.54	**6.49**
Temperature, field	deg C	15	AO	7.9	11.0	11.8	10.1	12.2
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	475	482	338	**597**	**672**
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	0.092	0.067	< 0.074
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	27	21	27	< 10	< 10
Chloride	mg/L	250	AO	249	231	187	52.5	67.8
Conductivity	umhos/cm	-	-	3440	3370	3090	1660	1690
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	**9.7**	**8.7**	**10.3**	3.1	3.1
Hardness	mg/L	80-100	OG	-	**1860**	-	-	**774**
Nitrate (as N)	mg/L	10.0	MAC	0.50	0.40	0.19	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	< 0.050
pH, lab	s.u.	6.5-8.5	OG	7.79	7.60	7.68	8.12	7.91
Phenolics (total)	mg/L	-	-	-	< 0.0024	-	-	< 0.0010
Phosphorus	mg/L	-	-	-	0.0897	-	-	< 0.0165
Sulfate	mg/L	500	AO	**1370**	**1410**	**1430**	317	321
Total dissolved solids (TDS)	mg/L	500	AO	**2960**	**2810**	**2860 J**	**845**	**869**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.90	-	-	< 0.15
Total suspended solids (TSS)	mg/L	-	-	-	281	-	-	18.5
Turbidity	NTU	5.0	MAC	**6.50**	**42.0**	**91.1**	2.65	**15.2**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW8B-06	OW9B-06	OW9B-06	OW9B-06
Sample ID:				GW-18235-0915-DD-018	GW-18235-0515-DD-009	GW-18235-0715-DD-011	GW-18235-0915-DD-010
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [(1)]**	**ODWS Source**				
Field Parameters							
Conductivity, field	uS/cm	-	-	1700	1790	1720	1690
pH, field	s.u.	6.5-8.5	OG	7.40	6.66	**6.46**	7.75
Temperature, field	deg C	15	AO	12.8	9.4	10.6	11.7
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	446	**592**	**659**	**537**
Ammonia-N	mg/L	-	-	0.052	< 0.050	< 0.050	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	14	11	< 10	14
Chloride	mg/L	250	AO	102	42.4	42.4	11.3
Conductivity	umhos/cm	-	-	1860	1900	1880	1870
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	3.5	4.3	4.6	3.9
Hardness	mg/L	80-100	OG	-	-	**806**	-
Nitrate (as N)	mg/L	10.0	MAC	0.23	0.051	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.66	8.11	8.04	7.92
Phenolics (total)	mg/L	-	-	-	-	< 0.0015	-
Phosphorus	mg/L	-	-	-	-	< 0.0238	-
Sulfate	mg/L	500	AO	391	474	483	**2450**
Total dissolved solids (TDS)	mg/L	500	AO	**1380 J**	**1100**	**1090**	**986 J**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	< 0.15	-
Total suspended solids (TSS)	mg/L	-	-	-	-	49.3	-
Turbidity	NTU	5.0	MAC	**14.4**	4.12	**17.8**	**83.7**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1-03	MW1-03	MW1-03	MW2-03	MW2-03	MW2-03
Sample ID:				GW-18235-0515-DD-024	GW-18235-0715-DD-028	GW-18235-0915-DD-023	GW-18235-0515-DD-020	GW-18235-0515-DD-021	GW-18235-0715-DD-026
Sample Date:				5/23/2015	7/16/2015	11/12/2015	5/23/2015	5/23/2015 Duplicate	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.0053	-	-	-	< 0.0050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.00022	-	-	-	< 0.00034
Barium (dissolved)	mg/L	1.0	MAC	0.0507	0.0768	0.0785	0.0510	0.0395	0.0537
Beryllium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	-	< 0.00010
Boron (dissolved)	mg/L	5.0	IMAC	0.025	0.036	< 0.10	0.025	0.038	0.026
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.000010	-	-	-	0.000015
Calcium (dissolved)	mg/L	-	-	196	168	183	194	152	175
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.00050	-	-	-	< 0.00050
Cobalt (dissolved)	mg/L	-	-	-	< 0.00010	-	-	-	< 0.00010
Copper (dissolved)	mg/L	1.0	AO	-	0.00095	-	-	-	0.00176
Iron (dissolved)	mg/L	0.30	AO	< 0.050	< 0.010	< 0.10	< 0.050	< 0.050	< 0.010
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.000050	-	-	-	< 0.000050
Magnesium (dissolved)	mg/L	-	-	40.5	48.8	50.6	40.8	64.8	42.4
Manganese (dissolved)	mg/L	0.05	AO	-	0.00212	-	-	-	< 0.00050
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	0.000864	-	-	-	0.000932
Nickel (dissolved)	mg/L	-	-	-	0.00089	-	-	-	0.00137
Potassium (dissolved)	mg/L	-	-	-	2.07	-	-	-	1.79
Silver (dissolved)	mg/L	-	-	-	< 0.000050	-	-	-	< 0.000050
Sodium (dissolved)	mg/L	20/200	AO	**53.3**	**48.0**	**52.0**	**53.5**	**55.6**	**53.3**
Thallium (dissolved)	mg/L	-	-	-	0.000011	-	-	-	< 0.000010
Vanadium (dissolved)	mg/L	-	-	-	< 0.00050	-	-	-	< 0.00050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.0014	-	-	-	< 0.0028

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2-03	MW2B-07	MW2C-01	MW3-03	MW3-03	MW3-03
Sample ID:				GW-18235-0915-DD-021	GW-18235-0915-DD-012	GW-18235-0515-DD-011	GW-18235-0515-DD-022	GW-18235-0515-DD-023	GW-18235-0715-DD-027
Sample Date:				11/12/2015	11/12/2015	5/23/2015	5/23/2015	5/23/2015 Duplicate	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	-	-	-	-	< 0.0050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	-	-	-	< 0.00045
Barium (dissolved)	mg/L	1.0	MAC	0.0554	0.0368	< 0.020	0.0400	0.0639	0.0394
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	< 0.00010
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	0.31	0.038	0.037	0.039
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	-	-	-	0.000020
Calcium (dissolved)	mg/L	-	-	150	72.9	189	155	182	140
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-	< 0.00050
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	0.00010
Copper (dissolved)	mg/L	1.0	AO	-	-	-	-	-	0.00195
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	**< 0.50**	0.054	< 0.050	< 0.010
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-	< 0.000050
Magnesium (dissolved)	mg/L	-	-	31.3	64.1	590	65.7	48.7	57.2
Manganese (dissolved)	mg/L	0.05	AO	-	-	-	-	-	0.00078
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	-	-	-	-	0.00123
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.00099
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	1.14
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	< 0.000050
Sodium (dissolved)	mg/L	20/200	AO	**61.0**	**51.5**	**286**	**55.9**	**47.3**	**53.7**
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	< 0.000010
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	< 0.00050
Zinc (dissolved)	mg/L	5.0	AO	-	-	-	-	-	< 0.0016

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW3-03	MW6B-07	MW6B-07	MW6B-07	MW1B-13	MW1B-13
Sample ID:				GW-18235-0915-DD-022	GW-18235-0515-DD-003	GW-18235-0715-DD-003	GW-18235-0915-DD-004	GW-18235-0515-DD-005	GW-18235-0715-DD-007
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	-	-	0.0012
Barium (dissolved)	mg/L	1.0	MAC	0.0389	< 0.020	0.0131	0.0139	0.064	0.0580
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-	0.00011
Calcium (dissolved)	mg/L	-	-	118	218	202	222	234	237
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-	< 0.0050
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	0.0056
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	-	0.0024
Iron (dissolved)	mg/L	0.30	AO	< 0.10	**< 0.50**	< 0.10	< 0.10	**< 0.50**	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-	< 0.00050
Magnesium (dissolved)	mg/L	-	-	51.9	309	301	307	287	259
Manganese (dissolved)	mg/L	0.05	AO	-	-	< 0.0050	-	-	**0.737**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00097	-	-	0.00706
Nickel (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	0.0150
Potassium (dissolved)	mg/L	-	-	-	-	2.50	-	-	2.61
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	-	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**55.8**	**82.6**	**80.1**	**83.4**	**143**	**134**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	-	0.00012
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	-	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1B-13	OW1B-06	OW1B-06	OW1B-06	OW3B-13	OW3B-13
Sample ID:				GW-18235-0915-DD-006	GW-18235-0515-DD-015	GW-18235-0715-DD-019	GW-18235-0915-DD-016	GW-18235-0515-DD-007	GW-18235-0715-DD-009
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.0050	-	-	< 0.0050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.00055	-	-	0.00070
Barium (dissolved)	mg/L	1.0	MAC	0.0496	0.0238	0.0244	0.0300	0.0650	0.0761
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	-	< 0.00010
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	0.033	0.057	< 0.10	0.048	0.065
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.000010	-	-	0.000056
Calcium (dissolved)	mg/L	-	-	189	125	102	127	124	106
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.00050	-	-	< 0.00050
Cobalt (dissolved)	mg/L	-	-	-	-	0.00024	-	-	0.00154
Copper (dissolved)	mg/L	1.0	AO	-	-	0.00036	-	-	0.00166
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.050	0.148	< 0.10	< 0.050	< 0.010
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.000050	-	-	< 0.000050
Magnesium (dissolved)	mg/L	-	-	183	186	214	191	78.6	67.3
Manganese (dissolved)	mg/L	0.05	AO	-	-	0.0110	-	-	**0.301**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00263	-	-	0.00807
Nickel (dissolved)	mg/L	-	-	-	-	0.00065	-	-	0.00555
Potassium (dissolved)	mg/L	-	-	-	-	3.69	-	-	4.81
Silver (dissolved)	mg/L	-	-	-	-	< 0.000050	-	-	< 0.000050
Sodium (dissolved)	mg/L	20/200	AO	**102**	**67.1**	**77.1**	**71.0**	**50.4**	**61.9**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.000010	-	-	0.000089
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.00050	-	-	< 0.00050
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.0019	-	-	< 0.0025

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW3B-13	OW5B-06	OW5B-06	OW5B-06	OW8B-06	OW8B-06
Sample ID:				GW-18235-0915-DD-008	GW-18235-0515-DD-012	GW-18235-0715-DD-015	GW-18235-0915-DD-013	GW-18235-0515-DD-017	GW-18235-0715-DD-024
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-	< 0.0050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	-	-	< 0.00027
Barium (dissolved)	mg/L	1.0	MAC	0.0910	0.038	0.0328	0.0359	0.0207	0.0224
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	< 0.00010
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	0.19	0.24	0.30	0.745	1.13
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-	0.000020
Calcium (dissolved)	mg/L	-	-	157	344	322	366	84.6	101
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-	< 0.00050
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	< 0.00010
Copper (dissolved)	mg/L	1.0	AO	-	-	0.0025	-	-	0.00046
Iron (dissolved)	mg/L	0.30	AO	< 0.10	**< 0.50**	< 0.10	< 0.10	< 0.050	< 0.010
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-	< 0.000050
Magnesium (dissolved)	mg/L	-	-	54.0	281	257	208	152	127
Manganese (dissolved)	mg/L	0.05	AO	-	-	< 0.0050	-	-	< 0.00050
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00247	-	-	0.00430
Nickel (dissolved)	mg/L	-	-	-	-	0.0062	-	-	0.00069
Potassium (dissolved)	mg/L	-	-	-	-	3.39	-	-	2.43
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	-	-	< 0.000050
Sodium (dissolved)	mg/L	20/200	AO	**32.6**	**119**	**120**	**125**	**86.6**	**93.3**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	-	< 0.000010
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	< 0.00050
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	-	< 0.0018

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW8B-06	OW9B-06	OW9B-06	OW9B-06
Sample ID:				GW-18235-0915-DD-018	GW-18235-0515-DD-009	GW-18235-0715-DD-011	GW-18235-0915-DD-010
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**				
Metals							
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.0050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.00028	-
Barium (dissolved)	mg/L	1.0	MAC	0.0296	0.0250	0.0237	0.0268
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.00010	-
Boron (dissolved)	mg/L	5.0	IMAC	1.59	0.102	0.100	0.13
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	0.000019	-
Calcium (dissolved)	mg/L	-	-	138	74.5	66.0	70.7
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.00050	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.00010	-
Copper (dissolved)	mg/L	1.0	AO	-	-	0.00053	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.050	< 0.010	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.000050	-
Magnesium (dissolved)	mg/L	-	-	124	168	156	169
Manganese (dissolved)	mg/L	0.05	AO	-	-	< 0.00050	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00296	-
Nickel (dissolved)	mg/L	-	-	-	-	0.00075	-
Potassium (dissolved)	mg/L	-	-	-	-	4.90	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.000050	-
Sodium (dissolved)	mg/L	20/200	AO	**105**	**141**	**128**	**137**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.000010	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.00050	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.0017	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.4C

Summary of Groundwater Analytical Results - Shallow Overburden
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1-03	MW2-03	MW3-03	MW6B-07	MW1B-13	OW1B-06	OW3B-13	OW5B-06	OW8B-06	OW9B-06
Sample ID:					GW-18235-0715-DD-028	GW-18235-0715-DD-026	GW-18235-0715-DD-027	GW-18235-0715-DD-003	GW-18235-0715-DD-007	GW-18235-0715-DD-019	GW-18235-0715-DD-009	GW-18235-0715-DD-015	GW-18235-0715-DD-024	GW-18235-0715-DD-011
Sample Date:					7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**										
Volatile Organic Compounds														
1,1,1,2-Tetrachloroethane	µg/L	-	1.1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	µg/L	-	200	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	µg/L	-	1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	µg/L	-	4.7	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	µg/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	µg/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	0.2	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichlorobenzene	µg/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	µg/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	µg/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	µg/L	-	59	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	µg/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	1800	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	µg/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	640	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	µg/L	-	2700	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	µg/L	5	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	µg/L	-	16	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	µg/L	-	25	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	µg/L	-	0.89	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	µg/L	5	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	µg/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	µg/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	µg/L	-	2.4	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	µg/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	µg/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	µg/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	µg/L	-	25	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	µg/L	2.4	2.4	AO	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	µg/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	µg/L	-	15	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	µg/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	µg/L	-	5.4	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	µg/L	30	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	µg/L	24	24	AO	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	µg/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	µg/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	µg/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	µg/L	-	150	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	µg/L	100	-	MAC	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Vinyl chloride	µg/L	2	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	µg/L	300	300	AO	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
Semi-volatile Organic Compounds														
Acenaphthene	µg/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	µg/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	µg/L	-	2.4	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	µg/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	µg/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.015[ab]	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	µg/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.021	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	µg/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	µg/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	µg/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	µg/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	µg/L	-	0.41	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	µg/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	µg/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	µg/L	-	11	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	µg/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	0.022	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	µg/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2) Table 2, Ontario Regulation 153/04, March 2004
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30 Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2A-01	MW2A-01	MW2A-01	MW4A-09	MW4A-09
Sample ID:				GW-18235-0515-DD-010	GW-18235-0715-DD-014	GW-18235-0915-DD-011	GW-18235-0515-DD-018	GW-18235-0715-DD-025
Sample Date:				5/23/2015	7/16/2015	11/12/2015	5/23/2015	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	3780	3620	3580	3520	3420
pH, field	s.u.	6.5-8.5	OG	6.57	**6.17**	7.26	6.68	6.52
Temperature, field	deg C	15	AO	10.3	10.5	10.1	10.7	11.4
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	428	433	425	317	327
Ammonia-N	mg/L	-	-	0.097	< 0.135	0.116	0.055	< 0.056
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	< 10	< 10	12	< 10	< 10
Chloride	mg/L	250	AO	11.4	11.7	11.2	14.6	14.1
Conductivity	umhos/cm	-	-	4020	4000	4040	3770	3720
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	1.7	1.7	1.9	2.0	2.1
Hardness	mg/L	80-100	OG	-	**2620**	-	-	**2210**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	0.14	0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	< 0.050
pH, lab	s.u.	6.5-8.5	OG	7.70	7.57	7.45	7.87	7.73
Phenolics (total)	mg/L	-	-	-	< 0.0017	-	-	< 0.0010
Phosphorus	mg/L	-	-	-	< 0.0030	-	-	0.413
Sulfate	mg/L	500	AO	**2490**	**2560**	**2440**	**2320**	**2270**
Total dissolved solids (TDS)	mg/L	500	AO	**3550**	**3950**	**3760 J**	**3270**	**3260**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.23	-	-	< 0.15
Total suspended solids (TSS)	mg/L	-	-	-	8.5	-	-	988
Turbidity	NTU	5.0	MAC	1.64	2.25	**74.8**	**10.9**	**111**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW4A-09	MW4A-09	MW5A-09	MW5A-09	MW5A-09
Sample ID:				GW-18235-0915-DD-019	GW-18235-0915-DD-020	GW-18235-0515-DD-001	GW-18235-0715-DD-001	GW-18235-0915-DD-001
Sample Date:				11/12/2015	11/12/2015 Duplicate	5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	3310	-	3820	3660	3690
pH, field	s.u.	6.5-8.5	OG	7.44	-	6.52	**6.01**	7.29
Temperature, field	deg C	15	AO	10.2	-	10.1	10.1	9.6
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	329	310	430	439	369
Ammonia-N	mg/L	-	-	< 0.050	< 0.050	0.623	0.665	0.571
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	12	< 10	< 10	< 10	23
Chloride	mg/L	250	AO	11.0	10.8	13.6	13.2	13.7
Conductivity	umhos/cm	-	-	3730	3680	4160	4150	4160
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	1.9	1.8	2.2	2.3	3.1
Hardness	mg/L	80-100	OG	-	-	-	**2660**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.61	7.70	7.68	7.46	7.46
Phenolics (total)	mg/L	-	-	-	-	-	< 0.0018	-
Phosphorus	mg/L	-	-	-	-	-	0.0677	-
Sulfate	mg/L	500	AO	**2430**	**2400**	**2630**	**2560**	**2640**
Total dissolved solids (TDS)	mg/L	500	AO	**3380 J**	**3680 J**	**3670**	**3640**	**3910**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	0.68	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	162	-
Turbidity	NTU	5.0	MAC	**491**	**428**	**20.4**	**17.1**	**191**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW5A-09	MW6A-07	MW6A-07	MW6A-07	MW1A-13
Sample ID:				GW-18235-0915-DD-002	GW-18235-0515-DD-002	GW-18235-0715-DD-002	GW-18235-0915-DD-003	GW-18235-0515-DD-004
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**	**Duplicate**				
Field Parameters								
Conductivity, field	uS/cm	-	-	-	3580	3470	3460	5670
pH, field	s.u.	6.5-8.5	OG	-	6.55	**5.86**	7.25	**6.49**
Temperature, field	deg C	15	AO	-	10.5	10.6	10.3	10.9
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	416	466	465	448	**624**
Ammonia-N	mg/L	-	-	0.580	0.358	0.376	0.348	3.36
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	-
Chemical oxygen demand (COD)	mg/L	-	-	< 10	< 10	< 10	21	23
Chloride	mg/L	250	AO	13.8	5.5	10.9	10.0	36.1
Conductivity	umhos/cm	-	-	4160	3890	3910	3850	6290
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	2.3	2.3	2.2	2.7	**6.2**
Hardness	mg/L	80-100	OG	-	-	**2530**	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.050	-	-
pH, lab	s.u.	6.5-8.5	OG	7.42	7.71	7.60	7.47	7.79
Phenolics (total)	mg/L	-	-	-	-	< 0.0015	-	-
Phosphorus	mg/L	-	-	-	-	0.407	-	-
Sulfate	mg/L	500	AO	**2680**	**1230**	**2410**	**2280**	**4030**
Total dissolved solids (TDS)	mg/L	500	AO	**3560**	**3550**	**3520**	**3360**	**5690**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.43	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	738	-	-
Turbidity	NTU	5.0	MAC	**342**	**5.87**	**107**	**732**	**15.5**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1A-13	MW1A-13	OW1A-06	OW1A-06	OW1A-06
Sample ID:				GW-18235-0715-DD-006	GW-18235-0915-DD-005	GW-18235-0515-DD-014	GW-18235-0715-DD-017	GW-18235-0715-DD-018
Sample Date:				7/16/2015	11/12/2015	5/23/2015	7/16/2015	7/16/2015 Duplicate
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	-	5130	3620	3590	-
pH, field	s.u.	6.5-8.5	OG	-	7.35	6.71	**6.13**	-
Temperature, field	deg C	15	AO	-	10.4	9.8	10.4	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**633**	**586**	469	450	455
Ammonia-N	mg/L	-	-	2.66	1.80	0.506	0.452	0.466
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	-	-	< 2.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	21	25	< 10	< 10	< 10
Chloride	mg/L	250	AO	35.6	25.6	10.8	11.7	11.7
Conductivity	umhos/cm	-	-	6280	6160	4050	4000	4010
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	4.8	**5.6**	2.0	2.0	2.0
Hardness	mg/L	80-100	OG	**3430**	-	-	**2580**	**2590**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.20	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	< 0.050	-	-	< 0.050	< 0.050
pH, lab	s.u.	6.5-8.5	OG	7.70	7.50	7.75	7.64	7.67
Phenolics (total)	mg/L	-	-	< 0.0010	-	-	< 0.0048	< 0.0069
Phosphorus	mg/L	-	-	< 0.030	-	-	0.0460	0.0450
Sulfate	mg/L	500	AO	**4050**	**4150**	**2380**	**2550**	**2540**
Total dissolved solids (TDS)	mg/L	500	AO	**5630**	**5870**	**3880**	**3500**	**3480**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	2.71	-	-	0.51	0.51
Total suspended solids (TSS)	mg/L	-	-	111000	-	-	93.8	87.5
Turbidity	NTU	5.0	MAC	**176**	**1000**	**7.93**	**13.2 J**	**30.0 J**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW1A-06	OW3A-13	OW3A-13	OW3A-13	OW5A-06
Sample ID:				GW-18235-0915-DD-015	GW-18235-0515-DD-006	GW-18235-0715-DD-008	GW-18235-0915-DD-007	GW-18235-0515-DD-013
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	3550	3500	3340	3530	3140
pH, field	s.u.	6.5-8.5	OG	7.41	6.50	**6.29**	7.36	6.55
Temperature, field	deg C	15	AO	9.8	10.8	11.4	10.1	10.0
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	464	435	447	472	466
Ammonia-N	mg/L	-	-	0.511	< 0.050	< 0.075	0.096	0.513
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	-
Chemical oxygen demand (COD)	mg/L	-	-	18	< 10	< 10	14	< 10
Chloride	mg/L	250	AO	11.1	9.8	10.3	11.7	5.4
Conductivity	umhos/cm	-	-	4020	3710	3710	3980	3290
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	2.3	2.5	3.3	3.6	3.2
Hardness	mg/L	80-100	OG	-	-	**1970**	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	0.10	< 0.10	0.14	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.050	-	-
pH, lab	s.u.	6.5-8.5	OG	7.64	7.73	7.58	7.47	7.67
Phenolics (total)	mg/L	-	-	-	-	< 0.0010	-	-
Phosphorus	mg/L	-	-	-	-	< 0.015	-	-
Sulfate	mg/L	500	AO	**2400**	**2070**	**2260**	**2390**	**1840**
Total dissolved solids (TDS)	mg/L	500	AO	**3740 J**	**3290**	**3320**	**3320 J**	**2970**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	< 0.15	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	13200	-	-
Turbidity	NTU	5.0	MAC	**388**	**8.20**	**26.0**	**965**	**10.3**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW5A-06	OW5A-06	OW8A-06	OW8A-06	OW8A-06
Sample ID:				GW-18235-0715-DD-016	GW-18235-0915-DD-014	GW-18235-0515-DD-016	GW-18235-0715-DD-023	GW-18235-0915-DD-017
Sample Date:				7/16/2015	11/12/2015	5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	3010	2940	3500	3530	3420
pH, field	s.u.	6.5-8.5	OG	**5.98**	7.29	6.55	**6.33**	7.23
Temperature, field	deg C	15	AO	10.5	9.8	10.4	10.7	10.2
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	430	450	469	459	451
Ammonia-N	mg/L	-	-	0.522	0.477	0.518	0.409	0.564
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 10	14	< 10	< 10	16
Chloride	mg/L	250	AO	6.9	5.8	11.1	10.8	11.5
Conductivity	umhos/cm	-	-	3390	3350	3860	3850	3880
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	3.2	3.5	2.3	1.8	2.2
Hardness	mg/L	80-100	OG	**2120**	-	-	**2510**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	< 0.050	-	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.53	7.54	7.69	7.53	7.48
Phenolics (total)	mg/L	-	-	< 0.0028	-	-	< 0.0010	-
Phosphorus	mg/L	-	-	0.0957	-	-	0.0450	-
Sulfate	mg/L	500	AO	**2030**	**1920**	**2380**	**2330**	**2480**
Total dissolved solids (TDS)	mg/L	500	AO	**3160**	**2870 J**	**3340**	**3450**	**3640 J**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.63	-	-	0.39	-
Total suspended solids (TSS)	mg/L	-	-	161	-	-	98.5	-
Turbidity	NTU	5.0	MAC	**15.0**	**235**	**5.67**	**26.0**	**161**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW9A-06	OW9A-06	OW9A-06
Sample ID:				GW-18235-0515-DD-008	GW-18235-0715-DD-010	GW-18235-0915-DD-009
Sample Date:				5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**			
Field Parameters						
Conductivity, field	uS/cm	-	-	3700	3520	3490
pH, field	s.u.	6.5-8.5	OG	6.50	**6.22**	7.24
Temperature, field	deg C	15	AO	10.4	10.9	10.1
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	475	475	479
Ammonia-N	mg/L	-	-	0.206	< 0.270	0.180
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 10	< 10	12
Chloride	mg/L	250	AO	10.2	10.8	10.5
Conductivity	umhos/cm	-	-	3990	3940	3960
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	1.7	2.2	1.8
Hardness	mg/L	80-100	OG	-	**2570**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.67	7.65	7.35
Phenolics (total)	mg/L	-	-	-	< 0.0010	-
Phosphorus	mg/L	-	-	-	< 0.0088	-
Sulfate	mg/L	500	AO	**2400**	**2500**	**2510**
Total dissolved solids (TDS)	mg/L	500	AO	**3750**	**3580**	**3710 J**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.24	-
Total suspended solids (TSS)	mg/L	-	-	-	8.8	-
Turbidity	NTU	5.0	MAC	4.31	**6.06**	**162**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2A-01	MW2A-01	MW2A-01	MW4A-09	MW4A-09
Sample ID:				GW-18235-0515-DD-010	GW-18235-0715-DD-014	GW-18235-0915-DD-011	GW-18235-0515-DD-018	GW-18235-0715-DD-025
Sample Date:				5/23/2015	7/16/2015	11/12/2015	5/23/2015	7/16/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Metals								
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	< 0.020	0.0039	0.0049	< 0.020	0.0073
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.45	0.44	0.50	0.38	0.38
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	< 0.00010
Calcium (dissolved)	mg/L	-	-	475	464	511	516	467
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050
Cobalt (dissolved)	mg/L	-	-	-	0.0019	-	-	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	**< 0.50**	< 0.10	< 0.10	**< 0.50**	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050
Magnesium (dissolved)	mg/L	-	-	369	354	366	272	253
Manganese (dissolved)	mg/L	0.05	AO	-	**0.119**	-	-	**0.123**
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	0.00595	-	-	0.0191
Nickel (dissolved)	mg/L	-	-	-	0.0054	-	-	< 0.0050
Potassium (dissolved)	mg/L	-	-	-	5.61	-	-	6.50
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**118**	**113**	**118**	**151**	**149**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW4A-09	MW4A-09	MW5A-09	MW5A-09	MW5A-09
Sample ID:				GW-18235-0915-DD-019	GW-18235-0915-DD-020	GW-18235-0515-DD-001	GW-18235-0715-DD-001	GW-18235-0915-DD-001
Sample Date:				11/12/2015	11/12/2015	5/23/2015	7/16/2015	11/12/2015
					Duplicate			
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Metals								
Aluminum (dissolved)	mg/L	0.10	OG	-	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	-	0.0116	-
Barium (dissolved)	mg/L	1.0	MAC	0.0102	0.0099	< 0.020	0.0048	0.0059
Beryllium (dissolved)	mg/L	-	-	-	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.43	0.41	0.68	0.61	0.68
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	518	503	485	450	505
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	**2.00**	**3.15**	**1.66**
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	287	284	392	373	384
Manganese (dissolved)	mg/L	0.05	AO	-	-	-	0.0333	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	-	-	0.00475	-
Nickel (dissolved)	mg/L	-	-	-	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	-	-	4.82	-
Silver (dissolved)	mg/L	-	-	-	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**115**	**115**	**137**	**128**	**136**
Thallium (dissolved)	mg/L	-	-	-	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW5A-09	MW6A-07	MW6A-07	MW6A-07	MW1A-13
Sample ID:				GW-18235-0915-DD-002	GW-18235-0515-DD-002	GW-18235-0715-DD-002	GW-18235-0915-DD-003	GW-18235-0515-DD-004
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**	**Duplicate**				
Metals								
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0012	-	-
Barium (dissolved)	mg/L	1.0	MAC	0.0059	< 0.020	0.0048	0.0073	< 0.020
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-
Boron (dissolved)	mg/L	5.0	IMAC	0.69	0.54	0.49	0.54	0.61
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-
Calcium (dissolved)	mg/L	-	-	509	513	487	525	442
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	-
Iron (dissolved)	mg/L	0.30	AO	**1.67**	**1.54**	**2.94**	**0.91**	**0.56**
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-
Magnesium (dissolved)	mg/L	-	-	385	343	319	334	599
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.142**	-	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00421	-	-
Nickel (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-
Potassium (dissolved)	mg/L	-	-	-	-	4.52	-	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	-	-
Sodium (dissolved)	mg/L	20/200	AO	**137**	**116**	**111**	**115**	**541**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1A-13	MW1A-13	OW1A-06	OW1A-06	OW1A-06
Sample ID:				GW-18235-0715-DD-006	GW-18235-0915-DD-005	GW-18235-0515-DD-014	GW-18235-0715-DD-017	GW-18235-0715-DD-018
Sample Date:				7/16/2015	11/12/2015	5/23/2015	7/16/2015	7/16/2015 Duplicate
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Metals								
Aluminum (dissolved)	mg/L	0.10	OG	0.066	-	-	< 0.050	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	0.0017	-	-	0.0055	0.0053
Barium (dissolved)	mg/L	1.0	MAC	0.0061	0.0134	< 0.020	0.0046	0.0044
Beryllium (dissolved)	mg/L	-	-	< 0.0010	-	-	< 0.0010	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.60	0.60	0.53	0.53	0.55
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00010	-	-	< 0.00010	< 0.00010
Calcium (dissolved)	mg/L	-	-	437	398	377	444	454
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	-	-	< 0.0050	< 0.0050
Cobalt (dissolved)	mg/L	-	-	0.0050	-	-	< 0.0010	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	-	-	< 0.0020	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	**0.80**	< 0.10	**1.31**	**2.64**	**2.64**
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	-	-	< 0.00050	< 0.00050
Magnesium (dissolved)	mg/L	-	-	568	584	399	358	354
Manganese (dissolved)	mg/L	0.05	AO	**0.481**	-	-	**0.109**	**0.109**
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	-	-	< 0.000010	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	0.0213	-	-	0.00420	0.00441
Nickel (dissolved)	mg/L	-	-	0.0080	-	-	< 0.0050	< 0.0050
Potassium (dissolved)	mg/L	-	-	15.7	-	-	4.65	4.61
Silver (dissolved)	mg/L	-	-	< 0.00050	-	-	< 0.00050	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**510**	**281**	**153**	**129**	**126**
Thallium (dissolved)	mg/L	-	-	< 0.00010	-	-	< 0.00010	< 0.00010
Vanadium (dissolved)	mg/L	-	-	< 0.0050	-	-	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	-	-	< 0.010	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW1A-06	OW3A-13	OW3A-13	OW3A-13	OW5A-06
Sample ID:				GW-18235-0915-DD-015	GW-18235-0515-DD-006	GW-18235-0715-DD-008	GW-18235-0915-DD-007	GW-18235-0515-DD-013
Sample Date:				11/12/2015	5/23/2015	7/16/2015	11/12/2015	5/23/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Metals								
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	-	-
Barium (dissolved)	mg/L	1.0	MAC	0.0059	0.026	0.0301	0.0235	< 0.020
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-
Boron (dissolved)	mg/L	5.0	IMAC	0.59	0.42	0.34	0.53	0.41
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-
Calcium (dissolved)	mg/L	-	-	434	514	403	531	515
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	-
Iron (dissolved)	mg/L	0.30	AO	**0.68**	**< 0.50**	< 0.10	< 0.10	**3.22**
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-
Magnesium (dissolved)	mg/L	-	-	385	258	234	313	210
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.0745**	-	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00512	-	-
Nickel (dissolved)	mg/L	-	-	-	-	0.0051	-	-
Potassium (dissolved)	mg/L	-	-	-	-	4.94	-	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	-	-
Sodium (dissolved)	mg/L	20/200	AO	**145**	**162**	**143**	**158**	**89.3**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.011	-	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW5A-06	OW5A-06	OW8A-06	OW8A-06	OW8A-06
Sample ID:				GW-18235-0715-DD-016	GW-18235-0915-DD-014	GW-18235-0515-DD-016	GW-18235-0715-DD-023	GW-18235-0915-DD-017
Sample Date:				7/16/2015	11/12/2015	5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Metals								
Aluminum (dissolved)	mg/L	0.10	OG	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	0.0130	-	-	0.0022	-
Barium (dissolved)	mg/L	1.0	MAC	0.0048	0.0065	< 0.020	0.0046	0.0060
Beryllium (dissolved)	mg/L	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.44	0.46	0.49	0.54	0.53
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	493	571	494	472	511
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	< 0.0010	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	**4.21**	**1.56**	**2.32**	**3.04**	**1.79**
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	217	203	324	323	320
Manganese (dissolved)	mg/L	0.05	AO	0.0463	-	-	**0.0867**	-
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	0.00417	-	-	0.00378	-
Nickel (dissolved)	mg/L	-	-	< 0.0050	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	3.48	-	-	4.83	-
Silver (dissolved)	mg/L	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**87.0**	**89.8**	**118**	**111**	**118**
Thallium (dissolved)	mg/L	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	-	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW9A-06	OW9A-06	OW9A-06
Sample ID:				GW-18235-0515-DD-008	GW-18235-0715-DD-010	GW-18235-0915-DD-009
Sample Date:				5/23/2015	7/16/2015	11/12/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**			
Metals						
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	< 0.020	0.0045	0.0049
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.49	0.47	0.52
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	500	478	543
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	0.0022	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	**< 0.50**	0.19	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	350	334	346
Manganese (dissolved)	mg/L	0.05	AO	-	**0.140**	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00526	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	5.37	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**125**	**111**	**111**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5C

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW2A-01	MW4A-09	MW5A-09	MW6A-07	MW1A-13	OW1A-06	OW1A-06	OW3A-13	OW5A-06	OW8A-06	OW9A-06
Sample ID:					GW-18235-0715-DD-014	GW-18235-0715-DD-025	GW-18235-0715-DD-001	GW-18235-0715-DD-002	GW-18235-0715-DD-006	GW-18235-0715-DD-017	GW-18235-0715-DD-018	GW-18235-0715-DD-008	GW-18235-0715-DD-016	GW-18235-0715-DD-023	GW-18235-0715-DD-010
Sample Date:					7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015 Duplicate	7/16/2015	7/16/2015	7/16/2015	7/16/2015
Parameters	**Units**	**ODWS [1] a**	**Table 2 [2] b**	**ODWS Source**											
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane	µg/L	-	1.1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	µg/L	-	200	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	µg/L	-	1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	µg/L	-	4.7	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	µg/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	µg/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	0.2	-	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**
1,2-Dichlorobenzene	µg/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	µg/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	µg/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	µg/L	-	59	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	µg/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	1800	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	µg/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	640	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	µg/L	-	2700	-	< 30	< 30	< 30	< 30	45	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	µg/L	5	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	µg/L	-	16	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	µg/L	-	25	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	µg/L	-	0.89	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	µg/L	5	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	µg/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	µg/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	µg/L	-	2.4	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	µg/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	µg/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	µg/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	µg/L	-	25	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	µg/L	2.4	2.4	AO	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	µg/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	µg/L	-	15	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	µg/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	µg/L	-	5.4	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	µg/L	30	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	µg/L	24	24	AO	< 0.50	< 0.50	< 0.50	< 0.50	0.51	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	µg/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	µg/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	µg/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	µg/L	-	150	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	µg/L	100	-	MAC	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Vinyl chloride	µg/L	2	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	µg/L	300	300	AO	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
Semi-volatile Organic Compounds															
Acenaphthene	µg/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	µg/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	µg/L	-	2.4	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.025	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	µg/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	µg/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	µg/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.040	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	µg/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	µg/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	µg/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.075	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	µg/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	µg/L	-	0.41	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.043	< 0.020	< 0.020	< 0.020
Fluorene	µg/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	µg/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	µg/L	-	11	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	µg/L	-	1	-	< 0.020	< 0.020	< 0.020	0.021	< 0.020	< 0.020	< 0.020	0.052	< 0.020	< 0.020	< 0.020
Pyrene	µg/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.090	< 0.020	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2)	Table 2, Ontario Regulation 153/04, March 2004
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.6A

Summary of Groundwater Analytical Results - Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1D-07	MW1D-07	MW1S-07	MW1S-07	MW2D-07	MW2D-07	MW2S-07
Sample ID:				--	GW-18235-0715-DD-004	--	GW-18235-0715-DD-005	--	GW-18235-0715-DD-012	--
Sample Date:				5/23/2015	7/16/2015	5/23/2015	7/16/2015	5/23/2015	7/16/2015	5/23/2015
Parameters	**Units**	**ODWS [1]**	**ODWS Source**							
Field Parameters										
Conductivity, field	uS/cm	-	-	2920	2760	3610	3430	3750	3590	3730
pH, field	s.u.	6.5-8.5	OG	6.98	7.16	6.60	6.51	6.65	**6.09**	6.56
Temperature, field	deg C	15	AO	10.3	11.9	10.3	10.7	10.3	10.6	10.2
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	-	169	-	453	-	433	-
Ammonia-N	mg/L	-	-	-	3.11	-	0.426	-	< 0.250	-
Biochemical oxygen demand (BOD)	mg/L	-	-	-	19.0	-	< 2.0	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	-	47	-	< 10	-	< 10	-
Chloride	mg/L	250	AO	-	16.5	-	12.9	-	11.5	-
Conductivity	umhos/cm	-	-	-	2800	-	3830	-	4020	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	-	2.6	-	2.6	-	2.0	-
Hardness	mg/L	80-100	OG	-	**1770**	-	**2500**	-	**2610**	-
Nitrate (as N)	mg/L	10.0	MAC	-	< 0.10	-	< 0.10	-	< 0.10	-
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	< 0.050	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	-	8.36	-	7.65	-	7.50	-
Phenolics (total)	mg/L	-	-	-	< 0.0012	-	< 0.0010	-	< 0.0020	-
Phosphorus	mg/L	-	-	-	0.0403	-	< 0.0091	-	0.0532	-
Sulfate	mg/L	500	AO	-	**1940**	-	**2430**	-	**2490**	-
Total dissolved solids (TDS)	mg/L	500	AO	-	**2530**	-	**3540**	-	**3600**	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	3.12	-	0.48	-	0.28	-
Total suspended solids (TSS)	mg/L	-	-	-	53.0	-	7.9	-	132	-
Turbidity	NTU	5.0	MAC	-	**200**	-	**11.3**	-	**5.14**	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.6A

Summary of Groundwater Analytical Results - Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2S-07	OW8D-07	OW8D-07	OW8S-07	OW8S-07
Sample ID:				GW-18235-0715-DD-013	--	GW-18235-0715-DD-020	GW-18235-0715-DD-021	GW-18235-0715-DD-022
Sample Date:				7/16/2015	5/23/2015	7/16/2015	7/16/2015	7/16/2015 Duplicate
Parameters	**Units**	**ODWS [1]**	**ODWS Source**					
Field Parameters								
Conductivity, field	uS/cm	-	-	3580	3750	2840	3620	-
pH, field	s.u.	6.5-8.5	OG	**6.00**	6.54	6.99	6.53	-
Temperature, field	deg C	15	AO	10.5	10.5	11.3	10.7	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	439	-	194	436	441
Ammonia-N	mg/L	-	-	< 0.253	-	3.00	0.353	0.356
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	-	24.0	< 2.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	< 10	-	43	< 10	< 10
Chloride	mg/L	250	AO	11.8	-	24.5	12.9	12.2
Conductivity	umhos/cm	-	-	3980	-	3150	3950	3940
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	AO	1.9	-	1.2	2.0	2.0
Hardness	mg/L	80-100	OG	**2590**	-	**2030**	**2630**	**2560**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	-	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	< 0.050	-	< 0.050	< 0.050	< 0.050
pH, lab	s.u.	6.5-8.5	OG	7.61	-	8.12	7.46	7.54
Phenolics (total)	mg/L	-	-	< 0.0022	-	< 0.0278	< 0.0046	< 0.0026
Phosphorus	mg/L	-	-	< 0.0041	-	0.0356	< 0.0073	< 0.0087
Sulfate	mg/L	500	AO	**2570**	-	**1990**	**2620**	**2480**
Total dissolved solids (TDS)	mg/L	500	AO	**3750**	-	**2960**	**3440**	**3470**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.27	-	2.63	0.43	0.36
Total suspended solids (TSS)	mg/L	-	-	7.8	-	4860	10.1	10.1
Turbidity	NTU	5.0	MAC	1.70	-	**75.0**	**5.97**	**6.80**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.6B

Summary of Groundwater Analytical Results - Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1D-07	MW1S-07	MW2D-07	MW2S-07	OW8D-07	OW8S-07	OW8S-07
Sample ID:				GW-18235-0715-DD-004	GW-18235-0715-DD-005	GW-18235-0715-DD-012	GW-18235-0715-DD-013	GW-18235-0715-DD-020	GW-18235-0715-DD-021	GW-18235-0715-DD-022
Sample Date:				7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015
Parameters	Units	ODWS [1]	ODWS Source							Duplicate
Metals										
Aluminum (dissolved)	mg/L	0.10	OG	**0.250**	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	< 0.0010	0.0058	< 0.0010	0.0012	0.0025	0.0038	0.0040
Barium (dissolved)	mg/L	1.0	MAC	0.0069	< 0.0029	0.0044	0.0034	0.0080	0.0043	0.0041
Beryllium (dissolved)	mg/L	-	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	**8.54**	0.52	0.51	0.48	**9.33**	0.55	0.56
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Calcium (dissolved)	mg/L	-	-	446	479	464	472	492	480	462
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Cobalt (dissolved)	mg/L	-	-	< 0.0010	< 0.0010	0.0024	0.0014	< 0.0010	0.0012	0.0011
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	**0.61**	**1.98**	0.24	**0.48**	< 0.10	**1.96**	**2.01**
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Magnesium (dissolved)	mg/L	-	-	160	317	351	344	196	348	341
Manganese (dissolved)	mg/L	0.05	AO	0.0320	0.0373	**0.164**	**0.156**	< 0.0050	**0.155**	**0.155**
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	< 0.000010	< 0.000010	< 0.000010	< 0.000010	< 0.000010	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	< 0.00050	0.00437	0.00515	0.00493	< 0.00050	0.00440	0.00418
Nickel (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	0.0052	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Potassium (dissolved)	mg/L	-	-	27.5	4.76	5.85	5.44	26.9	5.22	5.19
Silver (dissolved)	mg/L	-	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**32.4**	**107**	**112**	**112**	**33.4**	**114**	**116**
Thallium (dissolved)	mg/L	-	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Vanadium (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	< 0.011	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.6C

Summary of Groundwater Analytical Results - Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1D-07	MW1S-07	MW2D-07	MW2S-07	OW8D-07	OW8S-07	OW8S-07
Sample ID:					GW-18235-0715-DD-004	GW-18235-0715-DD-005	GW-18235-0715-DD-012	GW-18235-0715-DD-013	GW-18235-0715-DD-020	GW-18235-0715-DD-021	GW-18235-0715-DD-022
Sample Date:					7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015 Duplicate
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**							
Volatile Organic Compounds											
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	5	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	5	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	2.4	2.4	AO	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	-	15	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	30	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	24	24	AO	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trihalomethanes	ug/L	100	-	MAC	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Vinyl chloride	ug/L	2	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes (total)	ug/L	300	300	AO	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1

Table 5.6C

Summary of Groundwater Analytical Results - Bedrock
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1D-07	MW1S-07	MW2D-07	MW2S-07	OW8D-07	OW8S-07	OW8S-07
Sample ID:					GW-18235-0715-DD-004	GW-18235-0715-DD-005	GW-18235-0715-DD-012	GW-18235-0715-DD-013	GW-18235-0715-DD-020	GW-18235-0715-DD-021	GW-18235-0715-DD-022
Sample Date:					7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**							**Duplicate**
Semi-volatile Organic Compounds											
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11	-	0.064	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2)	Table 2, Ontario Regulation 153/04, March 2004
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30	Result below method detection limit

Table 5.7

Sample Key - Surface Water Monitoring
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location	Date	Sample ID	Parameters Analyzed/Comments
SW1	March 19, 2015	SW-18235-008	Indicator Parameters
	May 23, 2015	SW-18235-005	Inorganic Chemistry, Metals, PAHs, VOCs
	August 4, 2015	SW-18235-001/002	Indicator Parameters
	November 12, 2015	SW-18235-006/007	Inorganic Chemistry, Metals, PAHs, VOCs
SW3	March 19, 2015	SW-18235-007	Indicator Parameters
	May 23, 2015	--	DRY
	August 4, 2015	--	DRY
	November 12, 2015	SW-18235-004	Inorganic Chemistry, Metals, PAHs, VOCs
SW4	March 19, 2015	SW-18235-001/002	Indicator Parameters
	May 23, 2015	--	DRY
	August 4, 2015	--	DRY
	November 12, 2015	SW-18235-008	Inorganic Chemistry, Metals, PAHs, VOCs
SW5	March 19, 2015	SW-18235-009	Indicator Parameters
	May 23, 2015	SW-18235-004	Inorganic Chemistry, Metals, PAHs, VOCs
	August 4, 2015	--	DRY
	November 12, 2015	SW-18235-005	Inorganic Chemistry, Metals, PAHs, VOCs
SW6	March 19, 2015	SW-18235-005	Indicator Parameters
	May 23, 2015	--	DRY
	August 4, 2015	--	DRY
	November 12, 2015	SW-18235-001	Inorganic Chemistry, Metals, PAHs, VOCs
SW7	March 19, 2015	SW-18235-006	Indicator Parameters
	May 23, 2015	SW-18235-002/003	Inorganic Chemistry, Metals, PAHs, VOCs
	August 4, 2015	SW-18235-003	Indicator Parameters
	November 12, 2015	SW-18235-003	Inorganic Chemistry, Metals, PAHs, VOCs
SW8	March 19, 2015	SW-18235-004	Indicator Parameters
	May 23, 2015	SW-18235-001	Inorganic Chemistry, Metals, PAHs, VOCs
	August 4, 2015	--	DRY
	November 12, 2015	SW-18235-002	Inorganic Chemistry, Metals, PAHs, VOCs
TDS Pond [(1)]	March 13, 2015	SW-18235-SS-100	Confirmatory Sampling[(1)]
	March 19, 2015	TDS-18235-001	TDS Parameter List
	March 27, 2015	SW-18235-001/002	Confirmatory Sampling[(1)]
	April 13, 2015	SW-18235-TDS	Confirmatory Sampling[(1)]
	April 27, 2015	SW-18235-01	Confirmatory Sampling[(1)]
	May 23, 2015	TDS POND-18235-001	TDS Parameter List
	August 4, 2015	TDS POND-18235-001	TDS Parameter List
	November 12, 2015	TDS POND-18235-001	TDS Parameter List

Notes:

(1) - Confirmatory sampling occurs following a TDS Pond sample result detected above the relative trigger
NS - Not Sampled
Indicator Parameters - alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodiu TDS, sulphate, COD, and DOC.
Inorganic Chemistry - alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulphate, DOC, TDS, suspended solids, p BOD_5, COD, pH, total phosphorus, potassium, conductivity, and calcium.
Metals - arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, mangane mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, and nickel.
VOCs Volatile Organic Compounds
PAHs Polycyclic Aromatic Hydrocarbons
TDS Parameter List - alkalinity, conductivity, hardness, pH, chloride, sulphates, nitrate, nitrite, ammonia, TSS, TDS, COD, total phosphorus, TKN, BOD5, phenolics, dissolved oxygen, temperature, arsenic, barium, boron, cad chromium, copper, iron, lead, magnesium, mercury, zinc, ethylbenzene, benzo(a)pyrene, fluorene, an

Table 5.8A

Summary of Surface Water Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW1	SW1	SW1	SW3	SW3
Sample ID:			SW-18235-0315-DD-008	SW-18235-0515-DD-005	SW-18235-0815-DD-001	SW-18235-0815-DD-002	SW-18235-0915-DD-006	SW-18235-0915-DD-007	SW-18235-0315-DD-007	SW-18235-0915-DD-004
Sample Date:			3/19/2015	5/23/2015	8/4/2015	8/4/2015 Duplicate	11/12/2015	11/12/2015 Duplicate	3/19/2015	11/12/2015
Parameters	**Units**	**PWQO [1]**								
Field Parameters										
Conductivity, field	uS/cm	-	204	1050	443	-	537	-	692	1270
Dissolved oxygen (DO), field	mg/L	<4	1.79	8.52	5.08	-	1.34	-	5.83	4.02
flow, field	m/sec	-	ponded [2]	ponded [2]	ponded [2]	ponded [2]	0.140	-	ponded [2]	ponded [2]
pH, field	s.u.	6.5-8.5	7.58	6.94	6.90	-	7.43	-	7.40	7.48
Temperature, field	deg C	-	0.1	9.5	18.7	-	7.3	-	0.1	7.8
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-	38	146	124	120	77	103	129	172
Ammonia-N	mg/L	-	0.215	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.281	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	4.5	2.8	7.7	8.6	2.4	2.4	2.7	2.4
Chemical oxygen demand (COD)	mg/L	-	45	96	90	94	81	101	14	32
Chloride	mg/L	-	23.0	198	79.1	80.1	74.6	82.2	45.8	141
Conductivity	umhos/cm	-	164	912	492	490	489	608	617	1460
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	24.9	-	-	18.5	20.1	-	10.3
Hardness	mg/L	-	-	261	-	-	174	143	-	608
Nitrate (as N)	mg/L	-	0.113	0.021	< 0.020	0.025	< 0.020	< 0.020	0.344	0.27
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050
pH, lab	s.u.	6.5-8.5	6.66	7.83	7.64	7.55	7.46	7.53	7.85	7.91
Phenolics (total)	mg/L	0.001	**< 0.0054**	< 0.0010	**< 0.0036**	**< 0.0042**	0.0045	0.0042	**< 0.0023**	< 0.0010
Phosphorus	mg/L	0.03	0.199	0.113	0.432	0.428	0.224	0.523	0.0532	0.0695
Sulfate	mg/L	-	6.73	2.43	9.08	8.62	44.3	66.0	126	423
Total dissolved solids (TDS)	mg/L	-	137	527	309	312	306	327	382	1000
Total kjeldahl nitrogen (TKN)	mg/L	-	0.42	< 1.14	2.02	2.24	1.05	1.82	0.54	0.53
Total suspended solids (TSS)	mg/L	-	16.5	15.1	60.0	32.3	8.0	4.5	14.4	38.8
Turbidity	NTU	-	30.0	7.75	21.8	20.2	6.42	6.21	14.5	48.1
Metals										
Aluminum	mg/L	0.075	-	< 0.046	-	-	0.132	0.146	-	1.05
Arsenic	mg/L	0.005	-	< 0.0010	-	-	0.00084	0.00097	-	0.00076
Barium	mg/L	-	-	0.0495	-	-	0.0454	0.0398	-	0.0808
Beryllium	mg/L	1.1	-	< 0.00050	-	-	< 0.00010	< 0.00010	-	< 0.00010
Boron	mg/L	0.2	-	0.022	-	-	0.025	0.030	-	0.113
Cadmium	mg/L	0.0005	-	< 0.000090	-	-	0.000028	0.000052	-	0.000033
Calcium	mg/L	-	-	74.2	-	-	48.5	39.4	-	181
Chromium	mg/L	0.001	-	< 0.00069	-	-	0.00100	0.00108	-	0.00193
Cobalt	mg/L	0.0009	-	< 0.00050	-	-	0.00043	0.00057	-	0.00064
Copper	mg/L	0.005	-	< 0.0010	-	-	0.0012	0.0014	-	0.0042
Iron	mg/L	0.3	2.88	1.12	6.87	5.97	1.46	1.75	0.444	1.12
Lead	mg/L	0.005	-	< 0.00050	-	-	0.00027	0.00034	-	0.00152
Magnesium	mg/L	-	-	18.3	-	-	12.7	10.8	-	38.1
Manganese	mg/L	-	-	0.0904	-	-	0.164	0.191	-	0.0593
Mercury	mg/L	0.0002	-	-	-	-	< 0.000010	< 0.000010	-	< 0.000010
Mercury (dissolved)	mg/L	0.0002	-	< 0.000010	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	< 0.00050	-	-	0.00083	< 0.00050	-	0.00212
Nickel	mg/L	0.025	-	0.0011	-	-	0.0012	0.0014	-	0.0040
Potassium	mg/L	-	-	3.5	-	-	6.94	6.66	-	6.71
Silver	mg/L	0.0001	-	< 0.00010	-	-	< 0.000050	< 0.000050	-	< 0.000050
Sodium	mg/L	-	-	90.4	-	-	31.9	25.7	-	76.9
Thallium	mg/L	0.0003	-	< 0.00030	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	0.00383	0.00397	-	0.0358
Vanadium	mg/L	0.006	-	< 0.00050	-	-	0.00060	0.00068	-	0.00231
Zinc	mg/L	0.02	-	0.379	-	-	0.128	0.0686	-	0.0162

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO Criteria
<30 Result below method detection limit

Table 5.8A

Summary of Surface Water Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW4	SW4	SW4	SW5	SW5	SW5	SW6	SW6
Sample ID:			SW-18235-0315-DD-001	SW-18235-0315-DD-002	SW-18235-0915-DD-008	SW-18235-0315-DD-009	SW-18235-0515-DD-004	SW-18235-0915-DD-005	SW-18235-0315-DD-005	SW-18235-0915-DD-001
Sample Date:			3/19/2015	3/19/2015 Duplicate	11/12/2015	3/19/2015	5/23/2015	11/12/2015	3/19/2015	11/12/2015
Parameters	**Units**	**PWQO [1]**								
Field Parameters										
Conductivity, field	uS/cm	-	388	-	722	836	1850	1270	931	1790
Dissolved oxygen (DO), field	mg/L	<4	6.09	-	4.85	12.9	9.97	4.45	5.88	3.61
flow, field	m/sec	-	0.316	-	0.120	ponded [2]	ponded [2]	ponded [2]	ponded [2]	0.120
pH, field	s.u.	6.5-8.5	7.90	-	7.75	7.56	7.04	7.88	7.35	7.34
Temperature, field	deg C	-	1.2	-	8.0	0.1	8.8	7.7	0.1	7.2
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-	55	56	56	143	263	115	64	94
Ammonia-N	mg/L	-	0.227	0.236	< 0.050	0.313	0.066	< 0.050	0.468	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	2.9	3.0	< 2.0	10.0	12.9	12.2	5.1	< 2.0
Chemical oxygen demand (COD)	mg/L	-	36	38	58	56	96	114	54	54
Chloride	mg/L	-	19.7	19.7	16.4	40.5	181	66.0	93.4	184
Conductivity	umhos/cm	-	302	302	881	868	1930	1380	1030	2000
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	12.6	-	27.5	31.1	-	16.7
Hardness	mg/L	-	-	-	347	-	918	684	-	919
Nitrate (as N)	mg/L	-	0.617	0.647	0.669	0.674	< 0.10	< 0.10	0.423	< 0.10
Nitrite (as N)	mg/L	-	0.013	0.015	< 0.010	0.046	< 0.050	< 0.050	0.020	< 0.050
pH, lab	s.u.	6.5-8.5	7.44	7.46	7.66	7.25	7.96	7.36	7.03	7.28
Phenolics (total)	mg/L	0.001	**< 0.0024**	**< 0.0046**	0.0041	**< 0.0038**	**< 0.0021**	0.0143	**< 0.0051**	0.0035
Phosphorus	mg/L	0.03	0.118	0.119	0.0727	0.194	0.123	0.271	0.0739	0.0652
Sulfate	mg/L	-	56.1	56.2	49.5	280	573	565	319	789
Total dissolved solids (TDS)	mg/L	-	197	201	539	609	1500	1000	705	1210
Total kjeldahl nitrogen (TKN)	mg/L	-	0.75	0.72	1.24	1.61	1.51	1.71	1.71	0.84
Total suspended solids (TSS)	mg/L	-	16.4	17.1	8.0	52.2	132	11.4	6.5	7.5
Turbidity	NTU	-	38.0	33.0	11.6	33.0	45.0	9.16	19.7	3.47
Metals										
Aluminum	mg/L	0.075	-	-	0.617	-	0.263	0.158	-	0.075
Arsenic	mg/L	0.005	-	-	0.00038	-	0.0014	0.00117	-	0.00088
Barium	mg/L	-	-	-	0.0398	-	0.0797	0.0692	-	0.121
Beryllium	mg/L	1.1	-	-	< 0.00010	-	< 0.00050	< 0.00010	-	< 0.00010
Boron	mg/L	0.2	-	-	0.062	-	0.160	0.156	-	0.211
Cadmium	mg/L	0.0005	-	-	0.000022	-	< 0.000090	0.000071	-	0.000084
Calcium	mg/L	-	-	-	98.9	-	259	197	-	266
Chromium	mg/L	0.001	-	-	0.00127	-	**< 0.00102**	0.00101	-	0.00087
Cobalt	mg/L	0.0009	-	-	0.00026	-	0.00057	0.00322	-	0.00246
Copper	mg/L	0.005	-	-	0.0025	-	0.0012	0.0014	-	0.0012
Iron	mg/L	0.3	1.70	1.68	0.406	1.11	0.731	2.04	1.23	1.49
Lead	mg/L	0.005	-	-	0.00018	-	0.00088	0.00049	-	0.00051
Magnesium	mg/L	-	-	-	24.4	-	66.2	46.6	-	62.1
Manganese	mg/L	-	-	-	0.00523	-	0.271	0.923	-	0.818
Mercury	mg/L	0.0002	-	-	< 0.000010	-	-	< 0.000010	-	< 0.000010
Mercury (dissolved)	mg/L	0.0002	-	-	-	-	< 0.000010	-	-	-
Molybdenum	mg/L	0.04	-	-	< 0.00050	-	0.00051	0.00084	-	0.00239
Nickel	mg/L	0.025	-	-	0.0016	-	0.0035	0.0046	-	0.0078
Potassium	mg/L	-	-	-	7.33	-	12.4	14.2	-	11.6
Silver	mg/L	0.0001	-	-	< 0.000050	-	< 0.00010	< 0.000050	-	< 0.000050
Sodium	mg/L	-	-	-	35.9	-	88.1	39.1	-	85.9
Thallium	mg/L	0.0003	-	-	-	-	< 0.00030	-	-	-
Titanium	mg/L	-	-	-	0.0216	-	-	0.00543	-	0.00189
Vanadium	mg/L	0.006	-	-	0.00116	-	0.00078	0.00066	-	0.00050
Zinc	mg/L	0.02	-	-	0.0036	-	0.0062	0.0144	-	0.0156

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO Criteria
<30 Result below method detection limit

Table 5.8A

Summary of Surface Water Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW7	SW7	SW7	SW7	SW7	SW8	SW8	SW8
Sample ID:			SW-18235-0315-DD-006	SW-18235-0515-DD-002	SW-18235-0515-DD-003	SW-18235-0815-DD-003	SW-18235-0915-DD-003	SW-18235-0315-DD-004	SW-18235-0515-DD-001	SW-18235-0915-DD-002
Sample Date:			3/19/2015	5/23/2015	5/23/2015 Duplicate	8/4/2015	11/12/2015	3/19/2015	5/23/2015	11/12/2015
Parameters	**Units**	**PWQO [1]**								
Field Parameters										
Conductivity, field	uS/cm	-	377	766	-	654	1280	69	730	414
Dissolved oxygen (DO), field	mg/L	<4	4.10	8.74	-	3.48	2.46	4.48	9.96	3.55
flow, field	m/sec	-	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]
pH, field	s.u.	6.5-8.5	7.90	6.55	-	6.91	7.49	7.73	6.81	7.68
Temperature, field	deg C	-	0.2	5.1	-	21.7	7.1	0.3	5.1	6.9
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-	39	160	165	157	30	10	27	12
Ammonia-N	mg/L	-	0.405	< 0.050	0.095	< 0.050	< 0.050	0.071	< 0.050	0.350
Biochemical oxygen demand (BOD)	mg/L	-	4.0	6.9	8.1	3.5	3.5	2.0	2.0	5.7
Chemical oxygen demand (COD)	mg/L	-	45	110	112	90	87	50	157	87
Chloride	mg/L	-	26.9	70.4	70.5	51.6	80.2	2.33	1.85	0.79
Conductivity	umhos/cm	-	254	883	884	737	1380	59.5	85.6	378
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	31.2	30.6	-	15.4	-	45.2	16.9
Hardness	mg/L	-	-	367	364	-	633	-	42	160
Nitrate (as N)	mg/L	-	0.214	0.023	< 0.020	< 0.020	< 0.10	0.255	0.029	11.8
Nitrite (as N)	mg/L	-	0.018	< 0.010	< 0.010	< 0.010	< 0.050	< 0.010	< 0.010	0.051
pH, lab	s.u.	6.5-8.5	6.71	7.73	7.67	7.80	6.74	6.51	6.79	6.30
Phenolics (total)	mg/L	0.001	**< 0.0046**	**< 0.0029**	**< 0.0021**	**< 0.0028**	0.0019	**< 0.0034**	**< 0.0024**	0.0022
Phosphorus	mg/L	0.03	0.180	0.257	0.257	0.151	0.143	0.225	0.619	0.380
Sulfate	mg/L	-	74.7	199	199	158	587	9.66	9.26	119
Total dissolved solids (TDS)	mg/L	-	186	598	575	440	892	112	211	234
Total kjeldahl nitrogen (TKN)	mg/L	-	0.92	1.73	2.07	1.76	1.15	0.55	4.02	2.64
Total suspended solids (TSS)	mg/L	-	16.0	42.4 J	7.0 J	< 2.0	8.6	4.8	14.7	35.8
Turbidity	NTU	-	19.0	1.94 J	4.19 J	3.19	8.14	45.0	33.2	23.2
Metals										
Aluminum	mg/L	0.075	-	0.483 J	0.205 J	-	0.095	-	4.70	1.66
Arsenic	mg/L	0.005	-	0.0019	0.0018	-	0.00063	-	0.0013	0.00055
Barium	mg/L	-	-	0.0524	0.0479	-	0.0697	-	0.0368	0.0607
Beryllium	mg/L	1.1	-	< 0.00050	< 0.00050	-	< 0.00010	-	< 0.00050	0.00010
Boron	mg/L	0.2	-	0.284 J	0.058 J	-	0.235	-	0.029	0.036
Cadmium	mg/L	0.0005	-	< 0.000090	< 0.000090	-	0.000227	-	0.000103	0.000297
Calcium	mg/L	-	-	99.2	98.4	-	182	-	11.7	47.7
Chromium	mg/L	0.001	-	**< 0.00167**	**< 0.00118**	-	0.00096	-	0.00592	0.00276
Cobalt	mg/L	0.0009	-	0.00066	0.00053	-	0.00576	-	0.00181	0.00154
Copper	mg/L	0.005	-	0.0011	< 0.0010	-	0.0020	-	0.0054	0.0044
Iron	mg/L	0.3	1.34	0.926 J	0.540 J	0.406	3.40	2.96	4.24	0.661
Lead	mg/L	0.005	-	0.00072	< 0.00050	-	0.00022	-	0.00212	0.00077
Magnesium	mg/L	-	-	29.0	28.8	-	43.5	-	3.23	9.90
Manganese	mg/L	-	-	0.259	0.249	-	1.28	-	0.0947	0.202
Mercury	mg/L	0.0002	-	-	-	-	< 0.000010	-	-	< 0.000010
Mercury (dissolved)	mg/L	0.0002	-	< 0.000010	< 0.000010	-	-	-	< 0.000010	-
Molybdenum	mg/L	0.04	-	< 0.00050	< 0.00050	-	< 0.00050	-	< 0.00050	< 0.00050
Nickel	mg/L	0.025	-	0.0030	0.0024	-	0.0071	-	0.0049	0.0031
Potassium	mg/L	-	-	4.7	4.4	-	15.3	-	3.9	6.84
Silver	mg/L	0.0001	-	< 0.00010	< 0.00010	-	< 0.000050	-	< 0.00010	< 0.000050
Sodium	mg/L	-	-	44.0	41.0	-	43.9	-	2.25	2.20
Thallium	mg/L	0.0003	-	< 0.00030	< 0.00030	-	-	-	< 0.00030	-
Titanium	mg/L	-	-	-	-	-	0.00168	-	-	0.0406
Vanadium	mg/L	0.006	-	0.00110	0.00069	-	< 0.00050	-	0.00709	0.00462
Zinc	mg/L	0.02	-	0.0103 J	0.0033 J	-	0.0616	-	0.0166	0.0380

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO Criteria
<30 Result below method detection limit

Table 5.8B

Summary of Surface Water Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW3	SW4	SW5	SW5
Sample ID:			SW-18235-0515-DD-005	SW-18235-0915-DD-006	SW-18235-0915-DD-007	SW-18235-0915-DD-004	SW-18235-0915-DD-008	SW-18235-0515-DD-004	SW-18235-0915-DD-005
Sample Date:			5/23/2015	11/12/2015	11/12/2015 Duplicate	11/12/2015	11/12/2015	5/23/2015	11/12/2015
Parameters	**Units**	**PWQO [1]**		**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**
Volatile Organic Compounds									
1,1,1,2-Tetrachloroethane	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	µg/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	µg/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	µg/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	µg/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	µg/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	µg/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	400	< 20	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	µg/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	µg/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	µg/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	µg/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	µg/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	µg/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	µg/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	µg/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	µg/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	µg/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	µg/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	µg/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	µg/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	µg/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Table 5.8B

Summary of Surface Water Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW3	SW4	SW5	SW5
Sample ID:			SW-18235-0515-DD-005	SW-18235-0915-DD-006	SW-18235-0915-DD-007	SW-18235-0915-DD-004	SW-18235-0915-DD-008	SW-18235-0515-DD-004	SW-18235-0915-DD-005
Sample Date:			5/23/2015	11/12/2015	11/12/2015 Duplicate	11/12/2015	11/12/2015	5/23/2015	11/12/2015
Parameters	**Units**	**PWQO [1]**		**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**
Semi-volatile Organic Compounds									
Acenaphthene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	µg/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**0.029**	**< 0.020**	**0.026**	**< 0.020**
Benzo(a)anthracene	µg/L	0.0004	**< 0.020**	**< 0.020**	**< 0.020**	**0.074**	**< 0.020**	**0.078**	**< 0.020**
Benzo(a)pyrene	µg/L	-	< 0.010	< 0.010	< 0.010	0.063	< 0.010	0.075	< 0.010
Benzo(b)fluoranthene	µg/L	-	< 0.020	< 0.020	< 0.020	0.103	< 0.020	0.105	< 0.020
Benzo(g,h,i)perylene	µg/L	0.00002	**< 0.020**	**< 0.020**	**< 0.020**	**0.058**	**< 0.020**	**0.047**	**< 0.020**
Benzo(k)fluoranthene	µg/L	0.0002	**< 0.020**	**< 0.020**	**< 0.020**	**0.038**	**< 0.020**	**0.034**	**< 0.020**
Chrysene	µg/L	0.0001	**< 0.020**	**< 0.020**	**< 0.020**	**0.089**	**< 0.020**	**0.085**	**< 0.020**
Dibenz(a,h)anthracene	µg/L	0.002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluoranthene	µg/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**0.121**	**< 0.020**	**0.203**	**< 0.020**
Fluorene	µg/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.028	< 0.020
Indeno(1,2,3-cd)pyrene	µg/L	-	< 0.020	< 0.020	< 0.020	0.055	< 0.020	0.052	< 0.020
Naphthalene	µg/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	µg/L	0.03	< 0.020	< 0.020	< 0.020	**0.057**	< 0.020	**0.149**	< 0.020
Pyrene	µg/L	-	< 0.020	< 0.020	< 0.020	0.111	< 0.020	0.155	< 0.020

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO Criteria
<30 Result below method detection limit

Table 5.8B

Summary of Surface Water Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW6	SW7	SW7	SW7	SW8	SW8
Sample ID:			SW-18235-0915-DD-001	SW-18235-0515-DD-002	SW-18235-0515-DD-003	SW-18235-0915-DD-003	SW-18235-0515-DD-001	SW-18235-0915-DD-002
Sample Date:			11/12/2015	5/23/2015	5/23/2015 Duplicate	11/12/2015	5/23/2015	11/12/2015
Parameters	**Units**	**PWQO [1]**		**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	µg/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	µg/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	µg/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	µg/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	µg/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	µg/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	µg/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	400	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	µg/L	-	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	µg/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	µg/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	µg/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	µg/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	µg/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	µg/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	µg/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	µg/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	µg/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	µg/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	µg/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	µg/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	µg/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	µg/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	µg/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	µg/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	µg/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	µg/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	µg/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Table 5.8B

Summary of Surface Water Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			**SW6**	**SW7**	**SW7**	**SW7**	**SW8**	**SW8**
Sample ID:			**SW-18235-0915-DD-001**	**SW-18235-0515-DD-002**	**SW-18235-0515-DD-003**	**SW-18235-0915-DD-003**	**SW-18235-0515-DD-001**	**SW-18235-0915-DD-002**
Sample Date:			**11/12/2015**	**5/23/2015**	**5/23/2015 Duplicate**	**11/12/2015**	**5/23/2015**	**11/12/2015**
Parameters	**Units**	**PWQO [1]**		**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**	**ponded [2]**
Semi-volatile Organic Compounds								
Acenaphthene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	µg/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	µg/L	0.0004	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	µg/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	µg/L	0.00002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(k)fluoranthene	µg/L	0.0002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Chrysene	µg/L	0.0001	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	µg/L	0.002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluoranthene	µg/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluorene	µg/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	µg/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	µg/L	0.03	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	µg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO Criteria
<30 Result below method detection limit

Table 5.9

Summary of Soil Gas Monitoring Results 2015
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Gas Probe Location	24-Feb-15 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status	10-Mar-15 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status
GP-1D	0.00	-	-	-	-	2.84	FLOODED	0.05	-	-	-	-	2.83	FLOODED
GP-1S	0.00	3.4	7.4	15.9	73.3	2.31	Operational	0.00	5.6	8.8	11.3	74.3	2.54	Operational
GP-2D	0.06	-	-	-	-	1.77	FLOODED	0.18	-	-	-	-	1.79	FLOODED
GP-2S	0.00	-	-	-	-	1.64	FLOODED	0.09	-	-	-	-	1.67	FLOODED
GPN-3D	0.08	-	-	-	-	2.36	FLOODED	0.00	-	-	-	-	2.48	FLOODED
GPN-3S	0.00	0.0	4.0	12.0	84.0	3.21	Operational	0.00	0.0	6.3	2.5	91.2	2.36	Operational

Notes:

- Not Monitored

Table 5.9

Summary of Soil Gas Monitoring Results 2015
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Gas Probe Location	11-Mar-15 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status	15-Apr-15 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status
GP-1D	-	-	-	-	-	-	-	0.00	-	-	-	-	2.52	FLOODED
GP-1S	0.10	5.4	6.8	13.6	74.2	2.53	Operational	0.22	-	-	-	-	1.79	FLOODED
GP-2D	-	-	-	-	-	-	-	0.15	-	-	-	-	1.27	FLOODED
GP-2S	-	-	-	-	-	-	-	0.00	-	-	-	-	1.17	FLOODED
	-	-												
GPN-3D	-	-	-	-	-	-	-	0.00	-	-	-	-	2.17	FLOODED
GPN-3S	-	-	-	-	-	-	-	0.15	0.4	7.8	5.1	86.7	2.40	Operational

Notes:

- N

Notes:

- Not Monitored

Table 5.9

Summary of Soil Gas Monitoring Results 2015
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Gas Probe Location	23-Jul-15 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status	2-Oct-15 Pressure (in. W.C.)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Bal (% v/v)	Water Level (mBTOR)	Probe Status
GP-1D	0.00	-	-	-	-	2.72	FLOODED	0.06	-	-	-	-	3.44	FLOODED
GP-1S	0.00	1.4	9.4	14.0	75.2	2.06	Operational	0.06	0.1	5.8	16.9	77.2	2.81	Operational
GP-2D	0.00	-	-	-	-	1.42	FLOODED	0.08	-	-	-	-	2.66	FLOODED
GP-2S	0.00	-	-	-	-	1.36	FLOODED	0.00	0.0	2.6	19.4	78	2.15	Operational
GPN-3D	0.00	-	-	-	-	1.82	FLOODED	0.05	-	-	-	-	2.28	FLOODED
GPN-3S	0.00		Flow Fault			2.13	Operational	0.00	-	-	-	-	1.96	FLOODED

Notes:

- N

Notes:

- Not Monitored

Table 5.9

Summary of Soil Gas Monitoring Results 2015
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

	22-Dec-15						
Gas Probe Location	**Pressure (in. W.C.)**	**CH_4 (% v/v)**	**CO_2 (% v/v)**	**O_2 (% v/v)**	**Bal (% v/v)**	**Water Level (mBTOR)**	**Probe Status**
GP-1D	0.00	-	-	-	-	2.84	FLOODED
GP-1S	0.00	1.0	12.2	7.6	79.2	2.06	Operational
GP-2D	0.13	-	-	-	-	0.80	FLOODED
GP-2S	0.00	-	-	-	-	0.57	FLOODED
GPN-3D	0.01	-	-	-	-	2.22	FLOODED
GPN-3S	0.00	0.0	1.2	19.4	79.4	2.29	Operational

Notes:

- N

Notes:

- Not Monitored

Table 5.10

Summary of Upgraded TDS Pond Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				**TDS Pond**	**TDS Pond**	**TDS Pond**	**TDS Pond**	**TDS Pond**
Sample ID:				**SW-18235-20150312-SS-100**	**SW-18235-031315-LM-01**	**TDS POND-18235-0315-DD-001**	**SW-18235-032615-JL-01**	**SW-18235-032615-JL-02**
Sample Date:				**3/12/2015**	**3/13/2015**	**3/19/2015**	**3/27/2015**	**3/27/2015**
Parameters	**Units**	**PWQO [1] a**	**TRIGGER [2] b**					
Field Parameters								
Conductivity, field	uS/cm	-	-	-	-	353	-	-
Dissolved oxygen (DO), field	mg/L	<4	-	-	-	6.38	-	-
pH, field	s.u.	6.5-8.5	6.5-8.5	-	-	7.35	-	-
Temperature, field	deg C	-	-	-	-	1.2	-	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	58	-	-
Ammonia-N	mg/L	-	-	-	-	0.311	-	-
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	3.7	-	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	14	-	-
Chloride	mg/L	-	-	-	-	14.0	-	-
Conductivity	umhos/cm	-	-	-	-	346	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	-	-	-	-
Hardness	mg/L	-	-	-	-	138	-	-
Nitrate (as N)	mg/L	-	-	-	-	0.367	-	-
Nitrite (as N)	mg/L	-	-	-	-	0.012	-	-
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.17	8.21	7.83	8.10	7.57
Phenolics (total)	mg/L	0.001	-	-	-	**< 0.0036[a]**	-	-
Phosphorus	mg/L	0.03	-	-	-	0.0288	-	-
Sulfate	mg/L	-	-	-	-	87.7	-	-
Total dissolved solids (TDS)	mg/L	-	-	-	-	207	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.84	-	-
Total suspended solids (TSS)	mg/L	-	25	**41.5[b]**	< 2.0	8.6	4.8	3.8
Un-Ionized Ammonia	mg/L	0.02	-	-	-	0.0008	-	-
Metals								
Arsenic	mg/L	0.005	-	-	-	< 0.0010	-	-
Barium	mg/L	-	-	-	-	0.0145	-	-
Boron	mg/L	0.2	-	-	-	0.030	-	-
Cadmium	mg/L	0.0002	-	-	-	< 0.000090	-	-
Calcium	mg/L	-	-	-	-	31.7	-	-
Chromium	mg/L	0.001	-	-	-	0.00057	-	-
Copper	mg/L	0.005	-	-	-	0.0013	-	-
Iron	mg/L	0.3	-	-	-	**0.335[a]**	-	-
Lead	mg/L	0.005	-	-	-	< 0.00050	-	-
Magnesium	mg/L	-	-	-	-	14.2	-	-
Mercury	mg/L	0.0002	-	-	-	< 0.00010	-	-
Zinc	mg/L	0.03	-	-	-	0.0047	-	-

Table 5.10

Summary of Upgraded TDS Pond Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				**TDS Pond**	**TDS Pond**	**TDS Pond**	**TDS Pond**	**TDS Pond**
Sample ID:				**SW-18235-20150312-SS-100**	**SW-18235-031315-LM-01**	**TDS POND-18235-0315-DD-001**	**SW-18235-032615-JL-01**	**SW-18235-032615-JL-02**
Sample Date:				**3/12/2015**	**3/13/2015**	**3/19/2015**	**3/27/2015**	**3/27/2015**
Parameters	**Units**	**PWQO [1] a**	**TRIGGER [2] b**					
Volatile Organic Compounds								
Ethylbenzene	µg/L	8	-	-	-	< 0.50	-	-
Semi-volatile Organic Compounds								
Benzo(a)pyrene	µg/L	-	-	-	-	< 0.0050	-	-
Naphthalene	µg/L	7	-	-	-	0.022	-	-

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
(2)	TDS Trigger Parameters as per the Industrial Sewage Works ECA
-	No Value/Not Analyzed
J	The result is an estimated value
1.5	Does not meet the applicable Trigger Criteria
<30	Method detection limit does not meet Trigger Criteria
<30	Result below method detection limit

Table 5.10

Summary of Upgraded TDS Pond Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond
Sample ID:				SW-18235-041315-JL-TDS	SW-18235-042715-LM-01	TDS POND-18235-0515-DD-001	TDS POND-18235-0815-DD-001	TDS POND-18235-0915-DD-001
Sample Date:				4/13/2015	4/27/2015	5/23/2015	8/4/2015	11/12/2015
Parameters	**Units**	**PWQO [1] a**	**TRIGGER [2] b**					
Field Parameters								
Conductivity, field	uS/cm	-	-	-	-	1820	1060	820
Dissolved oxygen (DO), field	mg/L	<4	-	-	-	8.90	6.92	6.62
pH, field	s.u.	6.5-8.5	6.5-8.5	-	-	6.91	6.99	7.96
Temperature, field	deg C	-	-	-	-	12.0	23.5	8.7
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	115	74	55
Ammonia-N	mg/L	-	-	-	-	0.190	< 0.050	< 0.050
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	2.2	2.5	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	-	-	< 21	25	21
Chloride	mg/L	-	-	-	-	203	440	64.8
Conductivity	umhos/cm	-	-	-	-	1920	1150	998
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	-	7.6	-	4.4
Hardness	mg/L	-	-	-	-	736	436	390
Nitrate (as N)	mg/L	-	-	-	-	< 0.020	< 0.10	0.024
Nitrite (as N)	mg/L	-	-	-	-	< 0.010	< 0.050	< 0.010
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.03	7.86	8.01	8.13	7.95
Phenolics (total)	mg/L	0.001	-	-	-	< 0.0010	**< 0.0015**[a]	**0.0034**[a]
Phosphorus	mg/L	0.03	-	-	-	**0.0539**[a]	**0.0421**[a]	0.0180
Sulfate	mg/L	-	-	-	-	614	1990	350
Total dissolved solids (TDS)	mg/L	-	-	-	-	1250	749	547
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	< 1.19	0.96	0.25
Total suspended solids (TSS)	mg/L	-	25	15.1	4.3	**34.4**[b]	**27.5**[b]	7.6
Un-Ionized Ammonia	mg/L	0.02	-	-	-	0.0004	<0.0003	<0.0009
Metals								
Arsenic	mg/L	0.005	-	-	-	0.0013	0.0010	0.00036
Barium	mg/L	-	-	-	-	0.0718	0.0534	0.0298
Boron	mg/L	0.2	-	-	-	**0.308**[a]	**0.263**[a]	**0.208**[a]
Cadmium	mg/L	0.0002	-	-	-	< 0.000090	< 0.000090	< 0.000010
Calcium	mg/L	-	-	-	-	178	94.4	-
Chromium	mg/L	0.001	-	-	-	**< 0.00288**[a]	**0.00123**[a]	0.00096
Copper	mg/L	0.005	-	-	-	0.0025	0.0017	0.0012
Iron	mg/L	0.3	-	-	-	**1.95**[a]	**0.900**[a]	0.264
Lead	mg/L	0.005	-	-	-	0.00089	0.00066	0.00016
Magnesium	mg/L	-	-	-	-	70.9	48.6	45.6
Mercury	mg/L	0.0002	-	-	-	< 0.000010	< 0.000010	< 0.000010
Zinc	mg/L	0.03	-	-	-	0.0067	0.0038	< 0.0030

Table 5.10

Summary of Upgraded TDS Pond Analytical Results
2015 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				**TDS Pond**	**TDS Pond**	**TDS Pond**	**TDS Pond**	**TDS Pond**
Sample ID:				**SW-18235-041315-JL-TDS**	**SW-18235-042715-LM-01**	**TDS POND-18235-0515-DD-001**	**TDS POND-18235-0815-DD-001**	**TDS POND-18235-0915-DD-001**
Sample Date:				**4/13/2015**	**4/27/2015**	**5/23/2015**	**8/4/2015**	**11/12/2015**
Parameters	**Units**	**PWQO [1] a**	**TRIGGER [2] b**					
Volatile Organic Compounds								
Ethylbenzene	µg/L	8	-	-	-	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds								
Benzo(a)pyrene	µg/L	-	-	-	-	< 0.0050	< 0.0050	< 0.0050
Naphthalene	µg/L	7	-	-	-	< 0.020	< 0.020	0.030

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
(2) TDS Trigger Parameters as per the Industrial Sewage Works ECA
\- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit

Table 5.3

Summary of Leachate Analytical Results
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					Leachate Storage Tank
Sample Date:					7/19/2016
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**	
Field Parameters					
Conductivity, field	uS/cm	-	-	-	7560
pH, field	s.u.	6.5-8.5	6.5-8.5	OG	7.69
Temperature, field	Deg C	15	-	AO	**26.7**[a]
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	30-500	-	OG	432
Ammonia-N	mg/L	-	-	-	172
Biochemical oxygen demand (BOD)	mg/L	-	-	-	194
Chemical oxygen demand (COD)	mg/L	-	-	-	1000
Chloride	mg/L	250	-	AO	**1130**[a]
Conductivity	umhos/cm	-	-	-	7930
Dissolved organic carbon (DOC)	mg/L	-	-	-	228
Hardness	mg/L	80-100	-	OG	**2290**[a]
Nitrate (as N)	mg/L	10.0	-	MAC	< 2.0
Nitrite (as N)	mg/L	1.0	-	MAC	< 1.0
pH, lab	s.u.	6.5-8.5	6.5-8.5	OG	7.36
Phenolics (total)	mg/L	-	0.001	-	**0.670**[b]
Phosphorus	mg/L	-	0.01	-	**1.74**[b]
Sulfate	mg/L	500	-	AO	83
Total dissolved solids (TDS)	mg/L	500	-	AO	**4180**[a]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	212
Total suspended solids (TSS)	mg/L	-	-	-	319
Turbidity	NTU	5.0	-	MAC	**1110**[a]
Xylenes (total)	mg/L	0.30	-	AO	< 0.0056
Metals					
Aluminum	mg/L	0.10	0.075	OG	**0.47**[ab]
Arsenic	mg/L	0.025	0.005	IMAC	**0.134**[ab]
Barium	mg/L	1.0	-	MAC	0.468
Beryllium	mg/L	-	0.011	-	< 0.0010
Boron	mg/L	5.0	0.2	IMAC	**8.63**[ab]
Cadmium	mg/L	0.005	0.0002	MAC	< 0.00010
Calcium	mg/L	-	-	-	463
Chromium	mg/L	0.05	0.001	MAC	**0.0252**[b]
Cobalt	mg/L	-	0.0009	-	**0.0040**[b]
Copper	mg/L	1.0	0.005	AO	**< 0.010**[b]
Iron	mg/L	0.30	0.3	AO	**0.55**[ab]
Lead	mg/L	0.01	0.005	MAC	0.0018
Magnesium	mg/L	-	-	-	276
Manganese	mg/L	0.05	-	AO	**0.341**[a]
Mercury	mg/L	0.001	0.0002	MAC	< 0.00010
Molybdenum	mg/L	-	0.04	-	0.00172
Nickel	mg/L	-	0.025	-	**0.0655**[b]
Potassium	mg/L	-	-	-	169
Silver	mg/L	-	0.0001	-	**< 0.00050**[b]
Sodium	mg/L	20/200	-	AO	**809**[a]
Thallium	mg/L	-	0.0003	-	< 0.00010
Vanadium	mg/L	-	0.006	-	**0.0260**[b]
Zinc	mg/L	5.0	0.03	AO	**0.055**[b]

Table 5.3

Summary of Leachate Analytical Results
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					Leachate Storage Tank
Sample Date:					7/19/2016
Parameters	**Units**	**ODWS (1) a**	**PWQO (2) b**	**ODWS Source**	
Volatile Organic Compounds					
Trihalomethanes	ug/L	0.100	-	MAC	**< 10**
1,1,1,2-Tetrachloroethane	ug/L	-	20	-	< 2.5
1,1,1-Trichloroethane	ug/L	-	10	-	< 2.5
1,1,2,2-Tetrachloroethane	ug/L	-	70	-	< 2.5
1,1,2-Trichloroethane	ug/L	-	800	-	< 2.5
1,1-Dichloroethane	ug/L	-	200	-	< 2.5
1,1-Dichloroethene	ug/L	14	40	MAC	< 2.5
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	5	-	< 1.0
1,2-Dichlorobenzene	ug/L	200	2.5	MAC	< 2.5
1,2-Dichloroethane	ug/L	5	100	IMAC	< 2.5
1,2-Dichloropropane	ug/L	-	0.7	-	**< 2.5[b]**
1,3-Dichlorobenzene	ug/L	-	2.5	-	< 2.5
1,4-Dichlorobenzene	ug/L	5	4	MAC	< 2.5
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	400	-	< 100
2-Hexanone	ug/L	-	-	-	< 100
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	-	-	< 100
Acetone	ug/L	-	-	-	120
Benzene	ug/L	5	100	MAC	3.5
Bromodichloromethane	ug/L	-	200	-	< 5.0
Bromoform	ug/L	-	60	-	< 5.0
Bromomethane (Methyl bromide)	ug/L	-	0.9	-	**< 2.5[b]**
Carbon tetrachloride	ug/L	5	-	MAC	< 2.5
Chlorobenzene	ug/L	80	15	MAC	< 2.5
Chloroethane	ug/L	-	-	-	< 5.0
Chloroform (Trichloromethane)	ug/L	-	-	-	< 5.0
Chloromethane (Methyl chloride)	ug/L	-	700	-	< 5.0
cis-1,2-Dichloroethene	ug/L	-	200	-	< 2.5
cis-1,3-Dichloropropene	ug/L	-	-	-	< 2.5
Dibromochloromethane	ug/L	-	40	-	< 5.0
Ethylbenzene	ug/L	2.4	8	AO	**5.1[a]**
m&p-Xylenes	ug/L	-	2	-	**5.5[b]**
Methyl tert butyl ether (MTBE)	ug/L	-	200	-	< 2.5
Methylene chloride	ug/L	50	100	MAC	< 10
o-Xylene	ug/L	-	40	-	< 2.5
Styrene	ug/L	-	4	-	< 2.5
Tetrachloroethene	ug/L	30	50	MAC	< 2.5
Toluene	ug/L	24	0.8	AO	**6.4[b]**
trans-1,2-Dichloroethene	ug/L	-	200	-	< 2.5
trans-1,3-Dichloropropene	ug/L	-	7	-	< 2.5
Trichloroethene	ug/L	5	20	MAC	< 2.5
Trichlorofluoromethane (CFC-11)	ug/L	-	-	-	< 5.0
Vinyl chloride	ug/L	2	600	MAC	**< 2.5[a]**
Semi-volatile Organic Compounds					
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	0.818
Acenaphthene	ug/L	-	-	-	0.311
Acenaphthylene	ug/L	-	-	-	0.026
Anthracene	ug/L	-	0.0008	-	**0.054[b]**
Benzo(a)anthracene	ug/L	-	0.0004	-	**< 0.12[b]**
Benzo(a)pyrene	ug/L	0.01	-	MAC	**< 0.085[a]**
Benzo(b)fluoranthene	ug/L	-	-	-	< 0.10
Benzo(g,h,i)perylene	ug/L	-	0.00002	-	**< 0.10[b]**
Benzo(k)fluoranthene	ug/L	-	0.0002	-	**< 0.10[b]**
Chrysene	ug/L	-	0.0001	-	**< 0.15[b]**
Dibenz(a,h)anthracene	ug/L	-	0.002	-	**< 0.10[b]**
Fluoranthene	ug/L	-	0.0008	-	**0.154[b]**
Fluorene	ug/L	-	0.2	-	0.190
Indeno(1,2,3-cd)pyrene	ug/L	-	-	-	< 0.10
Naphthalene	ug/L	-	7	-	4.67
Phenanthrene	ug/L	-	0.03	-	**0.217[b]**
Pyrene	ug/L	-	-	-	0.130

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30 Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1-03	MW1-03	MW1-03	MW1-03	MW1B-13	MW1B-13	MW1B-13
Sample Date:		ODWS [1]	ODWS	5/4/2016	7/19/2016	11/29/2016	11/29/2016 Duplicate	5/4/2016	7/19/2016	11/29/2016
Parameters	**Units**		**Source**							
Field Parameters										
Conductivity, field	uS/cm	-	-	1550	1470	1430	-	2590	2780	2310
pH, field	s.u.	6.5-8.5	OG	6.94	7.43	7.53	-	7.16	7.82	7.75
Temperature, field	Deg C	15	AO	8.1	11.9	13.0	-	7.7	12.9	10.9
			-							
General Chemistry			-							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	371	415	268	258	473	**502**	454
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	0.029	0.029	0.082	< 0.110	0.187
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 35	22	20	21	< 46	92	40
Chloride	mg/L	250	AO	181	151	176	181	60.0	67.9	47.0
Conductivity	umhos/cm	-	-	1620	1550	1450	1440	2890	2930	2270
Dissolved organic carbon (DOC)	mg/L	-	-	< 5.2	3.8	5.0	4.5	6.3	5.5	7.3
Hardness	mg/L	80-100	OG	-	**716**	-	-	-	**1680**	-
Nitrate (as N)	mg/L	10.0	MAC	0.10	< 0.10	0.13	0.12	< 0.10	< 0.10	0.11
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.69	7.59	7.76	7.81	7.76	7.82	7.70
Phenolics (total)	mg/L	-	-	-	< 0.0036	-	-	-	< 0.0042	-
Phosphorus	mg/L	-	-	-	0.0464	-	-	-	0.264	-
Sulfate	mg/L	500	AO	296	264	239	245	**1350**	**1480**	**1000**
Total dissolved solids (TDS)	mg/L	500	AO	**1090**	**1020**	**902**	**890**	**2520**	**2550**	**1830**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.29	-	-	-	2.2	-
Total suspended solids (TSS)	mg/L	-	-	-	58.9	-	-	-	2250	-
Turbidity	NTU	5.0	MAC	**48.2**	**45.3**	**70.9 J**	**149 J**	**247**	**2480**	**418**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	-	< 0.0011	-
Metals										
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	-	0.0021	-
Barium (dissolved)	mg/L	1.0	MAC	0.0815	0.0804	0.0814	0.0862	0.0651	0.0665	0.0563
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	197	195	156	156	195	182	169
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	0.0241	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.16	0.20
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	57.6	55.7	37.5	38.2	223	297	227
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.0050	-	-	-	**1.25**	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00091	-	-	-	0.00857	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	0.0158	-
Potassium (dissolved)	mg/L	-	-	-	2.13	-	-	-	3.82	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	71.3	65.3	93.2	95.0	138	146	117
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	-	0.00011	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003;
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04
<30 Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2-03	MW2-03	MW2-03	MW2B-07	MW2C-01	MW2C-01
Sample Date:		ODWS [1]	ODWS Source	5/4/2016	7/19/2016	11/29/2016	5/4/2016	7/19/2016	11/29/2016
Parameters	**Units**								
Field Parameters									
Conductivity, field	uS/cm	-	-	1460	1410	1210	2090	4540	4640
pH, field	s.u.	6.5-8.5	OG	7.07	7.54	7.60	7.24	7.41	7.48
Temperature, field	Deg C	15	AO	8.1	11.4	12.9	7.6	10.9	10.2
			-						
General Chemistry			-						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	316	356	258	**535**	**851**	**830**
Ammonia-N	mg/L	-	-	< 0.020	< 0.072	0.033	< 0.020	< 0.053	0.030
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 43	21	36	< 41	28	19
Chloride	mg/L	250	AO	239	189	178	22.9	16.1	16.6
Conductivity	umhos/cm	-	-	1560	1460	1250	2170	4860	4850
Dissolved organic carbon (DOC)	mg/L	-	-	8.3	5.9	6.4	< 5.4	5.1	5.7
Hardness	mg/L	80-100	OG	-	**619**	-	-	**2690**	-
Nitrate (as N)	mg/L	10.0	MAC	0.041	0.070	0.18	0.46	2.27	0.90
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.010	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.70	7.79	7.70	7.85	7.78	7.50
Phenolics (total)	mg/L	-	-	-	< 0.0062	-	-	< 0.0031	-
Phosphorus	mg/L	-	-	-	0.0159	-	-	0.0283	-
Sulfate	mg/L	500	AO	145	166	147	**789**	**2750**	**3070**
Total dissolved solids (TDS)	mg/L	500	AO	**1000**	**975**	**762**	**1670**	**4520**	**4570**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.32	-	-	< 0.48	-
Total suspended solids (TSS)	mg/L	-	-	-	26.2	-	-	41.8	-
Turbidity	NTU	5.0	MAC	**48.7**	**20.9**	**245**	**293**	**21.4**	**46.5**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0712	0.0557	0.0643	0.0834	< 0.0091	0.0097
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	0.025	< 0.10	0.24	0.31
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	182	179	145	111	180	193
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	0.29	< 0.10	0.089	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	38.6	41.9	28.4	184	545	615
Manganese (dissolved)	mg/L	0.05	AO	-	0.0081	-	-	< 0.0050	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00109	-	-	0.00987	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	1.74	-	-	8.26	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	75.1	59.1	73.9	98.1	**326**	**302**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	0.015	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003;
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04
<30	Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW3-03	MW3-03	MW3-03	MW3-03	MW6B-07	MW6B-07	MW6B-07	MW6B-07
Sample Date:		ODWS [1]	ODWS Source	5/4/2016	7/19/2016	11/29/2016	11/29/2016 Duplicate	5/4/2016	7/19/2016	7/19/2016 Duplicate	11/29/2016
Parameters	**Units**										
Field Parameters											
Conductivity, field	uS/cm	-	-	986	1250	1500	-	2450	2720	-	2640
pH, field	s.u.	6.5-8.5	OG	7.04	7.52	7.52	-	7.21	7.56	-	7.61
Temperature, field	Deg C	15	AO	7.3	11.6	13.0	-	7.6	12.2	-	11.8
			-								
General Chemistry			-								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	378	417	368	407	443	466	494	497
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	0.026	0.023	< 0.020	< 0.080	< 0.020	0.035
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	-	< 2.0	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 55	51	35	39	< 28	20	16	< 10
Chloride	mg/L	250	AO	136	127	201	181	117	87.4	88.5	82.8
Conductivity	umhos/cm	-	-	1220	1320	1550	1570	2710	2840	2850	2730
Dissolved organic carbon (DOC)	mg/L	-	-	10.0	7.6	8.7	7.6	< 4.9	3.2	3.4	4.2
Hardness	mg/L	80-100	OG	-	**597**	-	-	-	**1650**	**1670**	-
Nitrate (as N)	mg/L	10.0	MAC	0.141	0.158	0.56	0.44	< 0.10	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.010	-	-	-	< 0.10	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.74	7.85	7.70	7.60	7.79	7.88	7.82	7.64
Phenolics (total)	mg/L	-	-	-	< 0.0032	-	-	-	< 0.0113	< 0.0039	-
Phosphorus	mg/L	-	-	-	0.206	-	-	-	0.0386	0.0395	-
Sulfate	mg/L	500	AO	87.6	140	196	225	**1260**	**1440**	**1470**	**1310**
Total dissolved solids (TDS)	mg/L	500	AO	**779**	**863**	**966**	**954**	**2300**	**2510**	**2520**	**2290**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.04	-	-	-	< 0.51	< 0.42	-
Total suspended solids (TSS)	mg/L	-	-	-	293	-	-	-	72.7	71.2	-
Turbidity	NTU	5.0	MAC	**149**	**227**	**201**	**248**	**34.6**	**150 J**	**77.5 J**	**16.5**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	-	< 0.0011	< 0.0011	-
Metals											
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	-	< 0.050	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0384	0.0409	0.0569	0.0563	0.0088	< 0.0125	< 0.0129	0.0143
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	0.034	0.034	< 0.10	< 0.10	< 0.10	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	-	< 0.00010	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	144	136	147	147	182	199	199	178
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	-	< 0.0020	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	0.040	0.040	< 0.10	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	-	< 0.00050	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	37.0	62.6	54.7	54.8	205	281	284	286
Manganese (dissolved)	mg/L	0.05	AO	-	0.0050	-	-	-	**0.0505**	0.0482	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	-	< 0.000010	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00125	-	-	-	0.00105	0.00107	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	1.28	-	-	-	2.69	2.72	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	-	< 0.00050	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	50.9	53.4	87.9	87.6	92.2	75.9	77.5	83.1
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	-	< 0.00010	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	-	< 0.010	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003;
\- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04
<30 Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW1B-06	OW1B-06	OW1B-06	OW3B-13	OW3B-13	OW3B-13	OW5B-06	OW5B-06	OW5B-06
Sample Date:		**ODWS [1]**	**ODWS Source**	**5/4/2016**	**7/19/2016**	**11/29/2016**	**5/4/2016**	**7/19/2016**	**11/29/2016**	**5/4/2016**	**7/19/2016**	**11/29/2016**
Parameters	**Units**											
Field Parameters												
Conductivity, field	uS/cm	-	-	1950	1960	2110	1250	1340	1710	3410	3130	4080
pH, field	s.u.	6.5-8.5	OG	7.18	7.56	7.48	7.27	7.68	7.42	7.05	7.51	7.38
Temperature, field	Deg C	15	AO	6.8	11.6	12.1	8.0	14.9	10.5	6.6	11.1	11.4
			-									
General Chemistry			-									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	491	**600**	**667**	349	447	473	418	485	429
Ammonia-N	mg/L	-	-	0.039	< 0.070	< 0.020	0.086	< 0.044	0.030	< 0.020	< 0.020	0.028
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 24	18	12	115	103	48	< 40	34	40
Chloride	mg/L	250	AO	74.6	59.6	41.4	4.11	4.91	6.7	**377**	**314**	**571**
Conductivity	umhos/cm	-	-	1980	2100	2130	1010	1150	1340	3480	3260	4270
Dissolved organic carbon (DOC)	mg/L	-	-	< 4.3	3.3	5.3	< 4.2	2.9	7.0	9.0	54.4	10.1
Hardness	mg/L	80-100	OG	-	**1170**	-	-	**591**	-	-	**1690**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	0.024	< 0.020	< 0.10	< 0.20	< 0.20	0.40
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	< 0.010	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.92	7.83	7.68	7.88	7.56	7.45	7.59	7.70	7.44
Phenolics (total)	mg/L	-	-	-	< 0.0041	-	-	< 0.0101	-	-	< 0.0038	-
Phosphorus	mg/L	-	-	-	0.0899	-	-	1.05	-	-	0.0649	-
Sulfate	mg/L	500	AO	**663**	**658**	**625**	228	244	354	**1470**	**1410**	**1330**
Total dissolved solids (TDS)	mg/L	500	AO	**1470**	**1560**	**1460**	**831**	**797**	**938**	**2800**	**2730**	**3300**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.28	-	-	2.8	-	-	< 0.68	-
Total suspended solids (TSS)	mg/L	-	-	-	79.7	-	-	445	-	-	116	-
Turbidity	NTU	5.0	MAC	**70.3**	**71.7**	**34.6**	**4000**	**4000**	**744**	**82.9**	**223**	**139**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	< 0.0011	-	-	< 0.0011	-
Metals												
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0286	0.0311	0.0266	0.0730	0.100	0.0971	0.0372	0.0334	0.0410
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.21	0.17	0.22
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	0.00021	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	141	144	118	107	155	185	352	288	370
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	167	197	213	50.5	49.6	65.4	238	235	269
Manganese (dissolved)	mg/L	0.05	AO	-	0.0069	-	-	**0.0894**	-	-	< 0.0050	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00254	-	-	0.00505	-	-	0.00279	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	0.0059	-
Potassium (dissolved)	mg/L	-	-	-	3.05	-	-	4.30	-	-	3.31	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	58.2	70.8	73.5	58.6	27.7	38.6	123	110	**218**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003;
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04
<30 Result below method detection limit

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW8B-06	OW8B-06	OW8B-06	OW9B-06	OW9B-06	OW9B-06
Sample Date:		ODWS [1]	ODWS Source	5/4/2016	7/19/2016	11/29/2016	5/4/2016	7/19/2016	11/29/2016
Parameters	**Units**								
Field Parameters									
Conductivity, field	uS/cm	-	-	1770	1610	1660	1830	1760	1780
pH, field	s.u.	6.5-8.5	OG	7.30	7.58	7.38	7.39	7.92	7.66
Temperature, field	Deg C	15	AO	8.1	12.7	12.5	8.4	10.7	11.7
			-						
General Chemistry			-						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**518**	**538**	**563**	**589**	**620**	**621**
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	0.026	< 0.020	< 0.020	0.058
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 23	13	15	< 33	17	12
Chloride	mg/L	250	AO	92.3	94.9	73.3	46.2	43.8	40.8
Conductivity	umhos/cm	-	-	1810	1710	1700	1890	1850	1800
Dissolved organic carbon (DOC)	mg/L	-	-	< 4.0	3.3	8.6	< 5.2	3.4	6.8
Hardness	mg/L	80-100	OG	-	**600**	-	-	**787**	-
Nitrate (as N)	mg/L	10.0	MAC	0.12	0.29	0.21	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.88	7.82	7.68	7.97	7.95	7.80
Phenolics (total)	mg/L	-	-	-	< 0.0077	-	-	< 0.0057	-
Phosphorus	mg/L	-	-	-	0.0121	-	-	0.0133	-
Sulfate	mg/L	500	AO	400	390	351	**505**	471	419
Total dissolved solids (TDS)	mg/L	500	AO	**1170**	**1130**	**1040**	**1220**	**1230**	**1110**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.15	-	-	< 0.15	-
Total suspended solids (TSS)	mg/L	-	-	-	98.1	-	-	50.7	-
Turbidity	NTU	5.0	MAC	**14.7**	**19.8**	**55.0**	**55.1**	**20.6**	**130**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0248	0.0237	0.0261	0.0236	0.0246	0.0248
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.97	1.01	1.10	0.13	0.11	0.12
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	112	102	119	67.7	65.1	66.2
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	0.0021	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	140	83.8	91.7	151	152	157
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.0050	-	-	< 0.0050	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00359	-	-	0.00297	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	1.44	-	-	4.27	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	91.9	70.5	81.5	120	111	105
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003;
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O.Reg 153/04
<30 Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1-03	MW1B-13	MW2-03	MW2C-01	MW3-03	MW6B-07	MW6B-07
Sample Date:					7/19/2016	7/19/2016	7/19/2016	7/19/2016	7/19/2016	7/19/2016	7/19/2016 Duplicate
Parameters	Units	ODWS [1] a	Table 2 [2] b	ODWS Source							
Volatile Organic Compounds											
Trihalomethanes	ug/L	0.100	-	MAC	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,1-Trichloroethane	ug/L	-	200	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,2-Trichloroethane	ug/L	-	4.7	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1-Dichloroethane	ug/L	-	5	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1-Dichloroethene	ug/L	14	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichlorobenzene	ug/L	200	3	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichloroethane	ug/L	5	1.6	IMAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichloropropane	ug/L	-	5	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,3-Dichlorobenzene	ug/L	-	59	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,4-Dichlorobenzene	ug/L	5	1	MAC	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	640	-	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]
Acetone	ug/L	-	2700	-	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]
Benzene	ug/L	5	5	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Bromodichloromethane	ug/L	-	16	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Bromoform	ug/L	-	25	-	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Carbon tetrachloride	ug/L	5	0.79	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Chlorobenzene	ug/L	80	30	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Ethylbenzene	ug/L	2.4	2.4	AO	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	-	15	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Methylene chloride	ug/L	50	50	MAC	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Tetrachloroethene	ug/L	30	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Toluene	ug/L	24	24	AO	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
trans-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]
Vinyl chloride	ug/L	2	0.5	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Semi-volatile Organic Compounds											
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	2	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Acenaphthylene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Anthracene	ug/L	-	2.4	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(a)anthracene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]
Benzo(b)fluoranthene	ug/L	-	0.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(g,h,i)perylene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(k)fluoranthene	ug/L	-	0.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Chrysene	ug/L	-	0.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Dibenz(a,h)anthracene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Fluoranthene	ug/L	-	0.41	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Naphthalene	ug/L	-	11	-	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]
Phenanthrene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Pyrene	ug/L	-	4.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2) Table 2, Ontario Regulation 153/04, March 2004
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30 Result below method detection limit

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					OW1B-06	OW3B-13	OW5B-06	OW8B-06	OW9B-06
Sample Date:					7/19/2016	7/19/2016	7/19/2016	7/19/2016	7/19/2016
Parameters	Units	ODWS [1] a	Table 2 [2] b	ODWS Source					
Volatile Organic Compounds									
Trihalomethanes	ug/L	0.100	-	MAC	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,1-Trichloroethane	ug/L	-	200	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,2-Trichloroethane	ug/L	-	4.7	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1-Dichloroethane	ug/L	-	5	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1-Dichloroethene	ug/L	14	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichlorobenzene	ug/L	200	3	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichloroethane	ug/L	5	1.6	IMAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichloropropane	ug/L	-	5	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,3-Dichlorobenzene	ug/L	-	59	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,4-Dichlorobenzene	ug/L	5	1	MAC	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	640	-	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]
Acetone	ug/L	-	2700	-	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]
Benzene	ug/L	5	5	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Bromodichloromethane	ug/L	-	16	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Bromoform	ug/L	-	25	-	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Carbon tetrachloride	ug/L	5	0.79	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Chlorobenzene	ug/L	80	30	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Ethylbenzene	ug/L	2.4	2.4	AO	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	-	15	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Methylene chloride	ug/L	50	50	MAC	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Tetrachloroethene	ug/L	30	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Toluene	ug/L	24	24	AO	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
trans-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]
Vinyl chloride	ug/L	2	0.5	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Semi-volatile Organic Compounds									
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	2	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Acenaphthylene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Anthracene	ug/L	-	2.4	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(a)anthracene	ug/L	-	1	-	**< 0.020**[b]	0.023[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	**< 0.010**[b]	0.025[ab]	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]
Benzo(b)fluoranthene	ug/L	-	0.1	-	**< 0.020**[b]	0.033[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(g,h,i)perylene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(k)fluoranthene	ug/L	-	0.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Chrysene	ug/L	-	0.1	-	**< 0.020**[b]	0.032[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Dibenz(a,h)anthracene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Fluoranthene	ug/L	-	0.41	-	**< 0.020**[b]	0.029[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Naphthalene	ug/L	-	11	-	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]
Phenanthrene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Pyrene	ug/L	-	4.1	-	**< 0.020**[b]	0.033[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2) Table 2, Ontario Regulation 153/04, March 2004
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30 Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1A-13	MW1A-13	MW1A-13	MW2A-01	MW2A-01	MW2A-01
Sample Date:				5/4/2016	7/19/2016	11/29/2016	5/4/2016	7/19/2016	11/29/2016
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Field Parameters									
Conductivity, field	uS/cm	-	-	5820	5750	5750	4010	3840	3970
pH, field	s.u.	6.5-8.5	OG	7.00	7.56	7.51	6.92	7.34	7.25
Temperature, field	Deg C	15	AO	9.0	13.1	9.7	9.4	10.8	10.2
			-						
General Chemistry			-						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**586**	**621**	**609**	432	326	447
Ammonia-N	mg/L	-	-	1.98	1.87	1.72	0.074	< 0.126	0.165
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 18	13	< 10	< 18	10	< 10
Chloride	mg/L	250	AO	26	29	23	11.7	14.8	12.8
Conductivity	umhos/cm	-	-	6110	6180	6140	4130	4340	4050
Dissolved organic carbon (DOC)	mg/L	-	-	< 4.5	3.2	6.1	6.8	2.6	2.3
Hardness	mg/L	80-100	OG	-	**4020**	-	-	**2650**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.40	< 0.40	< 0.40	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.20	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.54	7.69	7.51	7.53	7.66	7.32
Phenolics (total)	mg/L	-	-	-	< 0.0153	-	-	< 0.0067	-
Phosphorus	mg/L	-	-	-	0.0127	-	-	0.0149	-
Sulfate	mg/L	500	AO	**4620**	**5380**	**4320**	**2660**	**3220**	**2760**
Total dissolved solids (TDS)	mg/L	500	AO	**6480**	**6700**	**6580**	**4140**	**4510**	**4070**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	2.18	-	-	< 0.47	-
Total suspended solids (TSS)	mg/L	-	-	-	13.0	-	-	10.0	-
Turbidity	NTU	5.0	MAC	**14.3**	**405**	**16.2**	**53.9**	**20.1**	**9.46**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0018	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0064	< 0.0076	0.0079	0.0059	< 0.0044	0.0042
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.62	0.66	0.68	0.54	0.44	0.46
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	0.00010	-
Calcium (dissolved)	mg/L	-	-	439	476	463	479	497	463
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	0.0055	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	691	687	686	342	342	328
Manganese (dissolved)	mg/L	0.05	AO	-	**0.391**	-	-	0.0212	-
Mercury (dissolved)	mg/L	0.001	MAC	-	0.000017	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0156	-	-	0.00628	-
Nickel (dissolved)	mg/L	-	-	-	0.0078	-	-	0.0051	-
Potassium (dissolved)	mg/L	-	-	-	10.5	-	-	5.70	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	**282**	**276**	**249**	112	108	105
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	0.011	-	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC

\- No Value/Not Analyzed

J The result is an estimated value

559 Does not meet the applicable ODWS/O. Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O. Reg 153/04

<30 Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location: / Sample Date: / Parameters	Units	ODWS [1]	ODWS Source	MW4A-09 5/4/2016	MW4A-09 7/19/2016	MW4A-09 11/29/2016	MW5A-09 5/4/2016	MW5A-09 5/4/2016 Duplicate	MW5A-09 7/19/2016	MW5A-09 7/19/2016 Duplicate	MW5A-09 11/29/2016
Field Parameters											
Conductivity, field	uS/cm	-	-	3650	3540	3530	4020	-	3890	-	4140
pH, field	s.u.	6.5-8.5	OG	7.08	7.58	7.60	6.90	-	7.44	-	7.39
Temperature, field	Deg C	15	AO	9.9	11.1	10.8	9.0	-	10.3	-	8.8
			-								
General Chemistry			-								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	323	362	376	426	421	430	435	425
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	0.094	0.541	0.576	0.539	0.537	0.505
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	-	< 2.0	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 36	56	18	< 19	< 19	28	21	20
Chloride	mg/L	250	AO	48.4	25.1	23.1	13.7	14.0	12.8	14.1	12.7
Conductivity	umhos/cm	-	-	3790	3810	3910	4140	4150	4160	4180	4100
Dissolved organic carbon (DOC)	mg/L	-	-	< 3.8	1.9	3.0	< 4.2	< 3.2	1.9	1.7	2.6
Hardness	mg/L	80-100	OG	-	**2180**	-	-	-	**2680**	**2680**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	<	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	-	-	< 0.10	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.72	7.71	7.57	7.46	7.45	7.42	7.42	7.30
Phenolics (total)	mg/L	-	-	-	< 0.0061	-	-	-	< 0.0023	< 0.0064	-
Phosphorus	mg/L	-	-	-	1.98	-	-	-	0.202	0.176	-
Sulfate	mg/L	500	AO	**2530**	**2570**	**2520**	**2670**	**2740**	**2630**	**2890**	**2560**
Total dissolved solids (TDS)	mg/L	500	AO	**3690**	**3840**	**3820**	**4150**	**4130**	**4700**	**3990**	**4150**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 1.5	-	-	-	1.14	1.09	-
Total suspended solids (TSS)	mg/L	-	-	-	2240	-	-	-	631	691	-
Turbidity	NTU	5.0	MAC	**485**	**879**	**405**	**147**	**90.4**	**592**	**539**	**171**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	-	< 0.0011	< 0.0011	-
Metals											
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	-	< 0.050	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	-	< 0.0011	< 0.0012	-
Barium (dissolved)	mg/L	1.0	MAC	0.0154	< 0.0120	0.0137	0.0076	0.0066	< 0.0056	< 0.0056	0.0052
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.36	0.33	0.39	0.59	0.59	0.61	0.62	0.67
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	-	< 0.00010	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	491	476	470	472	470	470	488	499
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	-	< 0.0020	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	0.10	< 0.10	< 0.10	**2.06**	**1.82**	**1.55**	**1.55**	**1.33**
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	-	< 0.00050	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	250	240	282	364	356	365	354	362
Manganese (dissolved)	mg/L	0.05	AO	-	**0.0950**	-	-	-	0.0352	0.0350	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	-	< 0.000010	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0144	-	-	-	0.00501	0.00501	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	5.49	-	-	-	4.98	4.81	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	-	< 0.00050	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	180	121	131	128	122	124	120	124
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	-	< 0.00010	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	-	< 0.010	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC

\- No Value/Not Analyzed

J The result is an estimated value

559 Does not meet the applicable ODWS/O. Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O. Reg 153/04

<30 Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location: / Sample Date: / Parameters	Units	ODWS [1]	ODWS Source	MW6A-07 5/4/2016	MW6A-07 5/4/2016 Duplicate	MW6A-07 7/19/2016	MW6A-07 11/29/2016	OW1A-06 5/4/2016	OW1A-06 7/19/2016	OW1A-06 11/29/2016
Field Parameters										
Conductivity, field	uS/cm	-	-	3690	-	3610	3840	3900	3840	3980
pH, field	s.u.	6.5-8.5	OG	6.84	-	7.32	7.25	6.92	7.40	7.37
Temperature, field	Deg C	15	AO	9.8	-	11.0	9.7	9.2	10.2	9.8
			-							
General Chemistry			-							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	471	484	490	443	434	**539**	457
Ammonia-N	mg/L	-	-	0.394	0.404	0.349	0.313	0.422	0.418	0.396
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 48	< 49	28	37	< 15	< 10	< 10
Chloride	mg/L	250	AO	8.7	8.5	8.5	9.9	11.6	12.2	10.9
Conductivity	umhos/cm	-	-	3720	3600	3690	3890	4020	3900	4050
Dissolved organic carbon (DOC)	mg/L	-	-	< 3.5	< 4.7	2.2	3.0	< 2.9	1.8	3.9
Hardness	mg/L	80-100	OG	-	-	**2490**	-	-	**2500**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.10	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.49	7.44	7.41	7.23	7.60	7.70	7.47
Phenolics (total)	mg/L	-	-	-	-	< 0.0043	-	-	< 0.0027	-
Phosphorus	mg/L	-	-	-	-	0.125	-	-	0.0491	-
Sulfate	mg/L	500	AO	**2260**	**2300**	**2250**	**2380**	**2590**	**2610**	**2500**
Total dissolved solids (TDS)	mg/L	500	AO	**3640**	**3440**	**3730**	**3850**	**3950**	**3880**	**4040**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.89	-	-	< 0.60	-
Total suspended solids (TSS)	mg/L	-	-	-	-	414	-	-	67.4	-
Turbidity	NTU	5.0	MAC	**1270 J**	**706 J**	**612**	**266**	**86.7**	**442**	**59.4**
Xylenes (total)	mg/L	0.30	AO	-	-	< 0.0011	-	-	< 0.0011	-
Metals										
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0087	0.0086	< 0.0063	0.0054	0.0072	< 0.0056	0.0056
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.48	0.47	0.48	0.53	0.64	0.51	0.57
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	510	496	506	522	461	437	469
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	**1.35**	**1.43**	**0.44**	**0.76**	**1.32**	**0.97**	**0.75**
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	292	295	299	317	343	342	383
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.145**	-	-	**0.111**	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00403	-	-	0.00412	-
Nickel (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	-	4.33	-	-	4.47	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	106	104	98.7	109	125	117	133
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC

\- No Value/Not Analyzed

J The result is an estimated value

559 Does not meet the applicable ODWS/O. Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O. Reg 153/04

<30 Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW3A-13	OW3A-13	OW3A-13	OW5A-06	OW5A-06	OW5A-06
Sample Date:		ODWS [1]	ODWS Source	5/4/2016	7/19/2016	11/29/2016	5/4/2016	7/19/2016	11/29/2016
Parameters	**Units**								
Field Parameters			-						
Conductivity, field	uS/cm	-	-	2870	3670	4000	3280	3200	3330
pH, field	s.u.	6.5-8.5	OG	7.10	7.68	7.52	6.88	7.36	7.37
Temperature, field	Deg C	15	AO	9.1	12.8	9.2	9.1	10.5	9.8
			-						
General Chemistry			-						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	394	467	488	443	460	473
Ammonia-N	mg/L	-	-	0.020	< 0.020	0.030	0.479	0.578	0.472
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 29	24	15	< 33	29	20
Chloride	mg/L	250	AO	10.6	12.1	11.7	5.8	6.6	6.0
Conductivity	umhos/cm	-	-	3610	3830	3980	3280	3380	3320
Dissolved organic carbon (DOC)	mg/L	-	-	< 4.1	2.6	5.5	< 4.2	3.0	4.0
Hardness	mg/L	80-100	OG	-	**2380**	-	-	**2110**	-
Nitrate (as N)	mg/L	10.0	MAC	0.26	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.63	7.57	7.40	7.55	7.53	7.43
Phenolics (total)	mg/L	-	-	-	< 0.0052	-	-	< 0.0061	-
Phosphorus	mg/L	-	-	-	0.115	-	-	0.137	-
Sulfate	mg/L	500	AO	**1980**	**2610**	**2550**	**2010**	**2320**	**2190**
Total dissolved solids (TDS)	mg/L	500	AO	**3420**	**3750**	**3950**	**3160**	**3340**	**3130**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.39	-	-	< 0.82	-
Total suspended solids (TSS)	mg/L	-	-	-	82.6	-	-	221	-
Turbidity	NTU	5.0	MAC	**188**	**4000**	**174**	**336**	**1150**	**255**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0437	0.0320	0.0224	0.0065	< 0.0062	0.0062
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.27	0.40	0.52	0.50	0.40	0.37
Cadmium (dissolved)	mg/L	0.005	MAC	-	0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	477	515	504	518	528	424
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	0.0028	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	0.26	< 0.10	< 0.10	**1.76**	**1.69**	**0.39**
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	225	265	314	196	191	156
Manganese (dissolved)	mg/L	0.05	AO	-	**0.124**	-	-	**0.0535**	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00544	-	-	0.00502	-
Nickel (dissolved)	mg/L	-	-	-	0.0097	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	5.54	-	-	3.44	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	148	138	140	83.3	79.6	83.5
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O. Reg 153/04
<30	Result below method detection limit

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location: / Sample Date: / Parameters	Units	ODWS [1]	ODWS Source	OW8A-06 5/4/2016	OW8A-06 7/19/2016	OW8A-06 11/29/2016	OW9A-06 5/4/2016	OW9A-06 7/19/2016	OW9A-06 11/29/2016
Field Parameters									
Conductivity, field	uS/cm	-	-	3720	3660	3780	3850	3760	3890
pH, field	s.u.	6.5-8.5	OG	6.85	7.39	7.19	6.85	7.72	7.19
Temperature, field	Deg C	15	AO	9.7	11.0	10.1	9.5	10.5	9.9
			-						
General Chemistry			-						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	451	492	482	468	486	**521**
Ammonia-N	mg/L	-	-	0.239	0.445	0.468	0.232	< 0.201	0.138
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	< 19	< 10	< 10	< 17	< 10	< 10
Chloride	mg/L	250	AO	11.3	11.4	11.4	10.7	11.3	9.7
Conductivity	umhos/cm	-	-	3870	3770	3870	3950	3910	3810
Dissolved organic carbon (DOC)	mg/L	-	-	< 2.8	1.8	3.5	< 3.5	1.4	3.5
Hardness	mg/L	80-100	OG	-	**2320**	-	-	**2520**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.49	7.49	7.34	7.51	7.62	7.29
Phenolics (total)	mg/L	-	-	-	< 0.0083	-	-	< 0.0045	-
Phosphorus	mg/L	-	-	-	0.0307	-	-	0.0160	-
Sulfate	mg/L	500	AO	**2450**	**2700**	**2560**	**2570**	**2660**	**2290**
Total dissolved solids (TDS)	mg/L	500	AO	**3810**	**3880**	**3780**	**3930**	**3910**	**3770**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.57	-	-	3.61	-
Total suspended solids (TSS)	mg/L	-	-	-	39.4	-	-	48.0	-
Turbidity	NTU	5.0	MAC	**98.0**	**334**	**132**	**18.5**	**26.3**	**24.8**
Xylenes (total)	mg/L	0.30	AO	-	< 0.0011	-	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0060	< 0.0060	0.0052	0.0056	< 0.0041	0.0042
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.58	0.46	0.48	0.56	0.44	0.50
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	480	459	457	494	492	529
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	0.0026	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	**2.26**	**1.14**	**1.53**	0.25	< 0.10	0.18
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	296	285	280	329	314	338
Manganese (dissolved)	mg/L	0.05	AO	-	**0.0842**	-	-	**0.134**	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00440	-	-	0.00554	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	0.0078	-
Potassium (dissolved)	mg/L	-	-	-	4.63	-	-	5.43	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	200	AO	106	99.1	96.2	105	91.0	101
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	0.00011	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.010	-

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC

\- No Value/Not Analyzed

J The result is an estimated value

559 Does not meet the applicable ODWS/O. Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O. Reg 153/04

<30 Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1A-13	MW2A-01	MW4A-09	MW5A-09	MW5A-09	MW6A-07
Sample Date:					7/19/2016	7/19/2016	7/19/2016	7/19/2016	7/19/2016 Duplicate	7/19/2016
Parameters	**Units**	**ODWS a [1]**	**Table 2 b [2]**	**ODWS Source**						
Volatile Organic Compounds										
Trihalomethanes	ug/L	0.100	-	MAC	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1,1-Trichloroethane	ug/L	-	200	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1,2-Trichloroethane	ug/L	-	4.7	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1-Dichloroethane	ug/L	-	5	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1-Dichloroethene	ug/L	14	1.6	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichloroethane	ug/L	5	1.6	IMAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichloropropane	ug/L	-	5	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,3-Dichlorobenzene	ug/L	-	59	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,4-Dichlorobenzene	ug/L	5	1	MAC	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	640	-	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**
Acetone	ug/L	-	2700	-	**< 30[b]**	**< 30[b]**	**< 30[b]**	**< 30[b]**	**< 30[b]**	**< 30[b]**
Benzene	ug/L	5	5	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Bromodichloromethane	ug/L	-	16	-	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**
Bromoform	ug/L	-	25	-	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Carbon tetrachloride	ug/L	5	0.79	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Chlorobenzene	ug/L	80	30	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**
Ethylbenzene	ug/L	2.4	2.4	AO	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	-	15	-	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**
Methylene chloride	ug/L	50	50	MAC	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Tetrachloroethene	ug/L	30	1.6	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Toluene	ug/L	24	24	AO	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
trans-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**
Vinyl chloride	ug/L	2	0.5	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Semi-volatile Organic Compounds										
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	2	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Acenaphthylene	ug/L	-	1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Anthracene	ug/L	-	2.4	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(a)anthracene	ug/L	-	1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	**< 0.010[b]**	**< 0.010[b]**	**< 0.010[b]**	**< 0.010[b]**	**< 0.010[b]**	**< 0.010[b]**
Benzo(b)fluoranthene	ug/L	-	0.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(g,h,i)perylene	ug/L	-	0.2	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(k)fluoranthene	ug/L	-	0.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Chrysene	ug/L	-	0.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Dibenz(a,h)anthracene	ug/L	-	0.2	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Fluoranthene	ug/L	-	0.41	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Naphthalene	ug/L	-	11	-	**< 0.050[b]**	**< 0.050[b]**	**< 0.050[b]**	**< 0.050[b]**	**< 0.050[b]**	**< 0.050[b]**
Phenanthrene	ug/L	-	1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Pyrene	ug/L	-	4.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2)	Table 2, Ontario Regulation 153/04, March 2004
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location: / Sample Date: / Parameters	Units	ODWS a [1]	Table 2 b [2]	ODWS Source	OW1A-06 7/19/2016	OW3A-13 7/19/2016	OW5A-06 7/19/2016	OW8A-06 7/19/2016	OW9A-06 7/19/2016
Volatile Organic Compounds									
Trihalomethanes	ug/L	0.100	-	MAC	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,1-Trichloroethane	ug/L	-	200	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1,2-Trichloroethane	ug/L	-	4.7	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1-Dichloroethane	ug/L	-	5	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,1-Dichloroethene	ug/L	14	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichlorobenzene	ug/L	200	3	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichloroethane	ug/L	5	1.6	IMAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,2-Dichloropropane	ug/L	-	5	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,3-Dichlorobenzene	ug/L	-	59	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
1,4-Dichlorobenzene	ug/L	5	1	MAC	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	640	-	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]	**< 20**[b]
Acetone	ug/L	-	2700	-	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]	**< 30**[b]
Benzene	ug/L	5	5	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Bromodichloromethane	ug/L	-	16	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Bromoform	ug/L	-	25	-	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Carbon tetrachloride	ug/L	5	0.79	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Chlorobenzene	ug/L	80	30	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]	**< 1.0**[b]
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Ethylbenzene	ug/L	2.4	2.4	AO	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	-	15	-	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]	**< 2.0**[b]
Methylene chloride	ug/L	50	50	MAC	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Tetrachloroethene	ug/L	30	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Toluene	ug/L	24	24	AO	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
trans-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]	**< 5.0**[b]
Vinyl chloride	ug/L	2	0.5	MAC	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]	**< 0.50**[b]
Semi-volatile Organic Compounds									
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	2	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Acenaphthylene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Anthracene	ug/L	-	2.4	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(a)anthracene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]	**< 0.010**[b]
Benzo(b)fluoranthene	ug/L	-	0.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(g,h,i)perylene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Benzo(k)fluoranthene	ug/L	-	0.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Chrysene	ug/L	-	0.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Dibenz(a,h)anthracene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Fluoranthene	ug/L	-	0.41	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Naphthalene	ug/L	-	11	-	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]	**< 0.050**[b]
Phenanthrene	ug/L	-	1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]
Pyrene	ug/L	-	4.1	-	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]	**< 0.020**[b]

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2)	Table 2, Ontario Regulation 153/04, March 2004
-	No Value/Not Analyzed
J	The result is an estimated value
559	Does not meet the applicable ODWS/O.Reg 153/04 criteria
<30	Method detection limit does not meet ODWS/O.Reg 153/04 criteria
<30	Result below method detection limit

Table 5.6A

Summary of Groundwater Analytical Results - Bedrock (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location: / Sample Date: / Parameters	Units	ODWS [1]	ODWS Source	MW1D-07 7/19/2016	MW1S-07 7/19/2016	MW2D-07 7/19/2016	MW2S-07 7/19/2016	OW8D-07 7/19/2016	OW8S-07 7/19/2016
Field Parameters									
Conductivity, field	uS/cm	-	-	2890	3670	3790	3810	2990	3840
pH, field	s.u.	6.5-8.5	OG	7.94	7.75	7.39	7.31	8.26	7.68
Temperature, field	Deg C	15	AO	11.1	10.8	10.8	10.7	11.2	10.3
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	196	444	448	455	188	466
Ammonia-N	mg/L	-	-	3.58	0.405	< 0.226	< 0.203	2.96	< 0.278
Biochemical oxygen demand (BOD)	mg/L	-	-	44.2	< 2.0	< 2.0	< 2.0	35.2	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	86	11	10	< 10	84	14
Chloride	mg/L	250	AO	17.3	15.7	12.7	12.7	24.8	12.2
Conductivity	umhos/cm	-	-	3100	3840	4010	4010	3180	4060
Dissolved organic carbon (DOC)	mg/L	-	-	1.6	1.7	1.7	1.4	1.2	1.6
Hardness	mg/L	80-100	OG	**1900**	**2500**	**2610**	**2610**	**1850**	**2450**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	< 0.050	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
pH, lab	s.u.	6.5-8.5	OG	8.03	7.53	7.62	7.54	7.89	7.57
Phenolics (total)	mg/L	-	-	< 0.0147	< 0.0043	< 0.0037	< 0.0029	< 0.0090	< 0.0020
Phosphorus	mg/L	-	-	0.0181	0.0182	0.0103	< 0.0030	0.0425	0.0707
Sulfate	mg/L	500	AO	**2060**	**2970**	**2910**	**2910**	**2140**	**2630**
Total dissolved solids (TDS)	mg/L	500	AO	**3050**	**3850**	**4010**	**4020**	**3180**	**4140**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	3.93	< 0.73	< 0.32	< 0.47	3.33	< 0.43
Total suspended solids (TSS)	mg/L	-	-	31.5	24.6	37.5	6.9	66.5	142
Turbidity	NTU	5.0	MAC	**16.1**	**10.8**	**42.0**	**8.00**	**44.0**	**102**
Xylenes (total)	mg/L	0.30	AO -	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	< 0.0014	0.0031	< 0.0010	< 0.0010	0.0029	0.0022
Barium (dissolved)	mg/L	1.0	MAC	< 0.0044	< 0.0063	< 0.0083	< 0.0039	< 0.0078	< 0.0048
Beryllium (dissolved)	mg/L	-	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	**8.88**	0.49	0.49	0.46	**6.73**	0.48
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Calcium (dissolved)	mg/L	-	-	492	499	491	484	385	467
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Cobalt (dissolved)	mg/L	-	-	< 0.0010	< 0.0010	0.0025	0.0015	< 0.0010	0.0055
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	0.0050	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	< 0.10	**1.63**	0.13	0.25	< 0.10	**2.60**
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Magnesium (dissolved)	mg/L	-	-	163	304	335	339	217	311
Manganese (dissolved)	mg/L	0.05	AO	0.0058	0.0375	**0.174**	**0.162**	< 0.0050	**0.282**
Mercury (dissolved)	mg/L	0.001	MAC	< 0.00010	< 0.000010	< 0.000010	< 0.000010	< 0.00010	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	< 0.00050	0.00661	0.00528	0.00516	< 0.00050	0.0155
Nickel (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.0162
Potassium (dissolved)	mg/L	-	-	28.6	4.83	5.72	5.49	17.9	5.04
Silver (dissolved)	mg/L	-	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Sodium (dissolved)	mg/L	200	AO	30.8	99.2	103	106	21.1	101
Thallium (dissolved)	mg/L	-	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Vanadium (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC

\- No Value/Not Analyzed

J The result is an estimated value

559 Does not meet the applicable ODWS/O.Reg 153/04 criteria

<30 Method detection limit does not meet ODWS/O.Reg 153/04

<30 Result below method detection limit

Table 5.6B

Summary of Groundwater Analytical Results - Bedrock (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1D-07	MW1S-07	MW2D-07	MW2S-07	OW8D-07	OW8S-07
Sample Date:					7/19/2016	7/19/2016	7/19/2016	7/19/2016	7/19/2016	7/19/2016
Parameters	**Units**	**ODWS a (1)**	**Table 2 b (2)**	**ODWS Source**						
Volatile Organic Compounds										
Trihalomethanes	ug/L	0.100	-	MAC	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**	**< 3.2**
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1,1-Trichloroethane	ug/L	-	200	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1,2-Trichloroethane	ug/L	-	4.7	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1-Dichloroethane	ug/L	-	5	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,1-Dichloroethene	ug/L	14	1.6	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichloroethane	ug/L	5	1.6	IMAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichloropropane	ug/L	-	5	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,3-Dichlorobenzene	ug/L	-	59	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,4-Dichlorobenzene	ug/L	5	1	MAC	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	640	-	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**	**< 20[b]**
Acetone	ug/L	-	2700	-	**< 30[b]**	**< 30[b]**	**< 30[b]**	**< 30[b]**	**< 30[b]**	**< 30[b]**
Benzene	ug/L	5	5	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Bromodichloromethane	ug/L	-	16	-	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**
Bromoform	ug/L	-	25	-	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Carbon tetrachloride	ug/L	5	0.79	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Chlorobenzene	ug/L	80	30	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**	**< 1.0[b]**
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**
Ethylbenzene	ug/L	2.4	2.4	AO	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	-	15	-	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**	**< 2.0[b]**
Methylene chloride	ug/L	50	50	MAC	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Tetrachloroethene	ug/L	30	1.6	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Toluene	ug/L	24	24	AO	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
trans-1,2-Dichloroethene	ug/L	-	1.6	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**	**< 5.0[b]**
Vinyl chloride	ug/L	2	0.5	MAC	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
Semi-volatile Organic Compounds										
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	2	-	0.081	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Acenaphthylene	ug/L	-	1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Anthracene	ug/L	-	2.4	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(a)anthracene	ug/L	-	1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	**< 0.020[ab]**	**< 0.010[b]**	**< 0.010[b]**	**< 0.010[b]**	**< 0.010[b]**	**< 0.010[b]**
Benzo(b)fluoranthene	ug/L	-	0.1	-	**< 0.040[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(g,h,i)perylene	ug/L	-	0.2	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Benzo(k)fluoranthene	ug/L	-	0.1	-	**< 0.040[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Chrysene	ug/L	-	0.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Dibenz(a,h)anthracene	ug/L	-	0.2	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Fluoranthene	ug/L	-	0.41	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Naphthalene	ug/L	-	11	-	**< 0.070[b]**	**< 0.050[b]**	**< 0.050[b]**	**< 0.050[b]**	**< 0.050[b]**	**< 0.050[b]**
Phenanthrene	ug/L	-	1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**
Pyrene	ug/L	-	4.1	-	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**	**< 0.020[b]**

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC
(2) Table 2, Ontario Regulation 153/04, March 2004
- No Value/Not Analyzed
J The result is an estimated value
559 Does not meet the applicable ODWS/O. Reg 153/04 criteria
<30 Method detection limit does not meet ODWS/O. Reg 153/04 criteria
<30 Result below method detection limit

Table 5.8A

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW1
Sample Date:			3/11/2016	5/4/2016	11/29/2016	11/29/2016
Parameters	Units	PWQO [1]				Duplicate
Field Parameters						
Flow measurement, field	l/s	-	2.4	0.4	ponded	-
Conductivity, field	uS/cm	-	831	869	1540	-
Dissolved oxygen (DO), field	mg/L	>4-7	8.21	9.00	**5.10**	-
pH, field	s.u.	6.5-8.5	8.07	7.43	7.42	-
Temperature, field	Deg C	-	4.3	13.1	8.0	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	-	16	40	228	199
Ammonia-N	mg/L	-	< 0.060	< 0.020	0.036	0.048
Biochemical oxygen demand (BOD)	mg/L	-	2.3	< 2.0	2.3	2.3
Chemical oxygen demand (COD)	mg/L	-	51	71	55	45
Chloride	mg/L	-	14.1	32.9	247	221
Conductivity	umhos/cm	-	99.9	205	1580	1500
Dissolved organic carbon (DOC)	mg/L	-	-	23.9	15.2	15.1
Hardness	mg/L	-	-	58	344	292
Nitrate (as N)	mg/L	-	< 0.020	< 0.020	< 0.10	< 0.10
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.050	< 0.050
pH, lab	s.u.	6.5-8.5	6.81	7.31	7.37	7.49
Phenolics (total)	mg/L	0.001	**< 0.0029**	**< 0.0032**	**< 0.0057**	**< 0.0058**
Phosphorus	mg/L	0.01	**0.126**	**0.0638**	**0.208 J**	**0.479 J**
Sulfate	mg/L	-	7.23	6.26	220	194
Total dissolved solids (TDS)	mg/L	-	153	159	922	903
Total kjeldahl nitrogen (TKN)	mg/L	-	< 0.97	1.07	1.25	1.43
Total suspended solids (TSS)	mg/L	-	7.3	5.4	22.1 J	10.1 J
Turbidity	NTU	-	71.1 J	15.8	10.8	6.91
Xylenes (total)	mg/L	-	-	-	< 0.0011	< 0.0011
Metals						
Aluminum	mg/L	0.075	-	**1.15**	**0.180**	**0.223**
Arsenic	mg/L	0.005	-	0.00067	0.00066	0.00068
Barium	mg/L	-	-	0.0211	0.101	0.0851
Beryllium	mg/L	0.011	-	< 0.00010	< 0.00010	< 0.00010
Boron	mg/L	0.2	-	0.015	0.043	0.037
Cadmium	mg/L	0.0002	-	0.000020	0.000041	0.000037
Calcium	mg/L	-	-	17.0	100	84.4
Chromium	mg/L	0.001	-	**0.00184**	< 0.00050	0.00052
Cobalt	mg/L	0.0009	-	0.00035	0.00041 J	0.00021 J
Copper	mg/L	0.005	-	0.0020	0.0019	0.0020
Iron	mg/L	0.3	**5.31**	**1.54**	**0.377**	0.280
Lead	mg/L	0.005	-	0.00062	0.00019	0.00023
Magnesium	mg/L	-	-	3.90	22.8	19.7
Manganese	mg/L	-	-	0.0184	0.180 J	0.0877 J
Mercury (dissolved)	mg/L	0.0002	-	< 0.000010	< 0.000010	< 0.000010
Molybdenum	mg/L	0.04	-	< 0.00050	0.00289	0.00255
Nickel	mg/L	0.025	-	0.0018	0.00126	0.00126
Potassium	mg/L	-	-	1.51	4.87	5.64
Silver	mg/L	0.0001	-	< 0.000050	< 0.000050	< 0.000050
Sodium	mg/L	-	-	17.6	136	112
Thallium	mg/L	0.0003	-	-	0.000010	0.000010
Titanium	mg/L	-	-	0.0215	-	-
Vanadium	mg/L	0.006	-	0.00206	0.00075	0.00083
Zinc	mg/L	0.03	-	0.0053	**0.252**	**0.250**

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
(2) Surface water sample collected from non-flowing, ponded conditions
- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO
<30 Result below method detection limit

Table 5.8A

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW3	SW3	SW3	SW4	SW4	SW4
Sample Date:			3/11/2016	5/4/2016	11/29/2016	3/11/2016	3/11/2016 Duplicate	5/4/2016
Parameters	**Units**	**PWQO [1]**						
Field Parameters								
Flow measurement, field	l/s	-	1.5	0.2	ponded	67.4	-	6.2
Conductivity, field	uS/cm	-	950	1320	1420	273	-	525
Dissolved oxygen (DO), field	mg/L	>4-7	9.10	5.60	6.64	10.49	-	15.57
pH, field	s.u.	6.5-8.5	8.14	7.26	7.61	7.87	-	7.69
Temperature, field	Deg C	-	4.3	7.1	7.3	6.0	-	21.2
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	158	220	187	68	68	150
Ammonia-N	mg/L	-	< 0.032	0.029	0.045	< 0.080	< 0.119	0.028
Biochemical oxygen demand (BOD)	mg/L	-	2.2	< 2.0	< 2.0	< 2.0	2.5	< 2.0
Chemical oxygen demand (COD)	mg/L	-	37	55	42	52	53	55
Chloride	mg/L	-	115	159	71.9	19.3	19.6	59.0
Conductivity	umhos/cm	-	1030	1400	1400	328	328	629
Dissolved organic carbon (DOC)	mg/L	-	-	11.6	9.0	-	-	16.3
Hardness	mg/L	-	-	545	604	-	-	246
Nitrate (as N)	mg/L	-	0.716	0.026	0.538	2.69	2.69	< 0.020
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	0.013	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	7.96	7.86	7.83	7.87	7.87	**8.63**
Phenolics (total)	mg/L	0.001	**< 0.0038**	**< 0.0026**	**< 0.0113**	**< 0.0023**	**< 0.0033**	**< 0.0023**
Phosphorus	mg/L	0.01	**0.0611**	**0.0344**	**0.0854**	**0.233**	**0.234**	**0.0855**
Sulfate	mg/L	-	199	279	468	45.7	46.2	90.4
Total dissolved solids (TDS)	mg/L	-	667	948	998	299	291	396
Total kjeldahl nitrogen (TKN)	mg/L	-	< 0.82	0.75	0.70	2.10	2.15	1.21
Total suspended solids (TSS)	mg/L	-	15.4	15.7	52.1	115	94.0	21.2
Turbidity	NTU	-	61.0 J	15.8	58.5	195 J	184 J	18.7
Xylenes (total)	mg/L	-	-	-	< 0.0011	-	-	-
Metals								
Aluminum	mg/L	0.075	-	**0.739**	**1.17**	-	-	**0.969**
Arsenic	mg/L	0.005	-	0.00064	0.00077	-	-	0.00077
Barium	mg/L	-	-	0.0752	0.0772	-	-	0.0304
Beryllium	mg/L	0.011	-	< 0.00010	< 0.00010	-	-	< 0.00010
Boron	mg/L	0.2	-	0.088	0.193	-	-	0.046
Cadmium	mg/L	0.0002	-	0.000020	0.000045	-	-	0.000026
Calcium	mg/L	-	-	157	180	-	-	70.3
Chromium	mg/L	0.001	-	**0.00108**	**0.00191**	-	-	**0.00133**
Cobalt	mg/L	0.0009	-	0.00046	0.00063	-	-	0.00052
Copper	mg/L	0.005	-	0.0025	0.0045	-	-	0.0024
Iron	mg/L	0.3	**3.06**	**0.771**	**1.05**	**8.45**	**8.38**	**0.999**
Lead	mg/L	0.005	-	0.00074	0.00251	-	-	0.00050
Magnesium	mg/L	-	-	37.3	37.4	-	-	17.1
Manganese	mg/L	-	-	0.152	0.0649	-	-	0.0459
Mercury (dissolved)	mg/L	0.0002	-	< 0.000010	< 0.000010	-	-	< 0.000010
Molybdenum	mg/L	0.04	-	0.00173	0.00404	-	-	0.00106
Nickel	mg/L	0.025	-	0.0028	0.00369	-	-	0.0021
Potassium	mg/L	-	-	3.65	6.22	-	-	4.55
Silver	mg/L	0.0001	-	< 0.000050	< 0.000050	-	-	< 0.000050
Sodium	mg/L	-	-	85.4	46.4	-	-	31.7
Thallium	mg/L	0.0003	-	-	0.000026	-	-	-
Titanium	mg/L	-	-	0.0192	-	-	-	0.0206
Vanadium	mg/L	0.006	-	0.00143	0.00264	-	-	0.00209
Zinc	mg/L	0.03	-	0.0083	0.0166	-	-	0.0050

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
(2) Surface water sample collected from non-flowing, ponded conditions
- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO
<30 Result below method detection limit

Table 5.8A

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW5	SW5	SW5	SW6	SW6	SW6
Sample Date:			3/11/2016	5/4/2016	11/29/2016	3/11/2016	5/4/2016	11/29/2016
Parameters	**Units**	**PWQO [1]**						
Field Parameters								
Flow measurement, field	l/s	-	ponded	ponded	ponded	1.6	1.3	0.003
Conductivity, field	uS/cm	-	400	705	1740	960	1180	2090
Dissolved oxygen (DO), field	mg/L	>4-7	10.22	8.33	6.27	8.52	5.84	6.57
pH, field	s.u.	6.5-8.5	8.12	7.57	7.64	7.89	6.84	7.68
Temperature, field	Deg C	-	3.1	12.3	7.9	3.9	6.5	7.8
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	55	173	210	74	142	202
Ammonia-N	mg/L	-	< 0.048	< 0.020	0.067	< 0.032	< 0.020	0.085
Biochemical oxygen demand (BOD)	mg/L	-	2.8	< 2.0	6.4	< 2.0	< 2.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	25	57	82	44	64	47
Chloride	mg/L	-	34.3	76.2	117	69.5	91.1	122
Conductivity	umhos/cm	-	491	1010	1740	1060	1230	2020
Dissolved organic carbon (DOC)	mg/L	-	-	17.4	23.3	-	19.8	16.8
Hardness	mg/L	-	-	363	716	-	523	908
Nitrate (as N)	mg/L	-	0.040	< 0.020	< 0.10	< 0.020	< 0.020	< 0.10
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.050	< 0.010	< 0.010	< 0.050
pH, lab	s.u.	6.5-8.5	7.56	7.78	7.55	7.55	7.61	7.48
Phenolics (total)	mg/L	0.001	**< 0.0024**	**< 0.0026**	**< 0.0038**	**< 0.0024**	**< 0.0084**	**< 0.0057**
Phosphorus	mg/L	0.01	**0.0412**	**0.0371**	**0.471**	**0.0589**	**0.0446**	**0.0485**
Sulfate	mg/L	-	127	258	655	369	381	853
Total dissolved solids (TDS)	mg/L	-	270	698	1440	704	941	1620
Total kjeldahl nitrogen (TKN)	mg/L	-	< 0.58	0.91	2.72	< 0.90	1.35	1.03
Total suspended solids (TSS)	mg/L	-	3.0	8.8	51.5	27.5	17.1	4.7
Turbidity	NTU	-	5.26 J	22.7	22.5	34.8 J	23.4	5.30
Xylenes (total)	mg/L	-	-	-	< 0.0011	-	-	< 0.0011
Metals								
Aluminum	mg/L	0.075	-	**0.983**	**0.098**	-	**1.65**	< 0.057
Arsenic	mg/L	0.005	-	0.00075	0.00115	-	0.00087	0.00098
Barium	mg/L	-	-	0.0345	0.0496	-	0.0548	0.0544
Beryllium	mg/L	0.011	-	< 0.00010	< 0.00010	-	< 0.00010	< 0.00010
Boron	mg/L	0.2	-	0.078	0.190	-	0.143	**0.227**
Cadmium	mg/L	0.0002	-	0.000022	0.000079	-	0.000031	0.000048
Calcium	mg/L	-	-	105	208	-	150	261
Chromium	mg/L	0.001	-	**0.00141**	**0.00187**	-	**0.00200**	< 0.00050
Cobalt	mg/L	0.0009	-	0.00047	**0.00146**	-	0.00077	**0.00118**
Copper	mg/L	0.005	-	0.0018	0.0043	-	0.0018	0.0016
Iron	mg/L	0.3	**0.369**	**1.02**	**1.53**	**1.11**	**1.27**	**0.592**
Lead	mg/L	0.005	-	0.00083	0.00096	-	0.00099	0.00021
Magnesium	mg/L	-	-	24.3	47.8	-	35.7	62.4
Manganese	mg/L	-	-	0.0424	1.01	-	0.0841	0.573
Mercury (dissolved)	mg/L	0.0002	-	< 0.000010	< 0.000010	-	< 0.000010	< 0.000010
Molybdenum	mg/L	0.04	-	< 0.00050	0.000671	-	0.00144	0.00241
Nickel	mg/L	0.025	-	0.0028	0.00390	-	0.0049	0.00601
Potassium	mg/L	-	-	4.33	15.1	-	6.12	9.19
Silver	mg/L	0.0001	-	< 0.000050	< 0.000050	-	< 0.000050	< 0.000050
Sodium	mg/L	-	-	32.0	60.1	-	50.4	69.8
Thallium	mg/L	0.0003	-	-	< 0.000010	-	-	0.000010
Titanium	mg/L	-	-	0.0209	-	-	0.0335	-
Vanadium	mg/L	0.006	-	0.00186	0.00072	-	0.00268	< 0.00050
Zinc	mg/L	0.03	-	0.0080	0.0209	-	0.0051	0.0093

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
(2) Surface water sample collected from non-flowing, ponded conditions
- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO
<30 Result below method detection limit

Table 5.8A

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW7	SW7	SW7	SW7	SW8	SW8
Sample Date:			3/11/2016	5/4/2016	5/4/2016 Duplicate	11/29/2016	3/11/2016	5/4/2016
Parameters	**Units**	**PWQO [1]**						
Field Parameters								
Flow measurement, field	l/s	-	1.6	ponded	-	ponded	ponded	ponded
Conductivity, field	uS/cm	-	323	400	-	1580	52	67
Dissolved oxygen (DO), field	mg/L	>4-7	5.73	**4.51**	-	**4.69**	8.34	**3.78**
pH, field	s.u.	6.5-8.5	7.35	6.82	-	7.48	7.56	6.99
Temperature, field	Deg C	-	5.2	7.0	-	7.2	5.6	6.4
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	39	94	109	42	< 10	21
Ammonia-N	mg/L	-	< 0.063	0.023	0.023	0.170	< 0.069	< 0.020
Biochemical oxygen demand (BOD)	mg/L	-	4.4	< 2.0	< 2.0	6.9	< 2.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	41	68	80	87	55	98
Chloride	mg/L	-	42.6	38.4	38.4	80.9	1.74	0.71
Conductivity	umhos/cm	-	649	715	718	1610	49.6	53.0
Dissolved organic carbon (DOC)	mg/L	-	-	21.3	21.1	20.8	-	27.2
Hardness	mg/L	-	-	288	296	733	-	28
Nitrate (as N)	mg/L	-	< 0.020	< 0.020	< 0.020	< 0.10	< 0.020	< 0.020
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	< 0.050	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	7.31	7.58	7.58	**6.46**	6.69	6.63
Phenolics (total)	mg/L	0.001	**< 0.0030**	**< 0.0029**	**< 0.0036**	**< 0.0049**	**< 0.0022**	**< 0.0028**
Phosphorus	mg/L	0.01	**0.105**	**0.0708**	**0.0594**	**0.432**	**0.156**	**0.257**
Sulfate	mg/L	-	210	208	209	758	8.99	2.44
Total dissolved solids (TDS)	mg/L	-	419	507	513	1270	158	329
Total kjeldahl nitrogen (TKN)	mg/L	-	1.00	1.27	1.22	2.65	1.38	2.03
Total suspended solids (TSS)	mg/L	-	26.0	3.9	3.5	43.0	6.7	14.8
Turbidity	NTU	-	14.3 J	< 1.98	< 1.74	31.7	84.3 J	172
Xylenes (total)	mg/L	-	-	-	-	< 0.0011	-	-
Metals								
Aluminum	mg/L	0.075	-	**0.211 J**	0.068 J	**0.313**	-	**7.22**
Arsenic	mg/L	0.005	-	0.00077	0.00072	0.00086	-	0.00102
Barium	mg/L	-	-	0.0230	0.0209	0.0938	-	0.0440
Beryllium	mg/L	0.011	-	< 0.00010	< 0.00010	< 0.00010	-	0.00021
Boron	mg/L	0.2	-	0.092	0.090	**0.261**	-	0.025
Cadmium	mg/L	0.0002	-	0.000012	< 0.000010	**0.000945**	-	0.000138
Calcium	mg/L	-	-	80.6	83.8	209	-	6.89
Chromium	mg/L	0.001	-	**0.0474 J**	0.00066 J	0.00072	-	**0.00763**
Cobalt	mg/L	0.0009	-	0.00046 J	0.00024 J	**0.00696**	-	**0.00116**
Copper	mg/L	0.005	-	0.0025 J	< 0.0010 J	0.0048	-	**0.0061**
Iron	mg/L	0.3	**0.770**	**0.886 J**	0.241 J	**2.78**	**3.71**	**3.26**
Lead	mg/L	0.005	-	0.00032 J	0.00010 J	0.00097	-	0.00369
Magnesium	mg/L	-	-	21.1	20.9	51.3	-	2.68
Manganese	mg/L	-	-	0.0962 J	0.0240 J	2.03	-	0.0284
Mercury (dissolved)	mg/L	0.0002	-	< 0.000010	< 0.000010	< 0.000010	-	0.000019
Molybdenum	mg/L	0.04	-	0.00093	0.00087	0.000309	-	< 0.00050
Nickel	mg/L	0.025	-	0.0034	0.0025	0.00724	-	0.0059
Potassium	mg/L	-	-	3.72	3.62	29.7	-	2.59
Silver	mg/L	0.0001	-	< 0.000050	< 0.000050	< 0.000050	-	< 0.000050
Sodium	mg/L	-	-	26.0	26.1	39.1	-	1.05
Thallium	mg/L	0.0003	-	-	-	0.000027	-	-
Titanium	mg/L	-	-	0.00425 J	0.00148 J	-	-	0.151
Vanadium	mg/L	0.006	-	0.00073	< 0.00050	0.00109	-	**0.0108**
Zinc	mg/L	0.03	-	< 0.0030	< 0.0030	**0.111**	-	0.0192

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
(2) Surface water sample collected from non-flowing, ponded conditions
- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable PWQO Criteria
<30 Method detection limit does not meet PWQO
<30 Result below method detection limit

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW3	SW3
Sample Date:			5/4/2016	11/29/2016	11/29/2016 Duplicate	5/4/2016	11/29/2016
Parameters	**Units**	**PWQO [1]**					
Volatile Organic Compounds							
Trihalomethanes	ug/L	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	5.2 J	< 1.0 J	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**0.024**
Benzo(a)anthracene	ug/L	0.0004	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**0.045**
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	< 0.010	0.010	0.042
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	0.076
Benzo(g,h,i)perylene	ug/L	0.00002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**0.035**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**0.029**
Chrysene	ug/L	0.0001	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**0.060**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluoranthene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**0.031**	**0.101**
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	0.035
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	< 0.020	< 0.020	**0.061**
Pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	0.026	0.078

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed

J The result is an estimated value

1.5 Does not meet the applicable PWQO Criteria

<30 Method detection limit does not meet PWQO Criteria

<30 Result below method detection limit

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW4	SW5	SW5	SW6	SW6
Sample Date:			5/4/2016	5/4/2016	11/29/2016	5/4/2016	11/29/2016
Parameters	Units	PWQO [1]					
Volatile Organic Compounds							
Trihalomethanes	ug/L	-	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	7.5	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	ug/L	0.0004	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Chrysene	ug/L	0.0001	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluoranthene	ug/L	0.0008	**< 0.020**	**< 0.020**	**0.040**	**< 0.020**	**< 0.020**
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050	< 0.050	0.082
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	**0.057**	< 0.020	**0.054**
Pyrene	ug/L	-	< 0.020	< 0.020	0.029	< 0.020	< 0.020

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed

J The result is an estimated value

1.5 Does not meet the applicable PWQO Criteria

<30 Method detection limit does not meet PWQO Criteria

<30 Result below method detection limit

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW7	SW7	SW7	SW8
Sample Date:			5/4/2016	5/4/2016 Duplicate	11/29/2016	5/4/2016
Parameters	**Units**	**PWQO [1]**				
Volatile Organic Compounds						
Trihalomethanes	ug/L	-	< 3.2	< 3.2	< 3.2	< 3.2
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	ug/L	0.0004	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Chrysene	ug/L	0.0001	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluoranthene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) Surface water sample collected from non-flowing, ponded conditions

\- No Value/Not Analyzed

J The result is an estimated value

1.5 Does not meet the applicable PWQO Criteria

<30 Method detection limit does not meet PWQO Criteria

<30 Result below method detection limit

Table 5.10

Summary of Upgraded TDS Pond Analytical Results
2016 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location: / Sample Date: / Parameters	Units	PWQO [1] a	TRIGGER [2] b	TDS Pond 3/11/2016	TDS Pond 4/8/2016	TDS Pond 5/4/2016	TDS Pond 8/16/2016	TDS Pond 8/16/2016 Duplicate	TDS Pond 11/29/2016
Field Parameters									
Conductivity, field	uS/cm	-	-	663	-	691	850	-	-
Dissolved oxygen (DO), field	mg/L	-	-	10.32	-	11.04	1.12	-	-
pH, field	s.u.	6.5-8.5	6.5-8.5	8.03	-	8.34	7.89	-	-
Temperature, field	Deg C	-	-	8.3	-	11.8	25.9	-	-
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	-	-	62	-	77	86	85	134
Ammonia-N	mg/L	-	-	< 0.044	-	0.027	0.020 J	0.055 J	0.240
Biochemical oxygen demand (BOD)	mg/L	-	-	2.7	-	2.1	2.0	2.3	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	12	-	31	25	25	17
Chloride	mg/L	-	-	37.6	-	34.9	49.2	48.6	48.8
Conductivity	umhos/cm	-	-	822	-	816	1050	1050	1120
Dissolved organic carbon (DOC)	mg/L	-	-	-	-	-	-	-	4.5
Hardness	mg/L	-	-	330	-	321	442	444	448
Nitrate (as N)	mg/L	-	-	0.063	-	0.046	< 0.020	0.030	0.153
Nitrite (as N)	mg/L	-	-	< 0.010	-	< 0.010	< 0.010	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.02	8.01	8.22	8.28	8.23	8.18
Phenolics (total)	mg/L	0.001	-	**< 0.0016**[a]	-	**< 0.0015**[a]	**0.0105 J**[a]	**0.0059 J**[a]	**0.0023**[a]
Phosphorus	mg/L	0.01	320	**0.0309**[a]	-	**0.0308**[a]	**0.0377**[a]	**0.0299**[a]	**0.0426**[a]
Sulfate	mg/L	-	-	292	-	284	385	380	384
Total dissolved solids (TDS)	mg/L	-	-	535	-	555	717	724	744
Total kjeldahl nitrogen (TKN)	mg/L	-	-	< 0.79	-	0.53	0.72	0.70	0.70
Total suspended solids (TSS)	mg/L	-	25000	23.3	22.3	26.3	27.2	32.0	19.7
Metals									
Arsenic	mg/L	0.005	-	< 0.0010	-	0.00035	0.00105	0.00107	0.00052
Barium	mg/L	-	-	0.0245	-	0.0260	0.0570	0.0592	0.0475
Boron	mg/L	0.2	1500	0.142	-	0.133	**0.207**[a]	**0.210**[a]	**0.208**[a]
Cadmium	mg/L	0.0002	-	< 0.00010	-	0.000062	< 0.000010	< 0.000010	< 0.000010
Calcium	mg/L	-	-	61.3	-	67.0	73.6	75.3	90.0
Chromium	mg/L	0.001	-	**< 0.0050**[a]	-	0.00086	**0.00155**[a]	**0.00224**[a]	**0.00136**[a]
Copper	mg/L	0.005	-	**< 0.010**[a]	-	0.0014	0.0020	0.0022	0.0019
Iron	mg/L	0.3	4350	**< 0.50**[a]	-	**0.528**[a]	**1.22**[a]	**1.49**[a]	**0.937**[a]
Lead	mg/L	0.005	-	< 0.0010	-	0.00042	0.00070	0.00082	0.00053
Magnesium	mg/L	-	-	42.9	-	37.4	62.7	62.3	54.2
Mercury	mg/L	0.0002	-	-	-	< 0.000010	-	-	< 0.000010
Mercury (dissolved)	mg/L	0.0002	-	< 0.000010	-	-	< 0.000010	< 0.000010	-
Zinc	mg/L	0.03	110	< 0.030	-	< 0.0030	0.0041	0.0051	0.0031
Volatile Organic Compounds									
Ethylbenzene	ug/L	8	-	< 0.50	-	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds									
Benzo(a)pyrene	mg/L	-	-	< 0.000005	-	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Naphthalene	ug/L	7	7	< 0.020	-	0.023	< 0.020	< 0.020	< 0.020

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC
(2) TDS Trigger Parameters as per the Industrial Sewage Works ECA
- No Value/Not Analyzed
J The result is an estimated value
1.5 Does not meet the applicable Trigger Criteria
<30 Method detection limit does not meet Trigger Criteria
<30 Result below method detection limit

Table 5.3

Summary of Leachate Analytical Results
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					LCS
Sample ID:					LW-18235-0717-DD-033
Sample Date:					7/26/2017
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**	
Field Parameters					
Conductivity, field	uS/cm	-	-	-	8520
pH, field	s.u.	6.5-8.5	6.5-8.5	OG	6.93
Temperature, field	deg C	15	-	AO	**20.0**[a]
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	30-500	-	OG	**2270**[a]
Ammonia-N	mg/L	-	-	-	125
Biochemical oxygen demand (BOD)	mg/L	-	-	-	89.6
Chemical oxygen demand (COD)	mg/L	-	-	-	590
Chlordane	mg/L	0.007	0.00006	MAC	-
Chloride	mg/L	250	-	AO	**724**[a]
Conductivity	uS/cm	-	-	-	5980
Cyanide (total)	mg/L	0.2	0.005	MAC	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	136
Hardness	mg/L	80-100	-	OG	**1800**[a]
Methylphenol (cresol)	mg/L	-	-	-	-
Nitrate (as N)	mg/L	10.0	-	MAC	< 0.40
Nitrite (as N)	mg/L	1.0	-	MAC	< 0.20
pH, lab	s.u.	6.5-8.5	6.5-8.5	OG	7.42
Phenols	mg/L	-	0.001	-	**0.026**[b]
Phosphorus	mg/L	-	0.01	-	**1.77**[b]
Sulfate	mg/L	500	-	AO	**690**[a]
Total dissolved solids (TDS)	mg/L	500	-	AO	**3660**[a]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	212
Total organic carbon (TOC)	mg/L	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	30.2
Trihalomethanes	mg/L	0.100	-	MAC	< 0.0032
Turbidity	NTU	5.0	-	MAC	**392**[a]
Xylenes (total)	mg/L	0.02/0.09	-	AO/MAC	0.0109
Metals					
Aluminum	mg/L	0.10	0.075	OG	**0.20**[ab]
Arsenic	mg/L	0.025	0.005	IMAC	**0.0527**[ab]
Barium	mg/L	1.0	-	MAC	0.335
Beryllium	mg/L	-	0.011	-	< 0.0010
Boron	mg/L	5.0	0.2	IMAC	**6.26**[ab]
Cadmium	mg/L	0.005	0.0002	MAC	< 0.00010
Calcium	mg/L	-	-	-	373
Chromium	mg/L	0.05	0.001	MAC	**0.0210**[b]
Cobalt	mg/L	-	0.0009	-	**0.0028**[b]
Copper	mg/L	1.0	0.005	AO	**< 0.010**[b]
Iron	mg/L	0.30	0.3	AO	**< 0.50**[ab]
Lead	mg/L	0.01	0.005	MAC	< 0.0010
Magnesium	mg/L	-	-	-	212
Manganese	mg/L	0.05	-	AO	**0.320**[a]
Mercury	mg/L	0.001	0.0002	MAC	< 0.000010
Molybdenum	mg/L	-	0.04	-	0.00089
Nickel	mg/L	-	0.025	-	**0.0453**[a]
Potassium	mg/L	-	-	-	123
Silver	mg/L	-	0.0001	-	**< 0.00050**[b]
Sodium	mg/L	20/200	-	AO	**531**[a]
Thallium	mg/L	-	0.0003	-	< 0.00010
Vanadium	mg/L	-	0.006	-	**0.0191**[b]
Zinc	mg/L	5.0	0.03	AO	< 0.030
Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	ug/L	-	20	-	< 0.50
1,1,1-Trichloroethane	ug/L	-	10	-	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	70	-	< 0.50
1,1,2-Trichloroethane	ug/L	-	800	-	< 0.50
1,1-Dichloroethane	ug/L	-	200	-	< 0.50
1,1-Dichloroethene	ug/L	14	40	MAC	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	5	-	< 0.50
1,2-Dichlorobenzene	ug/L	200	2.5	MAC	< 0.50
1,2-Dichloroethane	ug/L	5	100	IMAC	0.55
1,2-Dichloropropane	ug/L	-	0.7	-	< 0.50
1,3-Dichlorobenzene	ug/L	-	2.5	-	< 0.50
1,4-Dichlorobenzene	ug/L	5	4	MAC	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	400	-	< 20
2-Chlorotoluene	ug/L	-	-	-	-
2-Hexanone	ug/L	-	-	-	< 30
4-Chlorotoluene	ug/L	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl keton	ug/L	-	-	-	< 20
Acetone	ug/L	-	-	-	< 30
Benzene	ug/L	1	100	MAC	**3.06**[a]
Bromodichloromethane	ug/L	-	200	-	< 2.0
Bromoform	ug/L	-	60	-	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.9	-	< 0.50
Carbon tetrachloride	ug/L	2	-	MAC	< 0.50
Chlorobenzene	ug/L	80	15	MAC	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0
Chloroform (Trichloromethane)	ug/L	-	-	-	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	700	-	< 1.0
cis-1,2-Dichloroethene	ug/L	-	200	-	0.89
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50
Dibromochloromethane	ug/L	-	40	-	< 2.0
Ethylbenzene	ug/L	1.6/140	8	AO/MAC	**6.68**[a]
m&p-Xylenes	ug/L	-	2	-	**8.2**[b]
Methyl tert butyl ether (MTBE)	ug/L	15	200	AO	< 2.0
Methylene chloride	ug/L	50	100	MAC	< 5.0
o-Xylene	ug/L	-	40	-	2.76
Styrene	ug/L	-	4	-	< 0.50
Tetrachloroethene	ug/L	10	50	MAC	< 0.50
Toluene	ug/L	60	0.8	AO	**4.10**[b]
trans-1,2-Dichloroethene	ug/L	-	200	-	< 0.50
trans-1,3-Dichloropropene	ug/L	-	7	-	< 0.50
Trichloroethene	ug/L	5	20	MAC	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	-	-	< 5.0
Vinyl chloride	ug/L	1	600	MAC	0.70

Table 5.3

Summary of Leachate Analytical Results
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					LCS
Sample ID:					LW-18235-0717-DD-033
Sample Date:					7/26/2017
Parameters	**Units**	**ODWS [1] a**	**PWQO [2] b**	**ODWS Source**	
Semi-volatile Organic Compounds					
1,2,3-Trichlorobenzene	ug/L	-	0.9	-	-
1,2,4-Trichlorobenzene	ug/L	-	0.5	-	-
1,2-Dichlorobenzene	ug/L	200	2.5	MAC	-
1,3,5-Trichlorobenzene	ug/L	-	0.65	-	-
1,3-Dichlorobenzene	ug/L	-	2.5	-	-
1,4-Dichlorobenzene	ug/L	5	4	MAC	-
1-Chloronaphthalene	ug/L	-	0.1	-	-
1H-Indole	ug/L	-	-	-	-
1-Methylnaphthalene	ug/L	-	2	-	-
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	1.08
2,2'-Oxybis(1-chloropropane) (bis(2-Chlorois	ug/L	-	-	-	-
2,3,4,5-Tetrachlorophenol	ug/L	-	-	-	-
2,3,4,6-Tetrachlorophenol	ug/L	100	-	MAC	-
2,3,4-Trichlorophenol	ug/L	-	18	-	-
2,3,5,6-Tetrachlorophenol	ug/L	-	-	-	-
2,3,5-Trichlorophenol	ug/L	-	-	-	-
2,4,5-Trichlorophenol	ug/L	-	18	-	-
2,4,6-Trichlorophenol	ug/L	5	18	MAC	-
2,4-Dichlorophenol	ug/L	900	0.2	MAC	-
2,4-Dimethylphenol	ug/L	-	10	-	-
2,4-Dinitrophenol	ug/L	-	-	-	-
2,4-Dinitrotoluene	ug/L	-	4	-	-
2,6-Dichlorophenol	ug/L	-	0.2	-	-
2,6-Dinitrotoluene	ug/L	-	6	-	-
2-Chloronaphthalene	ug/L	-	0.2	-	-
2-Chlorophenol	ug/L	-	7	-	-
2-Methylnaphthalene	ug/L	-	2	-	-
2-Methylphenol	ug/L	-	1	-	-
2-Nitrophenol	ug/L	-	0.5	-	-
3&4-Methylphenol	ug/L	-	1	-	-
3,3'-Dichlorobenzidine	ug/L	-	0.6	-	-
4,6-Dinitro-2-methylphenol	ug/L	-	0.2	-	-
4-Bromophenyl phenyl ether	ug/L	-	0.05	-	-
4-Chloro-3-methylphenol	ug/L	-	3	-	-
4-Chloroaniline	ug/L	-	-	-	-
4-Chlorophenyl phenyl ether	ug/L	-	0.05	-	-
4-Nitrophenol	ug/L	-	50	-	-
5-Nitroacenaphthene	ug/L	-	-	-	-
Acenaphthene	ug/L	-	-	-	0.572
Acenaphthylene	ug/L	-	-	-	< 0.020
Anthracene	ug/L	-	0.0008	-	**0.032** [b]
Benzo(a)anthracene	ug/L	-	0.0004	-	**< 0.20** [b]
Benzo(a)pyrene	ug/L	0.01	-	MAC	**< 0.10** [a]
Benzo(b)fluoranthene	ug/L	-	-	-	< 0.20
Benzo(g,h,i)perylene	ug/L	-	0.00002	-	**< 0.20** [b]
Benzo(k)fluoranthene	ug/L	-	0.0002	-	**< 0.20** [b]
Biphenyl (1,1-Biphenyl)	ug/L	-	0.2	-	-
bis(2-Chloroethoxy)methane	ug/L	-	-	-	-
bis(2-Chloroethyl)ether	ug/L	-	200	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	-	0.6	-	-
Butyl benzylphthalate (BBP)	ug/L	-	0.2	-	-
Camphene	ug/L	-	2	-	-
Chrysene	ug/L	-	0.0001	-	**< 0.20** [b]
Dibenz(a,h)anthracene	ug/L	-	0.002	-	**< 0.20** [b]
Dibenzofuran	ug/L	-	0.3	-	-
Dieldrin	ug/L	0.7	0.001	MAC	-
Diethyl phthalate	ug/L	-	-	-	-
Dimethyl phthalate	ug/L	-	-	-	-
Di-n-butylphthalate (DBP)	ug/L	-	4	-	-
Di-n-octyl phthalate (DnOP)	ug/L	-	-	-	-
Diphenyl ether	ug/L	-	0.03	-	-
Diphenylamine	ug/L	-	3	-	-
Fluoranthene	ug/L	-	0.0008	-	**< 0.20** [b]
Fluorene	ug/L	-	0.2	-	**0.343** [b]
gamma-BHC (lindane)	ug/L	4	0.01	MAC	-
Hexachlorobutadiene	ug/L	-	0.009	-	-
Hexachlorocyclopentadiene	ug/L	-	0.06	-	-
Hexachloroethane	ug/L	-	1	-	-
Indeno(1,2,3-cd)pyrene	ug/L	-	-	-	< 0.20
Isophorone	ug/L	-	-	-	-
Naphthalene	ug/L	-	7	-	5.77
Nitrobenzene	ug/L	-	0.02	-	-
N-Nitrosodi-n-propylamine	ug/L	-	-	-	-
Pentachlorophenol	ug/L	60	0.5	MAC	-
Perylene	ug/L	-	0.00007	-	-
Phenanthrene	ug/L	-	0.03	-	**0.286** [b]
Phenol	ug/L	-	5	-	-
Pyrene	ug/L	-	-	-	< 0.20

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			
Sample ID:			
Sample Date:			
Parameters	**Units**	**ODWS [1]**	**ODWS Source**
Field Parameters			
Conductivity, field	uS/cm	-	-
pH, field	s.u.	6.5-8.5	OG
Temperature, field	deg C	15	AO
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	30-500	OG
Ammonia-N	mg/L	-	-
Biochemical oxygen demand (BOD)	mg/L	-	-
Chemical oxygen demand (COD)	mg/L	-	-
Chloride	mg/L	250	AO
Conductivity	uS/cm	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-
Hardness	mg/L	80-100	OG
Nitrate (as N)	mg/L	10.0	MAC
Nitrite (as N)	mg/L	1.0	MAC
pH, lab	s.u.	6.5-8.5	OG
Phenols	mg/L	-	-
Phosphorus	mg/L	-	-
Sulfate	mg/L	500	AO
Total dissolved solids (TDS)	mg/L	500	AO
Total kjeldahl nitrogen (TKN)	mg/L	-	-
Total suspended solids (TSS)	mg/L	-	-
Trihalomethanes	mg/L	0.100	MAC
Turbidity	NTU	5.0	MAC
Xylenes (total)	mg/L	0.02/0.09	AO/MAC
Metals			
Aluminum (dissolved)	mg/L	0.10	OG
Arsenic (dissolved)	mg/L	0.025	IMAC
Barium (dissolved)	mg/L	1.0	MAC
Beryllium (dissolved)	mg/L	-	-
Boron (dissolved)	mg/L	5.0	IMAC
Cadmium (dissolved)	mg/L	0.005	MAC
Calcium (dissolved)	mg/L	-	-
Chromium (dissolved)	mg/L	0.05	MAC
Cobalt (dissolved)	mg/L	-	-
Copper (dissolved)	mg/L	1.0	AO
Iron (dissolved)	mg/L	0.30	AO
Lead (dissolved)	mg/L	0.01	MAC
Magnesium (dissolved)	mg/L	-	-
Manganese (dissolved)	mg/L	0.05	AO
Mercury (dissolved)	mg/L	0.001	MAC
Molybdenum (dissolved)	mg/L	-	-
Nickel (dissolved)	mg/L	-	-
Potassium (dissolved)	mg/L	-	-
Silver (dissolved)	mg/L	-	-
Sodium (dissolved)	mg/L	20/200	AO
Thallium (dissolved)	mg/L	-	-
Vanadium (dissolved)	mg/L	-	-
Zinc (dissolved)	mg/L	5.0	AO

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1-03	MW1-03	MW1-03
Sample ID:				GW-18235-0517-DD-023	GW-18235-0717-DD-030	GW-18235-1117-DD-021
Sample Date:				5/17/2017	7/26/2017	12/1/2017
Parameters	**Units**	**ODWS [1]**	**ODWS Source**			
Field Parameters						
Conductivity, field	uS/cm	-	-	1970	3160	1830
pH, field	s.u.	6.5-8.5	OG	7.13	7.28	6.94
Temperature, field	deg C	15	AO	9.0	12.7	12.6
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	329	349	327
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	< 0.032
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	18	24	20
Chloride	mg/L	250	AO	**328**	**351**	**278**
Conductivity	uS/cm	-	-	2020	2040	1790
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	4.3	4.5	5.4
Hardness	mg/L	80-100	OG	-	**736**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.69	7.48	8.02
Phenols	mg/L	-	-	-	< 0.0020	-
Phosphorus	mg/L	-	-	-	0.0395	-
Sulfate	mg/L	500	AO	258	287	245
Total dissolved solids (TDS)	mg/L	500	AO	**1260**	**1300**	**1160**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.15	-
Total suspended solids (TSS)	mg/L	-	-	-	58.0	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	**84.1**	**70.0**	**61.9**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	< 0.0011	-
Metals						
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.109	0.109	0.104
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	0.032
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	215	209	195
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.010
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	57.5	52.1	48.1
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.0050	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00123	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	2.39	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**121**	**101**	**124**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1B-13	MW1B-13	MW1B-13	MW1B-13	MW2-03	MW2-03
Sample ID:				GW-18235-0517-DD-007	GW-18235-0717-DD-010	GW-18235-1117-DD-005	GW-18235-1117-DD-006	GW-18235-0517-DD-021	GW-18235-0717-DD-028
Sample Date:				5/17/2017	7/26/2017	12/1/2017	12/1/2017	5/17/2017	7/26/2017
							Duplicate		
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Field Parameters									
Conductivity, field	uS/cm	-	-	262	4290	2100	2100	1930	2830
pH, field	s.u.	6.5-8.5	OG	7.34	7.33	6.90	6.90	7.12	7.22
Temperature, field	deg C	15	AO	8.6	14.2	9.3	9.3	8.8	12.3
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	487	468	450	448	297	325
Ammonia-N	mg/L	-	-	0.039	< 0.058	< 0.309	< 0.335	< 0.020	< 0.020
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	< 100	52	52	49	28	25
Chloride	mg/L	250	AO	52.3	59.2	43.3	42.2	**437**	**350**
Conductivity	uS/cm	-	-	2690	2710	2290	2210	2030	1820
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	4.9	4.7	5.1	5.0	6.9	7.4
Hardness	mg/L	80-100	OG	-	**1420**	-	-	-	**671**
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	-	< 0.050
pH, lab	s.u.	6.5-8.5	OG	7.79	7.73	8.01	7.99	7.73	7.57
Phenols	mg/L	-	-	-	< 0.0072	-	-	-	< 0.0039
Phosphorus	mg/L	-	-	-	0.165	-	-	-	0.0600
Sulfate	mg/L	500	AO	**1200**	**1320**	**1000**	**992**	155	150
Total dissolved solids (TDS)	mg/L	500	AO	**2210**	**2280**	**1930**	**1830**	**1260**	**1150**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.63	-	-	-	0.41
Total suspended solids (TSS)	mg/L	-	-	-	519	-	-	-	85.6
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	-	-	< 0.0032
Turbidity	NTU	5.0	MAC	**581**	**777**	**1470 J**	**3060 J**	**92.8**	**79.7**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	< 0.0011	-	-	-	< 0.0011
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	0.065	-	-	-	< 0.0050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	0.0020	-	-	-	0.00040
Barium (dissolved)	mg/L	1.0	MAC	0.0516	0.0542	0.0583	0.0569	0.0999	0.0955
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	-	< 0.00010
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.022
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	-	0.000017
Calcium (dissolved)	mg/L	-	-	217	182	178	181	222	201
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	-	< 0.00050
Cobalt (dissolved)	mg/L	-	-	-	0.0104	-	-	-	< 0.00010
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	-	< 0.00214
Iron (dissolved)	mg/L	0.30	AO	< 0.10	0.17	< 0.10	< 0.10	< 0.10	0.015
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	-	< 0.000050
Magnesium (dissolved)	mg/L	-	-	193	235	137	137	46.5	41.2
Manganese (dissolved)	mg/L	0.05	AO	-	**0.918**	-	-	-	0.0251
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	0.00733	-	-	-	0.00144
Nickel (dissolved)	mg/L	-	-	-	0.0123	-	-	-	0.00145
Potassium (dissolved)	mg/L	-	-	-	3.21	-	-	-	1.69
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	-	< 0.000050
Sodium (dissolved)	mg/L	20/200	AO	**144**	**130**	**101**	**106**	**117**	**115**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	-	< 0.000010
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	-	< 0.00050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	-	0.0011

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW2-03	MW2B-07	MW2B-07	MW3-03	MW3-03	MW3-03
Sample ID:				GW-18235-1117-DD-019	GW-18235-0517-DD-013	GW-18235-0717-DD-018	GW-18235-0517-DD-022	GW-18235-0717-DD-029	GW-18235-1117-DD-020
Sample Date:				12/1/2017	5/17/2017	7/26/2017	5/17/2017	7/26/2017	12/1/2017
Parameters	**Units**	**ODWS (1)**	**ODWS Source**						
Field Parameters									
Conductivity, field	uS/cm	-	-	1660	2340	3960	875	1990	970
pH, field	s.u.	6.5-8.5	OG	6.90	7.39	7.45	7.13	7.25	6.91
Temperature, field	deg C	15	AO	12.4	9.0	11.7	8.5	12.6	12.1
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	315	**513**	**578**	407	488	439
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	< 0.042	0.035	< 0.020	< 0.124
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	42	31	740	38	42	33
Chloride	mg/L	250	AO	**284**	22.3	26.4	105	121	109
Conductivity	uS/cm	-	-	1640	2270	2510	1260	1480	1380
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	9.7	4.8	4.9	7.6	8.4	8.5
Hardness	mg/L	80-100	OG	-	-	**1280**	-	**562**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	0.13	< 0.10	0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.050	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.95	7.79	7.71	7.70	7.63	8.02
Phenols	mg/L	-	-	-	-	< 0.0054	-	< 0.0079	-
Phosphorus	mg/L	-	-	-	-	46.4	-	0.188	-
Sulfate	mg/L	500	AO	153	**843**	**1070**	92.5	209	189
Total dissolved solids (TDS)	mg/L	500	AO	**1070**	**1740**	**2210**	**744**	**830**	**910**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	23.3	-	0.68	-
Total suspended solids (TSS)	mg/L	-	-	-	-	20900	-	250	-
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	**88.2**	**317**	**4000**	**151**	**206**	**87.0**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	-	< 0.0011	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	< 0.0050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	-	0.00055	-
Barium (dissolved)	mg/L	1.0	MAC	0.0868	0.0795	0.0596	0.0352	0.0486	0.0447
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	-	< 0.00010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	< 0.10	0.045	0.037	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	0.000015	-
Calcium (dissolved)	mg/L	-	-	164	138	123	133	140	127
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	-	< 0.00050	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	-	0.00011	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	< 0.00216	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.010	0.037	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	< 0.000050	-
Magnesium (dissolved)	mg/L	-	-	35.8	214	237	34.6	51.9	55.0
Manganese (dissolved)	mg/L	0.05	AO	-	-	0.0213	-	0.00764	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00263	-	0.00129	-
Nickel (dissolved)	mg/L	-	-	-	-	< 0.0050	-	0.00108	-
Potassium (dissolved)	mg/L	-	-	-	-	5.66	-	1.27	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	-	< 0.000050	-
Sodium (dissolved)	mg/L	20/200	AO	**105**	**115**	**119**	**46.0**	**56.1**	**52.2**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	< 0.000010	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	< 0.00050	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	0.0010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07	MW6B-07
Sample ID:				GW-18235-0517-DD-004	GW-18235-0517-DD-005	GW-18235-0717-DD-005	GW-18235-0717-DD-006	GW-18235-1117-DD-002	GW-18235-1117-DD-003
Sample Date:				5/17/2017	5/17/2017 Duplicate	7/26/2017	7/26/2017 Duplicate	12/1/2017	12/1/2017 Duplicate
Parameters	**Units**	**ODWS (1)**	**ODWS Source**						
Field Parameters									
Conductivity, field	uS/cm	-	-	1620	1620	4160	4160	2020	2020
pH, field	s.u.	6.5-8.5	OG	7.41	7.41	7.15	7.15	6.78	6.78
Temperature, field	deg C	15	AO	8.8	8.8	13.4	13.4	9.0	9.0
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	389	385	412	421	426	412
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.179	< 0.070
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	< 2.0	-	-
Chemical oxygen demand (COD)	mg/L	-	-	24	36	17	14	25	26
Chloride	mg/L	250	AO	169	137	136	123	127	138
Conductivity	uS/cm	-	-	2120	2130	2540	2560	2560	2470
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	3.8	3.8	3.9	3.9	4.4	4.7
Hardness	mg/L	80-100	OG	-	-	**1440**	**1470**	-	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.050	< 0.050	-	-
pH, lab	s.u.	6.5-8.5	OG	7.87	7.87	7.71	7.71	8.01	8.05
Phenols	mg/L	-	-	-	-	< 0.0134	< 0.0088	-	-
Phosphorus	mg/L	-	-	-	-	0.0167	0.0166	-	-
Sulfate	mg/L	500	AO	**714**	**599**	**1030**	**1040**	**1140**	**1080**
Total dissolved solids (TDS)	mg/L	500	AO	**1560**	**1600**	**2140**	**2130**	**2210**	**2070**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	< 0.15	0.15	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	29.3	23.7	-	-
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	< 0.0032	-	-
Turbidity	NTU	5.0	MAC	**22.5**	**13.8**	**27.9**	**26.8**	**19.2**	**20.8**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	-	< 0.0011	< 0.0011	-	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	< 0.050	-	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	< 0.0010	-	-
Barium (dissolved)	mg/L	1.0	MAC	0.0143	0.0149	0.0167	0.0164	0.0122	0.0121
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	< 0.0010	-	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	< 0.00010	-	-
Calcium (dissolved)	mg/L	-	-	166	176	165	169	162	164
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	< 0.0050	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	< 0.0010	-	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	< 0.0020	-	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	< 0.00050	-	-
Magnesium (dissolved)	mg/L	-	-	252	253	249	254	152	151
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.120**	**0.121**	-	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	< 0.000010	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00106	0.00110	-	-
Nickel (dissolved)	mg/L	-	-	-	-	< 0.0050	< 0.0050	-	-
Potassium (dissolved)	mg/L	-	-	-	-	2.95	2.97	-	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	< 0.00050	-	-
Sodium (dissolved)	mg/L	20/200	AO	**91.5**	**89.5**	**79.7**	**82.2**	**86.3**	**87.3**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	< 0.00010	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	< 0.0050	-	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	< 0.010	-	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW1B-06	OW1B-06	OW1B-06	OW3B-13	OW3B-13	OW3B-13
Sample ID:				GW-18235-0517-DD-017	GW-18235-0717-DD-022	GW-18235-1117-DD-015	GW-18235-0517-DD-009	GW-18235-0717-DD-012	GW-18235-1117-DD-008
Sample Date:				5/17/2017	7/26/2017	12/1/2017	5/17/2017	7/26/2017	12/1/2017
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Field Parameters									
Conductivity, field	uS/cm	-	-	1970	3370	2140	1080	1820	1400
pH, field	s.u.	6.5-8.5	OG	7.32	7.23	6.90	7.39	7.46	6.89
Temperature, field	deg C	15	AO	7.7	11.9	10.5	9.2	14.3	9.7
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**528**	**544**	**565**	452	462	492
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	< 0.129	< 0.020	< 0.020	< 0.020
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	10	17	13	34	46	32
Chloride	mg/L	250	AO	63.0	63.3	61.4	5.0	3.26	4.3
Conductivity	uS/cm	-	-	2090	2110	2060	1140	1060	1240
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	3.5	4.5	4.1	2.8	3.2	4.2
Hardness	mg/L	80-100	OG	-	**1060**	-	-	**567**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.020	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-	-	< 0.010	-
pH, lab	s.u.	6.5-8.5	OG	7.92	7.68	7.95	7.70	7.34	7.89
Phenols	mg/L	-	-	-	< 0.0046	-	-	< 0.0075	-
Phosphorus	mg/L	-	-	-	0.0475	-	-	0.329	-
Sulfate	mg/L	500	AO	**671**	**716**	**713**	244	163	233
Total dissolved solids (TDS)	mg/L	500	AO	**1580**	**1640**	**1590**	**782**	**757**	**863**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	< 0.15	-	-	0.71	-
Total suspended solids (TSS)	mg/L	-	-	-	106	-	-	1000	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	**37.3**	**67.2**	**43.2**	**425**	**1720**	**362**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	< 0.0011	-	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0278	0.0334	0.0312	0.0755	0.0750	0.0989
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	134	169	142	128	146	173
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0037	-	-	< 0.0027	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	228	154	180	78.7	49.2	63.3
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.0050	-	-	0.0267	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00198	-	-	0.00418	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	2.25	-	-	2.92	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**78.6**	**56.8**	**65.0**	**33.4**	17.8	18.6
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	0.011	-	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW5B-06	OW5B-06	OW5B-06	OW8B-06	OW8B-06	OW8B-06
Sample ID:				GW-18235-0517-DD-014	GW-18235-0717-DD-019	GW-18235-1117-DD-012	GW-18235-0517-DD-019	GW-18235-0717-DD-026	GW-18235-1117-DD-017
Sample Date:				5/17/2017	7/26/2017	12/1/2017	5/17/2017	7/26/2017	12/1/2017
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Field Parameters									
Conductivity, field	uS/cm	-	-	4190	6570	3560	1590	2560	1630
pH, field	s.u.	6.5-8.5	OG	7.13	6.99	6.86	7.28	7.32	6.96
Temperature, field	deg C	15	AO	7.9	12.1	9.8	8.6	12.1	11.2
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	427	428	449	**539**	**508**	**518**
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	< 0.088	< 0.020	< 0.020	< 0.229
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	58	42	61	12	17	19
Chloride	mg/L	250	AO	**546**	**497**	**349**	61.3	50.3	61.3
Conductivity	uS/cm	-	-	4540	4160	3510	1630	1600	1540
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	12.2	13.0	10.9	2.4	3.3	3.1
Hardness	mg/L	80-100	OG	-	**1890**	-	-	**647**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.10	0.11	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.57	7.46	7.88	7.93	7.76	8.16
Phenols	mg/L	-	-	-	< 0.0067	-	-	< 0.0064	-
Phosphorus	mg/L	-	-	-	0.0697	-	-	0.0428	-
Sulfate	mg/L	500	AO	**1510**	**1690**	**1430**	309	245	309
Total dissolved solids (TDS)	mg/L	500	AO	**3700**	**3520**	**3000**	**999**	**977**	**994**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.90	-	-	0.18	-
Total suspended solids (TSS)	mg/L	-	-	-	144	-	-	95.6	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	**216**	**106**	**471**	**47.9**	**79.7**	**66.3**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	< 0.0011	-	-	< 0.0011	-
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-	-	< 0.0050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-	-	0.00027	-
Barium (dissolved)	mg/L	1.0	MAC	0.0458	0.0406	0.0330	0.0233	0.0231	0.0229
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.00010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.23	0.25	0.23	0.86	0.819	0.95
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	0.000014	-
Calcium (dissolved)	mg/L	-	-	422	371	326	111	97.9	107
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.00050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.00010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0026	-	-	< 0.00236	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10	< 0.10	< 0.010	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	0.000051	-
Magnesium (dissolved)	mg/L	-	-	293	234	231	108	97.8	98.2
Manganese (dissolved)	mg/L	0.05	AO	-	**0.0819**	-	-	0.00071	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00311	-	-	0.00448	-
Nickel (dissolved)	mg/L	-	-	-	0.0107	-	-	0.00089	-
Potassium (dissolved)	mg/L	-	-	-	3.86	-	-	2.21	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.000050	-
Sodium (dissolved)	mg/L	20/200	AO	**279**	**227**	**195**	**80.3**	**69.2**	**77.4**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.000010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.00050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	0.0014	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4A

Summary of Groundwater Analytical Results - Shallow Overburden (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW9B-06	OW9B-06	OW9B-06
Sample ID:				GW-18235-0517-DD-011	GW-18235-0717-DD-014	GW-18235-1117-DD-010
Sample Date:				5/17/2017	7/26/2017	12/1/2017
Parameters	**Units**	**ODWS [1]**	**ODWS Source**			
Field Parameters						
Conductivity, field	uS/cm	-	-	2100	3600	1980
pH, field	s.u.	6.5-8.5	OG	7.45	7.12	6.87
Temperature, field	deg C	15	AO	9.1	11.1	11.4
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**609**	**600**	**586**
Ammonia-N	mg/L	-	-	< 0.020	< 0.020	< 0.142
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	30	28	26
Chloride	mg/L	250	AO	36.8	42.0	51.5
Conductivity	uS/cm	-	-	2160	2070	1910
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	3.7	3.8	4.2
Hardness	mg/L	80-100	OG	-	**897**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.050	-
pH, lab	s.u.	6.5-8.5	OG	7.94	7.82	8.18
Phenols	mg/L	-	-	-	< 0.0074	-
Phosphorus	mg/L	-	-	-	0.148	-
Sulfate	mg/L	500	AO	**629**	**642**	< 1.5
Total dissolved solids (TDS)	mg/L	500	AO	**1430**	**1470**	**1310**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.26	-
Total suspended solids (TSS)	mg/L	-	-	-	376	-
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	**388**	**488**	**193**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	< 0.0011	-
Metals						
Aluminum (dissolved)	mg/L	0.10	OG	-	< 0.050	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0293	0.0278	0.0293
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.13	0.13	0.11
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	82.9	77.0	70.9
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	< 0.0010	-
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	< 0.10	< 0.10	< 0.10
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	198	171	170
Manganese (dissolved)	mg/L	0.05	AO	-	< 0.0050	-
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	0.00290	-
Nickel (dissolved)	mg/L	-	-	-	< 0.0050	-
Potassium (dissolved)	mg/L	-	-	-	4.65	-
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**155**	**127**	**115**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1-03	MW1B-13
Sample ID:					GW-18235-0717-DD-030	GW-18235-0717-DD-010
Sample Date:					7/26/2017	7/26/2017
Parameters	**Units**	**ODWS [1] a**	**Table 2 [2] b**	**ODWS Source**		
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50 [b]**	**< 0.50 [b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640	-	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50
Semi-volatile Organic Compounds						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	< 0.020
Naphthalene	ug/L	-	11	-	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Table 2, Ontario Regulation 153/04, March 2004.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW2-03	MW2B-07	MW3-03
Sample ID:					GW-18235-0717-DD-028	GW-18235-0717-DD-018	GW-18235-0717-DD-029
Sample Date:					7/26/2017	7/26/2017	7/26/2017
Parameters	**Units**	**ODWS [1] a**	**Table 2 [2] b**	**ODWS Source**			
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640	-	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	0.038	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	0.057	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	0.100	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	**0.072 [ab]**	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	**0.150 [b]**	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	0.063	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	0.047	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	**0.239 [b]**	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	0.352	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	0.025 J	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	0.062	< 0.020
Naphthalene	ug/L	-	11	-	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	0.175	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	0.277	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Table 2, Ontario Regulation 153/04, March 2004.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW6B-07	MW6B-07	OW1B-06
Sample ID:					GW-18235-0717-DD-005	GW-18235-0717-DD-006	GW-18235-0717-DD-022
Sample Date:					7/26/2017	7/26/2017 Duplicate	7/26/2017
Parameters	**Units**	**ODWS a [1]**	**Table 2 b [2]**	**ODWS Source**			
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640	-	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11	-	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Table 2, Ontario Regulation 153/04, March 2004.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.4B

Summary of Groundwater Analytical Results - Shallow Overburden (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					OW3B-13	OW5B-06	OW8B-06	OW9B-06	OW9B-06
Sample ID:					GW-18235-0717-DD-012	GW-18235-0717-DD-019	GW-18235-0717-DD-026	GW-18235-0716-DD-015	GW-18235-0717-DD-014
Sample Date:					7/26/2017	7/26/2017	7/26/2017	7/19/2016	7/26/2017
Parameters	**Units**	**ODWS [1] a**	**Table 2 [2] b**	**ODWS Source**					
Volatile Organic Compounds									
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640	-	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds									
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020	0.023	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	< 0.020	0.035	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	**0.012 [ab]**	< 0.010	**0.029 [ab]**	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	0.052	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	< 0.020	0.037	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	< 0.020	0.041	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	< 0.020	0.065	< 0.020	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	< 0.020	0.040	< 0.020	< 0.020
Naphthalene	ug/L	-	11	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	< 0.020	0.058	< 0.020	< 0.020

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2)	Table 2, Ontario Regulation 153/04, March 2004.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1A-13	MW1A-13	MW1A-13	MW2A-01	MW2A-01	MW2A-01	MW4A-09	MW4A-09	MW4A-09	MW5A-09	MW5A-09	MW5A-09	MW5A-09
Sample ID:				GW-18235-0517-DD-006	GW-18235-0717-DD-009	GW-18235-1117-DD-004	GW-18235-0517-DD-012	GW-18235-0717-DD-017	GW-18235-1117-DD-011	GW-18235-0517-DD-020	GW-18235-0717-DD-027	GW-18235-1117-DD-018	GW-18235-0517-DD-001	GW-18235-0517-DD-002	GW-18235-0717-DD-001	GW-18235-0717-DD-002
Sample Date:				5/17/2017	7/26/2017	12/1/2017	5/17/2017	7/26/2017	12/1/2017	5/17/2017	7/26/2017	12/1/2017	5/17/2017	5/17/2017 Duplicate	7/26/2017	7/26/2017 Duplicate
Parameters	**Units**	**ODWS [1]**	**ODWS Source**													
Field Parameters																
Conductivity, field	uS/cm	-	-	5720	9440	6030	3930	6650	4060	3700	5870	4690	3970	3970	642	642
pH, field	s.u.	6.5-8.5	OG	7.50	7.22	6.85	6.97	7.23	6.77	7.27	7.29	6.91	7.01	7.01	7.24	7.24
Temperature, field	deg C	15	AO	9.6	11.9	8.4	9.7	10.9	9.9	10.0	11.8	10.8	9.3	9.3	10.4	10.4
General Chemistry																
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	**612**	**636**	**589**	450	390	406	332	324	318	437	427	400	402
Ammonia-N	mg/L	-	-	1.35	1.47	1.37	0.093	< 0.068	< 0.109	< 0.020	< 0.020	< 0.020	0.492	0.483	0.489	0.475
Biochemical oxygen demand (BOD)	mg/L	-	-	-	< 2.0	-	-	< 2.0	-	-	< 2.0	-	-	-	< 2.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	19	13	22	12	< 10	14	23	26	20	15	13	< 10	< 10
Chloride	mg/L	250	AO	24	20.9	25.0	13.5	13.7	12.1	19.7	15.8	15.8	14.5	12.9	13.9	13.6
Conductivity	uS/cm	-	-	6250	6140	5850	4200	4190	3910	3950	3720	3700	4240	4260	4130	4140
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	3.1	3.8	5.7	1.7	1.9	2.1	2.2	2.4	2.2	1.6	1.6	2.1	2.3
Hardness	mg/L	80-100	OG	-	**4080**	-	-	**2630**	-	-	**2190**	-	-	-	**2660**	**2610**
Nitrate (as N)	mg/L	10.0	MAC	< 0.40	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	0.23	< 0.20	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	< 0.10	-	-	< 0.10	-	-	< 0.10	-	-	-	< 0.10	< 0.10
pH, lab	s.u.	6.5-8.5	OG	7.77	7.64	7.92	7.54	7.40	7.88	7.71	7.65	7.96	7.50	7.49	7.29	7.31
Phenols	mg/L	-	-	-	< 0.0089	-	-	< 0.0042	-	-	< 0.0046	-	-	-	< 0.0040	< 0.0066
Phosphorus	mg/L	-	-	-	0.0419	-	-	0.0065	-	-	0.277	-	-	-	0.0363	0.0361
Sulfate	mg/L	500	AO	**4730**	**3770**	**4850**	**2940**	**2920**	**2580**	**2160**	**2490**	**2600**	**2820**	**2500**	**2720**	**2590**
Total dissolved solids (TDS)	mg/L	500	AO	**6620**	**6920**	**6640**	**4210**	**4450**	**4110**	**3870**	**3960**	**3870**	**4190**	**4100**	**4320**	**4350**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.68	-	-	0.22	-	-	0.39	-	-	-	0.55	0.53
Total suspended solids (TSS)	mg/L	-	-	-	2360	-	-	20.5	-	-	1630	-	-	-	169	164
Trihalomethanes	mg/L	0.100	MAC	-	< 0.0032	-	-	< 0.0032	-	-	< 0.0032	-	-	-	< 0.0032	< 0.0032
Turbidity	NTU	5.0	MAC	**258**	**4000**	**225**	**7.40**	**11.4**	2.62	**790**	**990**	**248**	**315**	**335**	**91.5**	**93.6**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	< 0.0011	-	-	< 0.0011	-	-	< 0.0011	-	-	-	< 0.0011	< 0.0011
Metals																
Aluminum (dissolved)	mg/L	0.10	OG	-	0.075	-	-	< 0.050	-	-	< 0.050	-	-	-	< 0.050	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	0.0058	-	-	< 0.0010	-	-	< 0.0010	-	-	-	0.0011	0.0012
Barium (dissolved)	mg/L	1.0	MAC	0.0114	0.0078	0.0067	0.0045	0.0038	0.0051	0.0127	0.0098	0.0123	0.0059	0.0061	0.0058	0.0055
Beryllium (dissolved)	mg/L	-	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.63	0.69	0.58	0.48	0.44	0.41	0.43	0.39	0.35	0.67	0.69	0.64	0.64
Cadmium (dissolved)	mg/L	0.005	MAC	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	-	< 0.00010	< 0.00010
Calcium (dissolved)	mg/L	-	-	413	465	436	523	472	483	524	480	465	491	526	475	468
Chromium (dissolved)	mg/L	0.05	MAC	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050
Cobalt (dissolved)	mg/L	-	-	-	0.0032	-	-	< 0.0010	-	-	< 0.0010	-	-	-	< 0.0010	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	-	< 0.0020	-	-	< 0.0020	-	-	< 0.0020	-	-	-	< 0.0020	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	< 0.10	0.26	**0.60**	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	**1.80**	**1.79**	**1.48**	**1.46**
Lead (dissolved)	mg/L	0.01	MAC	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	-	-	< 0.00050	< 0.00050
Magnesium (dissolved)	mg/L	-	-	714	709	756	386	351	346	289	240	274	397	386	359	350
Manganese (dissolved)	mg/L	0.05	AO	-	**0.212**	-	-	< 0.0050	-	-	**0.0674**	-	-	-	0.0370	0.0373
Mercury (dissolved)	mg/L	0.001	MAC	-	< 0.000010	-	-	< 0.000010	-	-	< 0.000010	-	-	-	< 0.000010	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	0.0121	-	-	0.00835	-	-	0.0146	-	-	-	0.00459	0.00449
Nickel (dissolved)	mg/L	-	-	-	0.0081	-	-	0.0076	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050
Potassium (dissolved)	mg/L	-	-	-	8.07	-	-	5.96	-	-	5.67	-	-	-	4.95	4.78
Silver (dissolved)	mg/L	-	-	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	-	-	< 0.00050	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**239**	**231**	**225**	**122**	**112**	**106**	**153**	**106**	**109**	**139**	**131**	**124**	**123**
Thallium (dissolved)	mg/L	-	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	-	< 0.00010	< 0.00010
Vanadium (dissolved)	mg/L	-	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	-	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	-	< 0.010	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O. Reg. 153/04 criteria.

<30 Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.

<30 Result below method detection limit.

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW5A-09	MW6A-07	MW6A-07	MW6A-07	MW6A-07	OW1A-06	OW1A-06	OW1A-06	OW3A-13	OW3A-13	OW3A-13	OW5A-06	OW5A-06
Sample ID:				GW-018235-122717-DD-001	GW-18235-0517-DD-003	GW-18235-0717-DD-003	GW-18235-0717-DD-004	GW-18235-1117-DD-001	GW-18235-0517-DD-016	GW-18235-0717-DD-021	GW-18235-1117-DD-014	GW-18235-0517-DD-008	GW-18235-0717-DD-011	GW-18235-1117-DD-007	GW-18235-0517-DD-015	GW-18235-0717-DD-020
Sample Date:				12/27/2017	5/17/2017	7/26/2017	7/26/2017 Duplicate	12/1/2017	5/17/2017	7/26/2017	12/1/2017	5/17/2017	7/26/2017	12/1/2017	5/17/2017	7/26/2017
Parameters	**Units**	**ODWS [1]**	**ODWS Source**													
Field Parameters																
Conductivity, field	uS/cm	-	-	4190	3640	600	600	3800	3870	6360	4030	2930	6010	3780	3080	5370
pH, field	s.u.	6.5-8.5	OG	7.99	7.00	7.06	7.06	6.76	7.05	7.12	6.83	7.21	7.53	6.89	7.05	7.09
Temperature, field	deg C	15	AO	4.8	9.9	10.7	10.7	9.6	9.5	10.4	9.7	9.9	11.4	9.3	9.5	10.2
General Chemistry																
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	401	497	444	442	433	459	431	432	414	434	451	484	408
Ammonia-N	mg/L	-	-	0.593	0.352	0.400	0.432	< 0.466	0.430	0.424	< 0.519	< 0.020	< 0.020	< 0.048	0.457	0.411
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	< 2.0	-	-	< 2.0	-	-	< 2.0	-	-	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	< 10	< 100	31	27	23	< 10	< 10	21	< 10	37	15	15	26
Chloride	mg/L	250	AO	12.5	8.4	9.6	10.7	9.8	11.6	13.6	13.5	7.1	11.0	10.5	5.7	7.2
Conductivity	uS/cm	-	-	3500	3730	3620	3750	3690	4130	4050	3890	3190	3710	3800	3320	3380
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	2.5	2.4	2.8	2.7	3.5	2.0	2.7	4.6	2.1	2.5	3.0	3.0	3.7
Hardness	mg/L	80-100	OG	-	-	**2440**	**2480**	-	-	**2440**	-	-	**2330**	-	-	**2060**
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.10	< 0.10	-	-	< 0.10	-	-	< 0.10	-	-	< 0.10
pH, lab	s.u.	6.5-8.5	OG	7.52	7.45	7.27	7.25	7.79	7.62	7.55	7.90	7.59	7.49	7.83	7.59	7.41
Phenols	mg/L	-	-	-	-	< 0.0044 J	< 0.0083 J	-	-	< 0.0112	-	-	< 0.0032	-	-	< 0.0052
Phosphorus	mg/L	-	-	-	-	0.224	0.233	-	-	0.0430	-	-	0.674	-	-	0.155
Sulfate	mg/L	500	AO	**2500**	**2300**	**2460**	**2580**	**2490**	**2540**	**2890**	**2660**	**1910**	**2370**	**2370**	**1890**	**2050**
Total dissolved solids (TDS)	mg/L	500	AO	**4220**	**3570**	**3660**	**3690**	**3800**	**4090**	**3940**	**4090**	**3100**	**3810**	**3910**	**3170**	**3260**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.82	0.73	-	-	0.46	-	-	0.54	-	-	0.65
Total suspended solids (TSS)	mg/L	-	-	-	-	587	585	-	-	1170	-	-	1690	-	-	319
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	< 0.0032	-	-	< 0.0032	-	-	< 0.0032	-	-	< 0.0032
Turbidity	NTU	5.0	MAC	**118**	**969**	**565**	**539**	**227**	**56.5**	**411**	**226**	**185**	**3360**	**148**	**160**	**187**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	-	< 0.0011	< 0.0011	-	-	< 0.0011	-	-	< 0.0011	-	-	< 0.0011
Metals																
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	< 0.050	-	-	< 0.050	-	-	< 0.050	-	-	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	0.0058	0.0055	0.0053	0.0053	0.0067	0.0064	0.0056	0.0078	0.0624	0.0323	0.0303	0.0072	0.0055
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.65	0.53	0.48	0.56	0.44	0.62	0.53	0.49	0.25	0.41	0.45	0.44	0.42
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010
Calcium (dissolved)	mg/L	-	-	502	499	492	509	491	487	423	426	510	519	480	556	494
Chromium (dissolved)	mg/L	0.05	MAC	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	< 0.0020	-	-	< 0.0020	-	-	< 0.0020	-	-	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	**3.15**	**0.95**	**0.67**	**0.66**	**1.07**	**1.02**	**0.64**	**0.48**	< 0.10	< 0.10	< 0.10	**1.16**	**1.32**
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050
Magnesium (dissolved)	mg/L	-	-	368	332	295	293	301	393	336	358	181	252	304	190	200
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.152**	**0.150**	-	-	**0.108**	-	-	0.0421	-	-	0.0416
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	< 0.000010	-	-	< 0.000010	-	-	< 0.000010	-	-	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00442	0.00447	-	-	0.00383	-	-	0.00515	-	-	0.00423
Nickel (dissolved)	mg/L	-	-	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	0.0092	-	-	< 0.0050
Potassium (dissolved)	mg/L	-	-	-	-	4.30	4.30	-	-	4.42	-	-	4.92	-	-	3.49
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	< 0.00050	-	-	< 0.00050	-	-	< 0.00050	-	-	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**132**	**115**	**100**	**102**	**101**	**132**	**119**	**122**	**89.1**	**117**	**130**	**91.0**	**78.5**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	< 0.00010	-	-	< 0.00010	-	-	< 0.00010	-	-	< 0.00010
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	< 0.0050	-	-	< 0.0050	-	-	< 0.0050	-	-	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	< 0.010	-	-	< 0.010	-	-	< 0.010	-	-	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

J The result is an estimated value.

559 Does not meet the applicable ODWS/O. Reg. 153/04 criteria.

<30 Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.

<30 Result below method detection limit.

Table 5.5A

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				OW5A-06	OW8A-06	OW8A-06	OW8A-06	OW9A-06	OW9A-06	OW9A-06
Sample ID:				GW-18235-1117-DD-013	GW-18235-0517-DD-018	GW-18235-0717-DD-025	GW-18235-1117-DD-016	GW-18235-0517-DD-010	GW-18235-0717-DD-013	GW-18235-1117-DD-009
Sample Date:				12/1/2017	5/17/2017	7/26/2017	12/1/2017	5/17/2017	7/26/2017	12/1/2017
Parameters	**Units**	**ODWS [1]**	**ODWS Source**							
Field Parameters										
Conductivity, field	uS/cm	-	-	3360	3700	6080	3820	3780	6250	3940
pH, field	s.u.	6.5-8.5	OG	6.84	6.94	7.06	6.86	6.95	7.01	6.79
Temperature, field	deg C	15	AO	9.7	9.8	10.8	9.8	9.7	10.5	10.0
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	417	477	444	426	482	**513**	467
Ammonia-N	mg/L	-	-	< 0.426	0.381	0.365	< 0.426	0.202	< 0.169	< 0.196
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	< 2.0	-	-	< 2.0	-
Chemical oxygen demand (COD)	mg/L	-	-	21	13	11	14	< 10	12	< 10
Chloride	mg/L	250	AO	6.3	13.8	13.0	10.1	10.9	10.1	11.0
Conductivity	uS/cm	-	-	3260	3890	3810	3730	4030	3810	3800
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	3.7	1.9	2.5	2.3	1.5	1.7	1.9
Hardness	mg/L	80-100	OG	-	-	**2360**	-	-	**2500**	-
Nitrate (as N)	mg/L	10.0	MAC	< 0.10	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	< 0.10
Nitrite (as N)	mg/L	1.0	MAC	-	-	< 0.10	-	-	< 0.10	-
pH, lab	s.u.	6.5-8.5	OG	7.88	7.59	7.38	7.76	7.52	7.39	7.89
Phenols	mg/L	-	-	-	-	< 0.0095	-	-	< 0.0047	-
Phosphorus	mg/L	-	-	-	-	0.0247	-	-	0.0328	-
Sulfate	mg/L	500	AO	**2020**	**2320**	**2760**	**2240**	**2440**	**2400**	**2590**
Total dissolved solids (TDS)	mg/L	500	AO	**3340**	**3820**	**3670**	**3820**	**4020**	**4090**	**3950**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.61	-	-	0.31	-
Total suspended solids (TSS)	mg/L	-	-	-	-	388	-	-	90.6	-
Trihalomethanes	mg/L	0.100	MAC	-	-	< 0.0032	-	-	< 0.0032	-
Turbidity	NTU	5.0	MAC	**65.8**	**215**	**147**	**60.9**	**6.93**	**58.2**	**18.8**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	-	-	< 0.0011	-	-	< 0.0011	-
Metals										
Aluminum (dissolved)	mg/L	0.10	OG	-	-	< 0.050	-	-	**0.186**	-
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	< 0.0010	-	-	< 0.0010	-
Barium (dissolved)	mg/L	1.0	MAC	0.0057	0.0057	0.0062	0.0070	0.0078	0.0071	0.0055
Beryllium (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	< 0.0010	-
Boron (dissolved)	mg/L	5.0	IMAC	0.39	0.55	0.50	0.44	0.50	0.49	0.42
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	< 0.00010	-	-	< 0.00010	-
Calcium (dissolved)	mg/L	-	-	506	523	476	476	505	495	498
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0063	-	-	< 0.0050	-
Cobalt (dissolved)	mg/L	-	-	-	-	< 0.0010	-	-	0.0026	-
Copper (dissolved)	mg/L	1.0	AO	-	-	< 0.0020	-	-	< 0.0020	-
Iron (dissolved)	mg/L	0.30	AO	**1.46**	**1.84**	**0.97**	**1.85**	**0.31**	0.23	0.19
Lead (dissolved)	mg/L	0.01	MAC	-	-	< 0.00050	-	-	< 0.00050	-
Magnesium (dissolved)	mg/L	-	-	203	336	284	298	349	306	327
Manganese (dissolved)	mg/L	0.05	AO	-	-	**0.0874**	-	-	**0.151**	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	< 0.000010	-	-	< 0.000010	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.00456	-	-	0.00548	-
Nickel (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	0.0072	-
Potassium (dissolved)	mg/L	-	-	-	-	4.62	-	-	5.51	-
Silver (dissolved)	mg/L	-	-	-	-	< 0.00050	-	-	< 0.00050	-
Sodium (dissolved)	mg/L	20/200	AO	**79.6**	**113**	**100**	**107**	**108**	**91.2**	**96.3**
Thallium (dissolved)	mg/L	-	-	-	-	< 0.00010	-	-	0.00011	-
Vanadium (dissolved)	mg/L	-	-	-	-	< 0.0050	-	-	< 0.0050	-
Zinc (dissolved)	mg/L	5.0	AO	-	-	< 0.010	-	-	< 0.010	-

Notes:

(1)	Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
559	Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30	Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30	Result below method detection limit.

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1A-13	MW2A-01	MW4A-09	MW5A-09	MW5A-09	MW6A-07
Sample ID:					GW-18235-0717-DD-009	GW-18235-0717-DD-017	GW-18235-0717-DD-027	GW-18235-0717-DD-001	GW-18235-0717-DD-002	GW-18235-0717-DD-003
Sample Date:					7/26/2017	7/26/2017	7/26/2017	7/26/2017	7/26/2017 Duplicate	7/26/2017
Parameters	**Units**	**ODWS [1] a**	**Table 2 [2] b**	**ODWS Source**						
Volatile Organic Compounds										
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**	**< 0.50 [b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	640	-	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds										
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2) Table 2, Ontario Regulation 153/04, March 2004.
- No Value/Not Analyzed.
559 Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30 Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30 Result below method detection limit.

Table 5.5B

Summary of Groundwater Analytical Results - Basal Overburden/Shallow Bedrock (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW6A-07	OW1A-06	OW3A-13	OW5A-06	OW8A-06	OW9A-06
Sample ID:					GW-18235-0717-DD-004	GW-18235-0717-DD-021	GW-18235-0717-DD-011	GW-18235-0717-DD-020	GW-18235-0717-DD-025	GW-18235-0717-DD-013
Sample Date:					7/26/2017	7/26/2017	7/26/2017	7/26/2017	7/26/2017	7/26/2017
Parameters	Units	ODWS [1] a	Table 2 [2] b	ODWS Source	Duplicate					
Volatile Organic Compounds										
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50** [b]	**< 0.50** [b]	**< 0.50** [b]	**< 0.50** [b]	**< 0.50** [b]	**< 0.50** [b]
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone)	ug/L	-	640	-	< 20	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds										
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.
(2) Table 2, Ontario Regulation 153/04, March 2004.
- No Value/Not Analyzed.
559 Does not meet the applicable ODWS/O. Reg. 153/04 criteria.
<30 Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.
<30 Result below method detection limit.

Table 5.6A

Summary of Groundwater Analytical Results - Bedrock (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				MW1D-07	MW1S-07	MW2D-07	MW2S-07	OW8D-07	OW8S-07
Sample ID:				GW-18235-0717-DD-007	GW-18235-0717-DD-008	GW-18235-0717-DD-015	GW-18235-0717-DD-016	GW-18235-0717-DD-023	GW-18235-0717-DD-024
Sample Date:				7/26/2017	7/26/2017	7/26/2017	7/26/2017	7/26/2017	7/26/2017
Parameters	**Units**	**ODWS [1]**	**ODWS Source**						
Field Parameters									
Conductivity, field	uS/cm	-	-	563	5910	6450	6380	4980	6380
pH, field	s.u.	6.5-8.5	OG	7.13	7.06	7.14	7.04	7.17	7.17
Temperature, field	deg C	15	AO	12.2	10.8	10.5	10.4	11.5	10.5
		-	-						
General Chemistry		-	-						
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	345	393	410	423	109	436
Ammonia-N	mg/L	-	-	0.755	0.367	< 0.170	< 0.208	2.85	0.302
Biochemical oxygen demand (BOD)	mg/L	-	-	< 2.0	< 2.0	< 2.0	< 2.0	12.0	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	220	150	< 10	< 10	42	< 10
Chloride	mg/L	250	AO	12.3	13.5	12.9	16.4	26.5	18.3
Conductivity	uS/cm	-	-	3670	3670	4040	4010	3180	4010
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	2.3	1.7	1.7	2.0	1.4	2.5
Hardness	mg/L	80-100	OG	**2410**	**2390**	**2530**	**2500**	**1950**	**2430**
Nitrate (as N)	mg/L	10.0	MAC	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Nitrite (as N)	mg/L	1.0	MAC	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
pH, lab	s.u.	6.5-8.5	OG	7.48	7.42	7.35	7.38	7.20	7.35
Phenols	mg/L	-	-	< 0.0102	< 0.0107	< 0.0039	< 0.0053	< 0.0086	< 0.0024
Phosphorus	mg/L	-	-	3.88	1.30	0.0146	0.0112	0.0259	0.0053
Sulfate	mg/L	500	AO	**2330**	**2440**	**2740**	**2690**	**2380**	**2640**
Total dissolved solids (TDS)	mg/L	500	AO	**3710**	**3780**	**4260**	**4230**	**3280**	**4160**
Total kjeldahl nitrogen (TKN)	mg/L	-	-	4.0	1.56	0.27	0.32	3.18	0.48
Total suspended solids (TSS)	mg/L	-	-	7230	3000	52.6	197	50.6	98.8
Trihalomethanes	mg/L	0.100	MAC	< 0.0032	< 0.0032	< 0.0032	< 0.0032	< 0.0032	< 0.0032
Turbidity	NTU	5.0	MAC	**4000**	**4000**	**23.8**	**54.4**	**68.5**	**81.2**
Xylenes (total)	mg/L	0.02/0.09	AO/MAC	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
Metals									
Aluminum (dissolved)	mg/L	0.10	OG	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (dissolved)	mg/L	0.025	IMAC	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0019	< 0.0010
Barium (dissolved)	mg/L	1.0	MAC	0.0212	0.0249	0.0058	0.0037	0.0106	0.0052
Beryllium (dissolved)	mg/L	-	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Boron (dissolved)	mg/L	5.0	IMAC	0.83	0.50	0.51	0.49	**8.49**	0.52
Cadmium (dissolved)	mg/L	0.005	MAC	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Calcium (dissolved)	mg/L	-	-	483	473	473	469	483	461
Chromium (dissolved)	mg/L	0.05	MAC	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Cobalt (dissolved)	mg/L	-	-	< 0.0010	0.0021	0.0025	0.0014	< 0.0010	0.0032
Copper (dissolved)	mg/L	1.0	AO	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Iron (dissolved)	mg/L	0.30	AO	0.18	< 0.10	< 0.10	0.11	< 0.10	**0.80**
Lead (dissolved)	mg/L	0.01	MAC	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Magnesium (dissolved)	mg/L	-	-	292	292	328	323	181	311
Manganese (dissolved)	mg/L	0.05	AO	**0.141**	**0.147**	**0.163**	**0.158**	0.0067	**0.352**
Mercury (dissolved)	mg/L	0.001	MAC	< 0.000010	< 0.000010	< 0.000010	< 0.000010	< 0.00010	< 0.000010
Molybdenum (dissolved)	mg/L	-	-	0.00405	0.00441	0.00573	0.00544	< 0.00050	0.00572
Nickel (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	0.0056	< 0.0050	< 0.0050	< 0.0050
Potassium (dissolved)	mg/L	-	-	5.98	4.80	5.69	5.45	24.8	5.10
Silver (dissolved)	mg/L	-	-	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
Sodium (dissolved)	mg/L	20/200	AO	**106**	**96.7**	**105**	**101**	**27.6**	**101**
Thallium (dissolved)	mg/L	-	-	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Vanadium (dissolved)	mg/L	-	-	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Zinc (dissolved)	mg/L	5.0	AO	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, prepared by the MOECC.

\- No Value/Not Analyzed.

559 Does not meet the applicable ODWS/O. Reg. 153/04 criteria.

<30 Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.

<30 Result below method detection limit.

Table 5.6B

Summary of Groundwater Analytical Results - Bedrock (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW1D-07	MW1S-07	MW2D-07
Sample ID:					GW-18235-0717-DD-007	GW-18235-0717-DD-008	GW-18235-0717-DD-015
Sample Date:					7/26/2017	7/26/2017	7/26/2017
Parameters	**Units**	**ODWS [1] a**	**Table 2 [2] b**	**ODWS Source**			
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640	-	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	0.126	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	0.028	0.034	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	0.081	0.093	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	**0.055[ab]**	**0.074[ab]**	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	**< 0.14[b]**	**0.125[b]**	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	0.039	0.047	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	0.038	< 0.020
Chrysene	ug/L	-	0.1	-	**0.117[b]**	**0.107[b]**	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	0.231	0.219	< 0.020
Fluorene	ug/L	-	120	-	0.026	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	0.042	0.051	< 0.020
Naphthalene	ug/L	-	11	-	0.081	0.114	< 0.050
Phenanthrene	ug/L	-	1	-	0.178	0.135	< 0.020
Pyrene	ug/L	-	4.1	-	0.187	0.168	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; prepared by the revised June 2006, MOECC.

(2) Table 2, Ontario Regulation 153/04, March 2004.

\- No Value/Not Analyzed.

559 Does not meet the applicable ODWS/O. Reg. 153/04 criteria.

<30 Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.

<30 Result below method detection limit.

Table 5.6B

Summary of Groundwater Analytical Results - Bedrock (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:					MW2S-07	OW8D-07	OW8S-07
Sample ID:					GW-18235-0717-DD-016	GW-18235-0717-DD-023	GW-18235-0717-DD-024
Sample Date:					7/26/2017	7/26/2017	7/26/2017
Parameters	**Units**	**ODWS [1] a**	**Table 2 [2] b**	**ODWS Source**			
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	ug/L	-	1.1	-	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	-	200	-	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	-	1	-	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	-	4.7	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	14	1.6	MAC	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.2	-	**< 0.50[b]**	**< 0.50[b]**	**< 0.50[b]**
1,2-Dichlorobenzene	ug/L	200	3	MAC	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	5	1.6	IMAC	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	-	5	-	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	-	59	-	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	5	1	MAC	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	-	1800	-	< 20	< 20	< 20
2-Hexanone	ug/L	-	-	-	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	640	-	< 20	< 20	< 20
Acetone	ug/L	-	2700	-	< 30	< 30	< 30
Benzene	ug/L	1	5	MAC	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	-	16	-	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	-	25	-	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	-	0.89	-	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	2	0.79	MAC	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	80	30	MAC	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	2.4	-	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	-	25	-	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	1.6/140	2.4	AO/MAC	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	-	-	-	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	15	15	AO	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	50	50	MAC	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Styrene	ug/L	-	5.4	-	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	10	1.6	MAC	< 0.50	< 0.50	< 0.50
Toluene	ug/L	60	24	MAC	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	-	1.6	-	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	-	-	-	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	5	1.6	MAC	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	150	-	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	1	0.5	MAC	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	3.2	-	< 0.028	< 0.028	< 0.028
Acenaphthene	ug/L	-	4.1	-	< 0.020	< 0.030	< 0.020
Acenaphthylene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	-	2.4	-	< 0.020	< 0.020	< 0.020
Benzo(a)anthracene	ug/L	-	1	-	< 0.020	< 0.10	< 0.020
Benzo(a)pyrene	ug/L	0.01	0.01	MAC	< 0.010	**< 0.050[ab]**	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.10	< 0.020
Benzo(g,h,i)perylene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Benzo(k)fluoranthene	ug/L	-	0.1	-	< 0.020	< 0.10	< 0.020
Chrysene	ug/L	-	0.1	-	< 0.020	< 0.10	< 0.020
Dibenz(a,h)anthracene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Fluoranthene	ug/L	-	0.41	-	< 0.020	< 0.020	< 0.020
Fluorene	ug/L	-	120	-	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.2	-	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	-	11	-	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	-	1	-	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	4.1	-	< 0.020	< 0.020	< 0.020

Notes:

(1) Ontario Drinking Water Standards (ODWS), June 2003; prepared by the revised June 2006, MOECC.

(2) Table 2, Ontario Regulation 153/04, March 2004.

\- No Value/Not Analyzed.

559 Does not meet the applicable ODWS/O. Reg. 153/04 criteria.

<30 Method detection limit does not meet ODWS/O. Reg. 153/04 criteria.

<30 Result below method detection limit.

Table 5.8A

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:		
Sample ID:		
Sample Date:		
Parameters	**Units**	**PWQO [1]**
Field Parameters		
Conductivity, field	uS/cm	-
Dissolved oxygen (DO), field	mg/L	>4-7
Flow, field	L/sec	-
pH, field	s.u.	6.5-8.5
Temperature, field	deg C	-
General Chemistry		
Alkalinity, total (as CaCO3)	mg/L	-
Ammonia-N	mg/L	-
Biochemical oxygen demand (BOD)	mg/L	-
Chemical oxygen demand (COD)	mg/L	-
Chloride	mg/L	-
Conductivity	uS/cm	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-
Hardness	mg/L	-
Nitrate (as N)	mg/L	-
Nitrite (as N)	mg/L	-
pH, lab	s.u.	6.5-8.5
Phenols	mg/L	0.001
Phosphorus	mg/L	0.01
Sulfate	mg/L	-
Total dissolved solids (TDS)	mg/L	-
Total kjeldahl nitrogen (TKN)	mg/L	-
Total suspended solids (TSS)	mg/L	-
Trihalomethanes	mg/L	-
Turbidity	NTU	-
Xylenes (total)	mg/L	-
Metals		
Aluminum	mg/L	0.075
Arsenic	mg/L	0.005
Barium	mg/L	-
Beryllium	mg/L	0.011
Boron	mg/L	0.2
Cadmium	mg/L	0.0001
Calcium	mg/L	-
Chromium	mg/L	0.001
Cobalt	mg/L	0.0009
Copper	mg/L	0.005
Iron	mg/L	0.3
Lead	mg/L	0.001/ 0.003/ 0.005
Magnesium	mg/L	-
Manganese	mg/L	-
Mercury	mg/L	0.0002
Mercury (dissolved)	mg/L	0.0002
Molybdenum	mg/L	0.04
Nickel	mg/L	0.025
Potassium	mg/L	-
Silver	mg/L	0.0001
Sodium	mg/L	-
Thallium	mg/L	0.0003
Titanium	mg/L	-
Vanadium	mg/L	0.006
Zinc	mg/L	0.02

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
(2)	Surface water sample collected from non-flowing, ponded conditions
-	No Value/Not Analyzed.
J	The result is an estimated value.
NF	No flow.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit.

Table 5.8A

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW3	SW3	SW4	SW4	SW4	SW5	SW5	SW5	SW6	SW6
Sample ID:			SW-18235-0317-DD-007	SW-18235-0317-DD-008	SW-18235-0517-DD-006	SW-18235-0817-AM-001	SW-18235-0817-AM-002	SW-18235-1117-DD-004	SW-18235-1117-DD-005	SW-18235-0317-DD-005	SW-18235-1117-DD-002	SW-18235-0317-DD-001	SW-18235-0517-DD-001	SW-18235-1117-DD-001	SW-18235-0317-DD-006	SW-18235-0517-DD-007	SW-18235-1117-DD-003	SW-18235-0317-DD-003	SW-18235-0517-DD-003
Sample Date:			3/23/2017	3/23/2017 Duplicate	5/17/2017	8/29/2017	8/29/2017 Duplicate	12/1/2017	12/1/2017 Duplicate	3/23/2017	12/1/2017	3/23/2017	5/17/2017	12/1/2017	3/23/2017	5/17/2017	12/1/2017	3/23/2017	5/17/2017
Parameters	**Units**	**PWQO [1]**																	
Field Parameters																			
Conductivity, field	uS/cm	-	116	116	156	1370	1370	297	297	716	1290	461	387	520	867	1680	1320	1730	821
Dissolved oxygen (DO), field	mg/L	>4-7	**4.98**	**4.98**	**2.98**	4.05	4.05	**3.50**	**3.50**	**4.89**	**4.10**	**4.68**	6.10	10.57	**4.92**	8.28	**2.90**	**4.62**	**3.19**
Flow, field	L/sec	-	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	6.3	0.042	33.8	0.008	0.117	ponded [2]	ponded [2]	ponded [2]	0.20	ponded [2]
pH, field	s.u.	6.5-8.5	7.30	7.30	7.86	**6.17**	**6.17**	6.73	6.73	6.90	6.61	7.70	7.94	6.61	7.66	7.75	6.72	7.25	7.25
Temperature, field	deg C	-	1.5	1.5	13.6	18.8	18.8	8.82	8.82	0.1	10.21	0.1	14.1	3.5	0.7	16.3	10.69	0.2	13.5
General Chemistry																			
Alkalinity, total (as CaCO3)	mg/L	-	33	30	40	321	311	52	63	182	314	91	160	164	128	162	191	182	219
Ammonia-N	mg/L	-	< 0.020	< 0.020	0.080	0.46	0.337	0.024	< 0.020	< 0.020	0.240	< 0.020	0.108	0.021	0.094	< 0.020	0.095	0.050	< 0.020
Biochemical oxygen demand (BOD)	mg/L	-	< 2.0	< 2.0	< 2.0	5.7	5.9	< 2.0	< 2.0	< 2.0	3.4	< 2.0	2.7	< 2.0	3.4	< 2.0	3.7	2.6	2.8
Chemical oxygen demand (COD)	mg/L	-	54	55	123	110	99	92	93	36	344	40	60	51	48	61	69	54	72
Chloride	mg/L	-	16.9	24.2	13.9	259	225	17.8	21.7	147	100	34.4	13.0	21.6	87.5	71.3	45.2	77.8	22.4
Conductivity	uS/cm	-	145	169	134	1360	1360	183	213	1120	1260	456	430	545	1610	1660	1280	1740	1100
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	22.3	-	-	37.9	34.6	-	12.1	-	17.2	16.4	-	19.6	24.4	-	24.9
Hardness	mg/L	-	-	-	55 J	-	-	64 J	65 J	-	538 J	-	196 J	246 J	-	760 J	503 J	-	526 J
Nitrate (as N)	mg/L	-	< 0.020	< 0.020	< 0.020	< 0.10	< 0.10	< 0.020	< 0.020	0.98	< 0.10	0.730	< 0.020	< 0.020	0.108	< 0.10	< 0.10	< 0.10	< 0.10
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	< 0.050	< 0.050	< 0.010	< 0.010	< 0.050	< 0.050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.050	< 0.050	< 0.050
pH, lab	s.u.	6.5-8.5	6.68	6.68	7.14	7.45	7.46	7.41	7.36	7.82	8.14	7.95	8.03	8.20	7.23	8.18	7.90	7.22	7.91
Phenols	mg/L	0.001	**< 0.0015**	**< 0.0014**	**0.0045**	**0.0019**	**0.0019**	< 0.0010	**0.0020**	**< 0.0013**	**0.0030**	**< 0.0016**	**0.0025**	< 0.0010	**< 0.0019**	**0.0026**	**0.0013**	**< 0.0026**	**0.0055**
Phosphorus	mg/L	0.01	**0.135**	**0.137**	**0.699**	**0.327**	**0.296**	**0.295**	**0.292**	**0.0940**	**2.28**	**0.0904**	**0.273**	**0.0651**	**0.0762**	**0.0776**	**0.144**	**0.0838**	**0.104**
Sulfate	mg/L	-	7.70	9.63	5.61	24.5	22.1	9.52	9.93	140	312	75.2	44.2	90.8	493	703	502	724	305
Total dissolved solids (TDS)	mg/L	-	166	183	122	894	970	202	219	678	903	313	309	375	1190	1280	973	1350	760
Total kjeldahl nitrogen (TKN)	mg/L	-	0.95	1.02	7.22	2.80	2.74	1.61	1.55	0.83	6.3	0.98	1.78	1.03	1.20	1.66	1.88	1.20	1.25
Total suspended solids (TSS)	mg/L	-	3.8	< 2.0	5.1	84.2	81.1	5.4 J	7.8 J	59.7	1740	3.8	30.0	7.5	76.2	8.2	17.8	28.7	16.4
Trihalomethanes	mg/L	-	-	-	-	-	-	< 0.0032	< 0.0032	-	< 0.0032	-	-	< 0.0032	-	-	< 0.0032	-	-
Turbidity	NTU	-	51.2	50.2	21.2	91.3	83.0	54.3	58.3	55.6	2100	49.4	115	11.7	28.9	3.10	20.2	10.1	6.96
Xylenes (total)	mg/L	-	-	-	-	-	-	< 0.0011	< 0.0011	-	< 0.0011	-	-	< 0.0011	-	-	< 0.0011	-	-
Metals																			
Aluminum	mg/L	0.075	-	-	**1.06**	-	-	**2.88**	**2.87**	-	**1.13**	-	**3.76**	**0.379**	-	0.063	**0.418**	-	**0.174**
Arsenic	mg/L	0.005	-	-	0.00093	-	-	0.00095	0.00101	-	0.00091	-	0.00144	0.00072	-	0.00092	0.00097	-	0.00164
Barium	mg/L	-	-	-	0.0190	-	-	0.0361	0.0357	-	0.0738	-	0.0356	0.0244	-	0.0429	0.0383	-	0.0382
Beryllium	mg/L	0.011	-	-	< 0.00010	-	-	0.00010	0.00010	-	< 0.00010	-	0.00013	< 0.00010	-	< 0.00010	< 0.00010	-	< 0.00010
Boron	mg/L	0.2	-	-	0.019	-	-	0.021	0.021	-	0.144	-	0.048	0.050	-	**0.251**	0.117	-	0.181
Cadmium	mg/L	0.0001	-	-	0.000061	-	-	0.000056	0.000060	-	0.000042	-	0.000074	0.000018	-	0.000023	0.000025	-	0.000038
Calcium	mg/L	-	-	-	15.7	-	-	17.7	18.4	-	151	-	53.9	71.3	-	212	145	-	157
Chromium	mg/L	0.001	-	-	**0.00153**	-	-	**0.00320**	**0.00312**	-	**0.00180**	-	**0.00431**	0.00075	-	0.00084	0.00083	-	**0.00108**
Cobalt	mg/L	0.0009	-	-	**0.00095**	-	-	**0.00096**	**0.00098**	-	**0.00091**	-	**0.00204**	0.00036	-	0.00047	0.00083	-	0.00062
Copper	mg/L	0.005	-	-	0.0026	-	-	0.0029	0.0030	-	**0.0059**	-	0.0048	0.0022	-	**0.0079**	0.0024	-	0.0020
Iron	mg/L	0.3	**3.45**	**3.42**	**2.27**	**12.2**	**12.1**	**3.40**	**3.42**	**1.78**	**1.44**	**1.93**	**3.82**	**0.359**	**3.76**	0.097	**0.947**	**2.08**	**0.976**
Lead	mg/L	0.001/ 0.003/ 0.005	-	-	0.00083	-	-	0.00161	0.00161	-	0.00300	-	0.00205	< 0.00019	-	0.00022	< 0.00062	-	0.00051
Magnesium	mg/L	-	-	-	3.77	-	-	4.72	4.73	-	39.0	-	15.0	16.5	-	55.8	34.4	-	32.8
Manganese	mg/L	-	-	-	0.174	-	-	0.136	0.142	-	0.225	-	0.163	0.0308	-	0.0133	0.292	-	0.121
Mercury	mg/L	0.0002	-	-	-	-	-	< 0.000010	< 0.000010	-	< 0.000010	-	-	< 0.000010	-	-	< 0.000010	-	-
Mercury (dissolved)	mg/L	0.0002	-	-	< 0.000010	-	-	-	-	-	-	-	< 0.000010	-	-	< 0.000010	-	-	< 0.000010
Molybdenum	mg/L	0.04	-	-	0.000253	-	-	0.000132	0.000144	-	0.00172	-	0.00166	0.00116	-	0.00206	0.000250	-	0.00147
Nickel	mg/L	0.025	-	-	0.00217	-	-	0.00277	0.00286	-	0.00438	-	0.00537	0.00225	-	0.00513	0.00270	-	0.00470
Potassium	mg/L	-	-	-	1.16	-	-	4.29	4.40	-	4.99	-	2.84	4.70	-	11.3	9.02	-	7.24
Silver	mg/L	0.0001	-	-	< 0.000050	-	-	< 0.000050	< 0.000050	-	< 0.000050	-	< 0.000050	< 0.000050	-	< 0.000050	< 0.000050	-	< 0.000050
Sodium	mg/L	-	-	-	9.25	-	-	7.75	8.15	-	58.7	-	13.8	14.7	-	76.0	35.5	-	31.3
Thallium	mg/L	0.0003	-	-	0.000014	-	-	0.000027	0.000026	-	0.000020	-	0.000042	< 0.000010	-	< 0.000010	< 0.000010	-	< 0.000010
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	-	-	0.00218	-	-	0.00400	0.00396	-	0.00250	-	**0.00608**	0.00100	-	< 0.00050	0.00109	-	0.00091
Zinc	mg/L	0.02	-	-	0.0166	-	-	0.0167	0.0174	-	0.0187	-	0.0175	< 0.0030	-	0.0063	0.0080	-	0.0072

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
(2)	Surface water sample collected from non-flowing, ponded conditions
-	No Value/Not Analyzed.
J	The result is an estimated value.
NF	No flow.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit.

Table 5.8A

Summary of Surface Water Analytical Results (General Chemistry and Metals)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW6	SW7	SW7	SW7	SW7	SW8	SW8	SW8
Sample ID:			SW-018235-122717-DD-001	SW-18235-0317-DD-004	SW-18235-0517-DD-004	SW-18235-0517-DD-005	SW-018235-122717-DD-003	SW-18235-0317-DD-002	SW-18235-0517-DD-002	SW-018235-122717-DD-002
Sample Date:			12/27/2017	3/23/2017	5/17/2017	5/17/2017 Duplicate	12/27/2017	3/23/2017	5/17/2017	12/27/2017
Parameters	**Units**	**PWQO [1]**								
Field Parameters										
Conductivity, field	uS/cm	-	1230	337	549	549	585	45	74	303
Dissolved oxygen (DO), field	mg/L	>4-7	10.98	4.67	2.47	2.47	7.28	6.89	1.68	14.60
Flow, field	L/sec	-	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]	ponded [2]
pH, field	s.u.	6.5-8.5	7.95	7.47	7.50	7.50	7.50	7.19	7.35	7.98
Temperature, field	deg C	-	0.5	2.6	14.5	14.5	0.5	0.2	13.0	0.5
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-	154	53	99	102	81	15	22	23
Ammonia-N	mg/L	-	0.624	0.054	0.048	< 0.020	0.292	< 0.020	< 0.020	0.226
Biochemical oxygen demand (BOD)	mg/L	-	17.7	6.9	2.5	< 3.0	6.1	< 2.0	2.1	7.5
Chemical oxygen demand (COD)	mg/L	-	2310	94	62 J	108 J	66	49	81	162
Chloride	mg/L	-	52.4	18.8	10.7	10.7	25.4	1.47	< 0.50	1.54
Conductivity	uS/cm	-	1180	558	666	666	612	58.2	54.9	86.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	16.6	-	20.6	20.2	29	-	25.5	39
Hardness	mg/L	-	841 J	-	298 J	306 J	215 J	-	29 J	52 J
Nitrate (as N)	mg/L	-	< 0.020	< 0.020	< 0.020	< 0.020	0.029	0.025	< 0.020	0.046
Nitrite (as N)	mg/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	7.58	6.74	7.45	7.44	6.77	6.47	6.77	6.49
Phenols	mg/L	0.001	< 0.0010	**< 0.0033**	0.0048 J	0.0027 J	0.0020	**< 0.0022**	0.0040	0.0030
Phosphorus	mg/L	0.01	16.5	0.241	0.125 J	0.210 J	0.266	0.138	0.217	0.868
Sulfate	mg/L	-	458	182	220	220	199	9.41	2.05	12.1
Total dissolved solids (TDS)	mg/L	-	893	396	448	443	478	178	128	343
Total kjeldahl nitrogen (TKN)	mg/L	-	26.1	1.49	1.28	1.52	1.66	1.06	1.78	3.8
Total suspended solids (TSS)	mg/L	-	4180	67.6	9.7 J	12.5 J	76.4	14.4	2.2	206
Trihalomethanes	mg/L	-	< 0.0032	-	-	-	< 0.0032	-	-	< 0.0032
Turbidity	NTU	-	3380	27.7	4.69	5.75	27.4	84.6	48.4	212
Xylenes (total)	mg/L	-	< 0.0011	-	-	-	< 0.0011	-	-	< 0.0011
Metals										
Aluminum	mg/L	0.075	95.1	-	0.127	0.093	1.81	-	3.01	13.6
Arsenic	mg/L	0.005	0.0381	-	0.00088	0.00082	< 0.0010	-	0.00102	0.0018
Barium	mg/L	-	0.887	-	0.0288	0.0285	0.0361	-	0.0264	0.116
Beryllium	mg/L	0.011	0.0044	-	< 0.00010	< 0.00010	< 0.0010	-	0.00016	< 0.0010
Boron	mg/L	0.2	0.21	-	0.141	0.137	< 0.10	-	0.023	< 0.10
Cadmium	mg/L	0.0001	0.00208	-	0.000021	0.000017	0.000053	-	0.000087	0.000313
Calcium	mg/L	-	230	-	86.7	90.6	60.6	-	7.77	12.9
Chromium	mg/L	0.001	0.126	-	0.00066	0.00059	**< 0.0050**	-	0.00383	0.0121
Cobalt	mg/L	0.0009	0.0761	-	0.00039	0.00037	0.0013	-	0.00097	0.0035
Copper	mg/L	0.005	0.086	-	0.0022	< 0.0010	**< 0.010**	-	0.0045	0.014
Iron	mg/L	0.3	177	2.78	0.713	0.636	2.56	2.71	2.36	8.14
Lead	mg/L	0.001/ 0.003/ 0.005	0.127	-	0.00048 J	0.00020 J	0.00481	-	0.00173	0.00877
Magnesium	mg/L	-	65.0	-	19.8	19.3	15.5	-	2.44	4.83
Manganese	mg/L	-	13.4	-	0.0613	0.0553	0.279	-	0.0422	0.193
Mercury	mg/L	0.0002	< 0.000010	-	-	-	< 0.000010	-	-	0.000012
Mercury (dissolved)	mg/L	0.0002	-	-	< 0.000010	< 0.000010	-	-	< 0.000010	-
Molybdenum	mg/L	0.04	0.00347	-	0.000871	0.000792	< 0.00050	-	0.000222	< 0.00050
Nickel	mg/L	0.025	0.118	-	0.00235	0.00210	< 0.0050	-	0.00443	0.0109
Potassium	mg/L	-	18.0	-	3.46	3.49	5.62	-	1.61	3.99
Silver	mg/L	0.0001	**< 0.00050**	-	< 0.000050	< 0.000050	**< 0.00050**	-	< 0.000050	**< 0.00050**
Sodium	mg/L	-	40.4	-	15.5	15.3	13.8	-	1.04	< 5.0
Thallium	mg/L	0.0003	0.00082	-	< 0.000010	< 0.000010	< 0.00010	-	0.000032	0.00012
Titanium	mg/L	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.006	0.169	-	< 0.00050	< 0.00050	< 0.0050	-	0.00466	0.0174
Zinc	mg/L	0.02	0.614	-	0.0056	**< 0.0030**	**< 0.030**	-	0.0133	0.049

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
(2)	Surface water sample collected from non-flowing, ponded conditions
-	No Value/Not Analyzed.
J	The result is an estimated value.
NF	No flow.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit.

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			**SW1**
Sample ID:			**SW-18235-0517-DD-006**
Sample Date:			**5/17/2017**
Parameters	**Units**	**PWQO [1]**	
Volatile Organic Compounds			
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20
2-Hexanone	ug/L	-	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20
Acetone	ug/L	-	< 30
Benzene	ug/L	100	< 0.50
Bromodichloromethane	ug/L	200	< 2.0
Bromoform	ug/L	60	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50
Chlorobenzene	ug/L	15	< 0.50
Chloroethane	ug/L	-	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50
Dibromochloromethane	ug/L	40	< 2.0
Ethylbenzene	ug/L	8	< 0.50
m&p-Xylenes	ug/L	2	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0
Methylene chloride	ug/L	100	< 5.0
o-Xylene	ug/L	40	< 0.50
Styrene	ug/L	4	< 0.50
Tetrachloroethene	ug/L	50	< 0.50
Toluene	ug/L	0.8	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50
Trichloroethene	ug/L	20	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0
Vinyl chloride	ug/L	600	< 0.50
Semi-volatile Organic Compounds			
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-
Acenaphthene	ug/L	-	< 0.020
Acenaphthylene	ug/L	-	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**
Benzo(a)anthracene	ug/L	0.0004	**< 0.020**
Benzo(a)pyrene	ug/L	-	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	**< 0.020**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**
Chrysene	ug/L	0.0001	**< 0.020**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**
Fluoranthene	ug/L	0.0008	**< 0.020**
Fluorene	ug/L	0.2	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020
Naphthalene	ug/L	7	< 0.050
Phenanthrene	ug/L	0.03	< 0.020
Pyrene	ug/L	-	< 0.020

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit .

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			**SW1**	**SW1**	**SW3**	**SW4**	**SW4**
Sample ID:			**SW-18235-1117-DD-004**	**SW-18235-1117-DD-005**	**SW-18235-1117-DD-002**	**SW-18235-0517-DD-001**	**SW-18235-1117-DD-001**
Sample Date:			**12/1/2017**	**12/1/2017**	**12/1/2017**	**5/17/2017**	**12/1/2017**
				Duplicate			
Parameters	**Units**	**PWQO [1]**					
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds							
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	< 0.028	0.104	-	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	0.150	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	0.239	< 0.020	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**	**< 0.020**	**0.746**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	ug/L	0.0004	**< 0.020**	**< 0.020**	**1.37**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	1.76	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020	2.90	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	**< 0.020**	**< 0.020**	**1.77**	**< 0.020**	**< 0.020**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**	**< 0.020**	**0.812**	**< 0.020**	**< 0.020**
Chrysene	ug/L	0.0001	**< 0.020**	**< 0.020**	**1.89**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**	**< 0.020**	**0.372**	**< 0.020**	**< 0.020**
Fluoranthene	ug/L	0.0008	**< 0.020**	**< 0.020**	**4.49**	**< 0.020**	**< 0.020**
Fluorene	ug/L	0.2	< 0.020	< 0.020	**0.215**	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	2.47	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050	0.137	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	**2.87**	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	< 0.020	3.71	< 0.020	< 0.020

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit .

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			**SW5**	**SW5**	**SW6**
Sample ID:			**SW-18235-0517-DD-007**	**SW-18235-1117-DD-003**	**SW-18235-0517-DD-003**
Sample Date:			**5/17/2017**	**12/1/2017**	**5/17/2017**
Parameters	**Units**	**PWQO [1]**			
Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds					
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	< 0.028	-
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	ug/L	0.0004	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**	**< 0.020**	**< 0.020**
Chrysene	ug/L	0.0001	**< 0.020**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**	**< 0.020**	**< 0.020**
Fluoranthene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	< 0.020	< 0.020

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit .

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			SW6	SW7	SW7	SW7
Sample ID:			SW-018235-122717-DD-001	SW-18235-0517-DD-004	SW-18235-0517-DD-005	SW-018235-122717-DD-003
Sample Date:			12/27/2017	5/17/2017	5/17/2017 Duplicate	12/27/2017
Parameters	**Units**	**PWQO [1]**				
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20	< 20	< 20
Acetone	ug/L	-	< 30	< 30	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50	< 0.50	< 0.50
Semi-volatile Organic Compounds						
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	< 0.028	-	-	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020	< 0.020	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)anthracene	ug/L	0.0004	**0.049**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(a)pyrene	ug/L	-	0.035	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	0.053	< 0.020	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	**0.028**	**< 0.020**	**< 0.020**	**< 0.020**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Chrysene	ug/L	0.0001	**0.049**	**< 0.020**	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**
Fluoranthene	ug/L	0.0008	**0.113**	**< 0.020**	**< 0.020**	**< 0.020**
Fluorene	ug/L	0.2	< 0.020	< 0.020	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	0.034	< 0.020	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	**0.060**	< 0.020	< 0.020	< 0.020
Pyrene	ug/L	-	0.090	< 0.020	< 0.020	< 0.020

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit .

Table 5.8B

Summary of Surface Water Analytical Results (VOCs and PAHs)
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:			**SW8**	**SW8**
Sample ID:			**SW-18235-0517-DD-002**	**SW-018235-122717-DD-002**
Sample Date:			**5/17/2017**	**12/27/2017**
Parameters	**Units**	**PWQO [1]**		
Volatile Organic Compounds				
1,1,1,2-Tetrachloroethane	ug/L	20	< 0.50	< 0.50
1,1,1-Trichloroethane	ug/L	10	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	ug/L	70	< 0.50	< 0.50
1,1,2-Trichloroethane	ug/L	800	< 0.50	< 0.50
1,1-Dichloroethane	ug/L	200	< 0.50	< 0.50
1,1-Dichloroethene	ug/L	40	< 0.50	< 0.50
1,2-Dibromoethane (Ethylene dibromide)	ug/L	5	< 0.50	< 0.50
1,2-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	100	< 0.50	< 0.50
1,2-Dichloropropane	ug/L	0.7	< 0.50	< 0.50
1,3-Dichlorobenzene	ug/L	2.5	< 0.50	< 0.50
1,4-Dichlorobenzene	ug/L	4	< 1.0	< 1.0
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	400	< 20	< 20
2-Hexanone	ug/L	-	< 30	< 30
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	-	< 20	< 20
Acetone	ug/L	-	< 30	< 30
Benzene	ug/L	100	< 0.50	< 0.50
Bromodichloromethane	ug/L	200	< 2.0	< 2.0
Bromoform	ug/L	60	< 1.0	< 1.0
Bromomethane (Methyl bromide)	ug/L	0.9	< 0.50	< 0.50
Carbon tetrachloride	ug/L	-	< 0.50	< 0.50
Chlorobenzene	ug/L	15	< 0.50	< 0.50
Chloroethane	ug/L	-	< 1.0	< 1.0
Chloroform (Trichloromethane)	ug/L	-	< 1.0	< 1.0
Chloromethane (Methyl chloride)	ug/L	700	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50
cis-1,3-Dichloropropene	ug/L	-	< 0.50	< 0.50
Dibromochloromethane	ug/L	40	< 2.0	< 2.0
Ethylbenzene	ug/L	8	< 0.50	< 0.50
m&p-Xylenes	ug/L	2	< 1.0	< 1.0
Methyl tert butyl ether (MTBE)	ug/L	200	< 2.0	< 2.0
Methylene chloride	ug/L	100	< 5.0	< 5.0
o-Xylene	ug/L	40	< 0.50	< 0.50
Styrene	ug/L	4	< 0.50	< 0.50
Tetrachloroethene	ug/L	50	< 0.50	< 0.50
Toluene	ug/L	0.8	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/L	200	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L	7	< 0.50	< 0.50
Trichloroethene	ug/L	20	< 0.50	< 0.50
Trichlorofluoromethane (CFC-11)	ug/L	-	< 5.0	< 5.0
Vinyl chloride	ug/L	600	< 0.50	< 0.50
Semi-volatile Organic Compounds				
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	< 0.028
Acenaphthene	ug/L	-	< 0.020	< 0.020
Acenaphthylene	ug/L	-	< 0.020	< 0.020
Anthracene	ug/L	0.0008	**< 0.020**	**< 0.020**
Benzo(a)anthracene	ug/L	0.0004	**< 0.020**	**< 0.020**
Benzo(a)pyrene	ug/L	-	< 0.010	< 0.010
Benzo(b)fluoranthene	ug/L	-	< 0.020	< 0.020
Benzo(g,h,i)perylene	ug/L	0.00002	**< 0.020**	**< 0.020**
Benzo(k)fluoranthene	ug/L	0.0002	**< 0.020**	**< 0.020**
Chrysene	ug/L	0.0001	**< 0.020**	**< 0.020**
Dibenz(a,h)anthracene	ug/L	0.002	**< 0.020**	**< 0.020**
Fluoranthene	ug/L	0.0008	**< 0.020**	**< 0.020**
Fluorene	ug/L	0.2	< 0.020	< 0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	< 0.020	< 0.020
Naphthalene	ug/L	7	< 0.050	< 0.050
Phenanthrene	ug/L	0.03	< 0.020	< 0.020
Pyrene	ug/L	-	< 0.020	< 0.020

Notes:

(1)	Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC.
-	No Value/Not Analyzed.
J	The result is an estimated value.
1.5	Does not meet the applicable PWQO Criteria.
<30	Method detection limit does not meet PWQO Criteria.
<30	Result below method detection limit .

Table 5.10

Summary of Upgraded TDS Pond Analytical Results
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond
Sample ID:				SW-18235-20150312-SS-100	SW-18235-031315-LM-01	TDS POND-18235-0315-DD-001	SW-18235-032615-JL-01	SW-18235-032615-JL-02	SW-18235-041315-JL-TDS	SW-18235-042715-LM-01	TDS POND-18235-0515-DD-001	TDS POND-18235-0815-DD-001	TDS POND-18235-0915-DD-001	TDS POND-18235-0316-DD-001	W-18235-08042016-RC-001
Sample Date:				3/12/2015	3/13/2015	3/19/2015	3/27/2015	3/27/2015	4/13/2015	4/27/2015	5/23/2015	8/4/2015	11/12/2015	3/11/2016	4/8/2016
Parameters	**Units**	**PWQO [1] a**	**TRIGGER [2] b**												
Field Parameters															
Conductivity, field	uS/cm	-	-	-	-	353	-	-	-	-	1820	1060	820	663	-
Dissolved oxygen (DO), field	mg/L	-	-	-	-	6.38	-	-	-	-	8.90	6.92	6.62	10.32	-
Flow	L/sec	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	6.5-8.5	-	-	7.35	-	-	-	-	6.91	6.99	7.96	8.03	-
Temperature, field	deg C	-	-	-	-	1.2	-	-	-	-	12.0	23.5	8.7	8.3	-
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	58	-	-	-	-	115	74	55	62	-
Ammonia-N	mg/L	-	-	-	-	0.311	-	-	-	-	0.190	< 0.050	< 0.050	< 0.044	-
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	3.7	-	-	-	-	2.2	2.5	< 2.0	2.7	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	14	-	-	-	-	21	25	21	12	-
Chloride	mg/L	-	-	-	-	14.0	-	-	-	-	203	440	64.8	37.6	-
Conductivity	uS/cm	-	-	-	-	346	-	-	-	-	1920	1150	998	822	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	7.6	-	4.4	-	-
Hardness	mg/L	-	-	-	-	138	-	-	-	-	736	436	390	330	-
Nitrate (as N)	mg/L	-	-	-	-	0.367	-	-	-	-	< 0.020	< 0.10	0.024	0.063	-
Nitrite (as N)	mg/L	-	-	-	-	0.012	-	-	-	-	< 0.010	< 0.050	< 0.010	< 0.010	-
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.17	8.21	7.83	8.10	7.57	8.03	7.86	8.01	8.13	7.95	8.02	8.01
Phenolics (total)	mg/L	0.001	-	-	-	**< 0.0036[a]**	-	-	-	-	< 0.0010	**< 0.0015[a]**	**0.0034[a]**	**< 0.0016[a]**	-
Phosphorus	mg/L	0.01	320	-	-	**0.0288[a]**	-	-	-	-	**0.0539[a]**	**0.0421[a]**	**0.0180[a]**	**0.0309[a]**	-
Sulfate	mg/L	-	-	-	-	87.7	-	-	-	-	614	1990	350	292	-
Total dissolved solids (TDS)	mg/L	-	-	-	-	207	-	-	-	-	1250	749	547	535	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.84	-	-	-	-	< 1.19	0.96	0.25	< 0.79	-
Total suspended solids (TSS)	mg/L	-	25000	41.5	< 2.0	8.6	4.8	3.8	15.1	4.3	34.4	27.5	7.6	23.3	22.3
Metals															
Arsenic	mg/L	0.005	-	-	-	< 0.0010	-	-	-	-	0.0013	0.0010	0.00036	< 0.0010	-
Barium	mg/L	-	-	-	-	0.0145	-	-	-	-	0.0718	0.0534	0.0298	0.0245	-
Benzo(a)pyrene	mg/L	-	-	-	-	< 0.000005	-	-	-	-	< 0.000005	< 0.000005	< 0.000005	< 0.000005	-
Boron	mg/L	0.2	1500	-	-	0.030	-	-	-	-	**0.308[a]**	**0.263[a]**	**0.208[a]**	0.142	-
Cadmium	mg/L	0.0002	-	-	-	< 0.000090	-	-	-	-	< 0.000090	< 0.000090	< 0.000010	< 0.00010	-
Calcium	mg/L	-	-	-	-	31.7	-	-	-	-	178	94.4	-	61.3	-
Chromium	mg/L	0.001	-	-	-	0.00057	-	-	-	-	**< 0.00288[a]**	**0.00123[a]**	0.00096	**< 0.0050[a]**	-
Copper	mg/L	0.005	-	-	-	0.0013	-	-	-	-	0.0025	0.0017	0.0012	**< 0.010[a]**	-
Iron	mg/L	0.3	4350	-	-	**0.335[a]**	-	-	-	-	**1.95[a]**	**0.900[a]**	0.264	**< 0.50[a]**	-
Lead	mg/L	0.005	-	-	-	< 0.00050	-	-	-	-	0.00089	0.00066	0.00016	< 0.0010	-
Magnesium	mg/L	-	-	-	-	14.2	-	-	-	-	70.9	48.6	45.6	42.9	-
Mercury	mg/L	0.0002	-	-	-	< 0.00010	-	-	-	-	< 0.000010	< 0.000010	< 0.000010	-	-
Mercury (dissolved)	mg/L	0.0002	-	-	-	-	-	-	-	-	-	-	-	< 0.000010	-
Zinc	mg/L	0.03	110	-	-	0.0047	-	-	-	-	0.0067	0.0038	< 0.0030	< 0.030	-
Volatile Organic Compounds															
Ethylbenzene	ug/L	8	-	-	-	< 0.50	-	-	-	-	< 0.50	< 0.50	< 0.50	< 0.50	-
Semi-volatile Organic Compounds															
Naphthalene	ug/L	7	7	-	-	0.022	-	-	-	-	< 0.020	< 0.020	0.030	< 0.020	-

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) TDS Trigger Parameters as per the Industrial Sewage Works ECA

\- No Value/Not Analyzed

J The result is an estimated value

NF No flow.

1.5 Does not meet the applicable Trigger Criteria

<30 Method detection limit does not meet Trigger Criteria

<30 Result below method detection limit

Table 5.10

Summary of Upgraded TDS Pond Analytical Results
2017 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Sample Location:				TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond	TDS Pond
Sample ID:				TDS POND-18235-0516-DD-001	SW-18235-0816-DD-001	TDS POND-18235-0816-DD-001	TDS POND-18235-1116-DD-001	SW-18235-012517-MO-001	TDS POND-18235-0317-DD-001	POND	TDS POND-18235-0517-DD-001	TDS-18235-061417-JL-01	TDS POND-18235-0817-AM-001	TDS POND-18235-1117-DD-001
Sample Date:				5/4/2016	8/16/2016	8/16/2016	11/29/2016	1/25/2017	3/23/2017	4/10/2017	5/17/2017	6/14/2017	8/29/2017	12/1/2017
Parameters	**Units**	**PWQO [1] a**	**TRIGGER [2] b**											
Field Parameters														
Conductivity, field	uS/cm	-	-	691	-	850	-	-	-	-	626	816	703	-
Dissolved oxygen (DO), field	mg/L	-	-	11.04	-	1.12	-	-	-	-	6.32	6.30	6.30	-
Flow	L/sec	-	-	-	-	-	-	-	-	-	NF	-	-	-
pH, field	s.u.	6.5-8.5	6.5-8.5	8.34	-	7.89	-	-	-	-	8.47	6.65	7.90	-
Temperature, field	deg C	-	-	11.8	-	25.9	-	-	-	-	17.8	23.4	21.8	-
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	-	-	77	85	86	134	-	99	-	74	-	84	72
Ammonia-N	mg/L	-	-	0.027	0.055 J	0.020 J	0.240	-	< 0.020	-	< 0.020	-	< 0.020	0.097
Biochemical oxygen demand (BOD)	mg/L	-	-	2.1	2.3	2.0	< 2.0	-	< 2.0	-	< 3.0	-	3.9	< 2.0
Chemical oxygen demand (COD)	mg/L	-	-	31	25	25	17	-	< 10	-	17	-	24	54
Chloride	mg/L	-	-	34.9	48.6	49.2	48.8	-	30.4	-	11.8	-	15.4	14.0
Conductivity	uS/cm	-	-	816	1050	1050	1120	-	898	-	672	-	869	824
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	-	-	-	-	4.5	-	-	-	-	-	-	-
Hardness	mg/L	-	-	321	444	442	448	-	387 J	-	297 J	-	420 J	376 J
Nitrate (as N)	mg/L	-	-	0.046	0.030	< 0.020	0.153	-	0.355	-	0.512	-	< 0.020	0.195
Nitrite (as N)	mg/L	-	-	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010	-	< 0.010	-	< 0.010	< 0.010
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.22	8.23	8.28	8.18	8.07	8.09	8.10	8.03	8.23	8.20	7.95
Phenolics (total)	mg/L	0.001	-	**< 0.0015**[a]	**0.0059 J**[a]	**0.0105 J**[a]	**0.0023**[a]	-	**< 0.0018**[a]	-	**0.0020**[a]	-	< 0.0010	< 0.0010
Phosphorus	mg/L	0.01	320	**0.0308**[a]	**0.0299**[a]	**0.0377**[a]	**0.0426**[a]	-	**0.0136**[a]	-	**0.0482**[a]	-	**0.0658**[a]	**0.0124**[a]
Sulfate	mg/L	-	-	284	380	385	384	-	312	-	247	-	350	343
Total dissolved solids (TDS)	mg/L	-	-	555	724	717	744	-	606	-	447	-	665	574
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.53	0.70	0.72	0.70	-	0.39	-	0.37	-	0.52	0.25
Total suspended solids (TSS)	mg/L	-	25000	26.3	32.0	27.2	19.7	2.9	13.2	16.8	22.6	20.7	27.1	6.6
Metals														
Arsenic	mg/L	0.005	-	0.00035	0.00107	0.00105	0.00052	-	0.00039	-	0.00057	-	0.00069	0.00045
Barium	mg/L	-	-	0.0260	0.0592	0.0570	0.0475	-	0.0288	-	0.0351	-	0.0504	0.0277
Benzo(a)pyrene	mg/L	-	-	< 0.000005	< 0.000005	< 0.000005	< 0.000005	-	< 0.000005	-	< 0.000005	-	< 0.000005	< 0.000005 J
Boron	mg/L	0.2	1500	0.133	**0.210**[a]	**0.207**[a]	**0.208**[a]	-	0.131	-	0.095	-	0.159	0.115
Cadmium	mg/L	0.0002	-	0.000062	< 0.000010	< 0.000010	< 0.000010	-	< 0.000010	-	0.000027	-	0.000011	0.000012
Calcium	mg/L	-	-	67.0	75.3	73.6	90.0	-	76.2	-	61.7	-	83.8	79.3
Chromium	mg/L	0.001	-	0.00086	**0.00224**[a]	**0.00155**[a]	**0.00136**[a]	-	0.00052	-	**0.00143**[a]	-	**0.00132**[a]	< 0.00050
Copper	mg/L	0.005	-	0.0014	0.0022	0.0020	0.0019	-	0.0013	-	0.0028	-	0.0022	0.0015
Iron	mg/L	0.3	4350	**0.528**[a]	**1.49**[a]	**1.22**[a]	**0.937**[a]	-	**0.372**[a]	-	**1.29**[a]	-	**1.17**[a]	0.160
Lead	mg/L	0.005	-	0.00042	0.00082	0.00070	0.00053	-	0.00030	-	0.00078	-	0.00062	< 0.00017
Magnesium	mg/L	-	-	37.4	62.3	62.7	54.2	-	47.8	-	34.7	-	51.1	43.1
Mercury	mg/L	0.0002	-	< 0.000010	-	-	< 0.000010	-	-	-	-	-	-	< 0.000010
Mercury (dissolved)	mg/L	0.0002	-	-	< 0.000010	< 0.000010	-	-	< 0.000010	-	< 0.000010	-	< 0.000010	-
Zinc	mg/L	0.03	110	< 0.0030	0.0051	0.0041	0.0031	-	< 0.0030	-	0.0055	-	0.0041	< 0.0030
Volatile Organic Compounds														
Ethylbenzene	ug/L	8	-	< 0.50	< 0.50	< 0.50	< 0.50	-	< 0.50	-	< 0.50	-	< 0.50	< 0.50
Semi-volatile Organic Compounds														
Naphthalene	ug/L	7	7	0.023	< 0.020	< 0.020	< 0.020	-	< 0.020	-	< 0.020	-	< 0.020	0.024 J

Notes:

(1) Water Management Policies, Guidelines, Provincial Water Quality Objectives, July 1994 (reprinted February 1999), prepared by MOECC

(2) TDS Trigger Parameters as per the Industrial Sewage Works ECA

\- No Value/Not Analyzed

J The result is an estimated value

NF No flow.

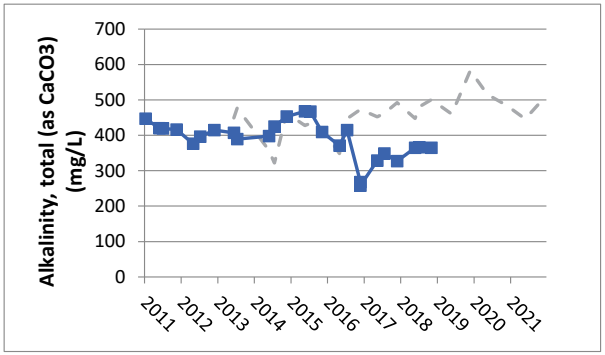
1.5 Does not meet the applicable Trigger Criteria

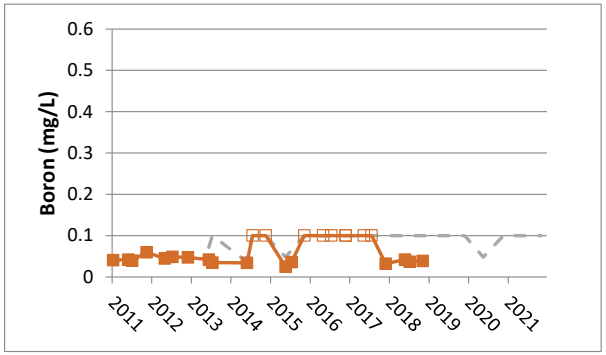
<30 Method detection limit does not meet Trigger Criteria

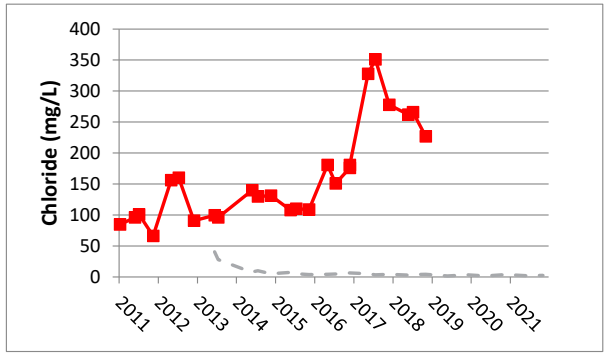
<30 Result below method detection limit

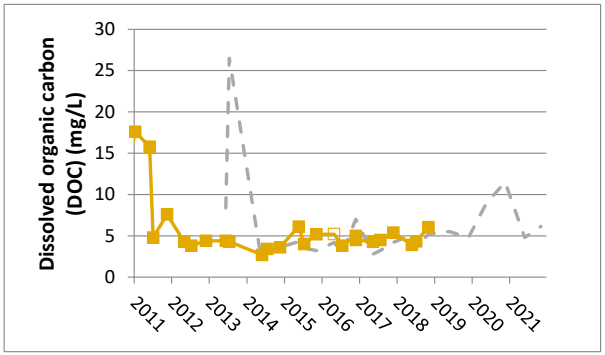
Appendix G.2

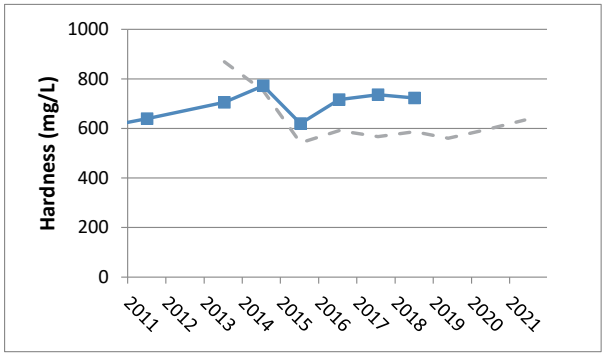
Indicator Parameter Concentrations vs Time Plots

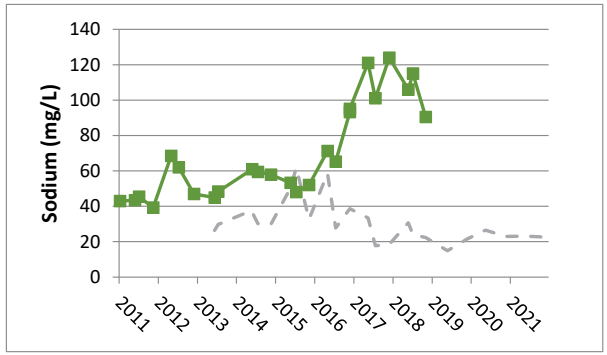


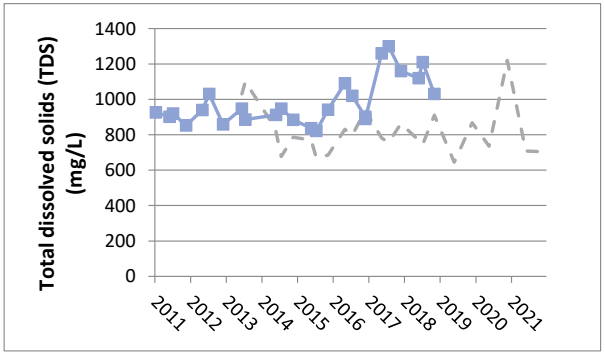






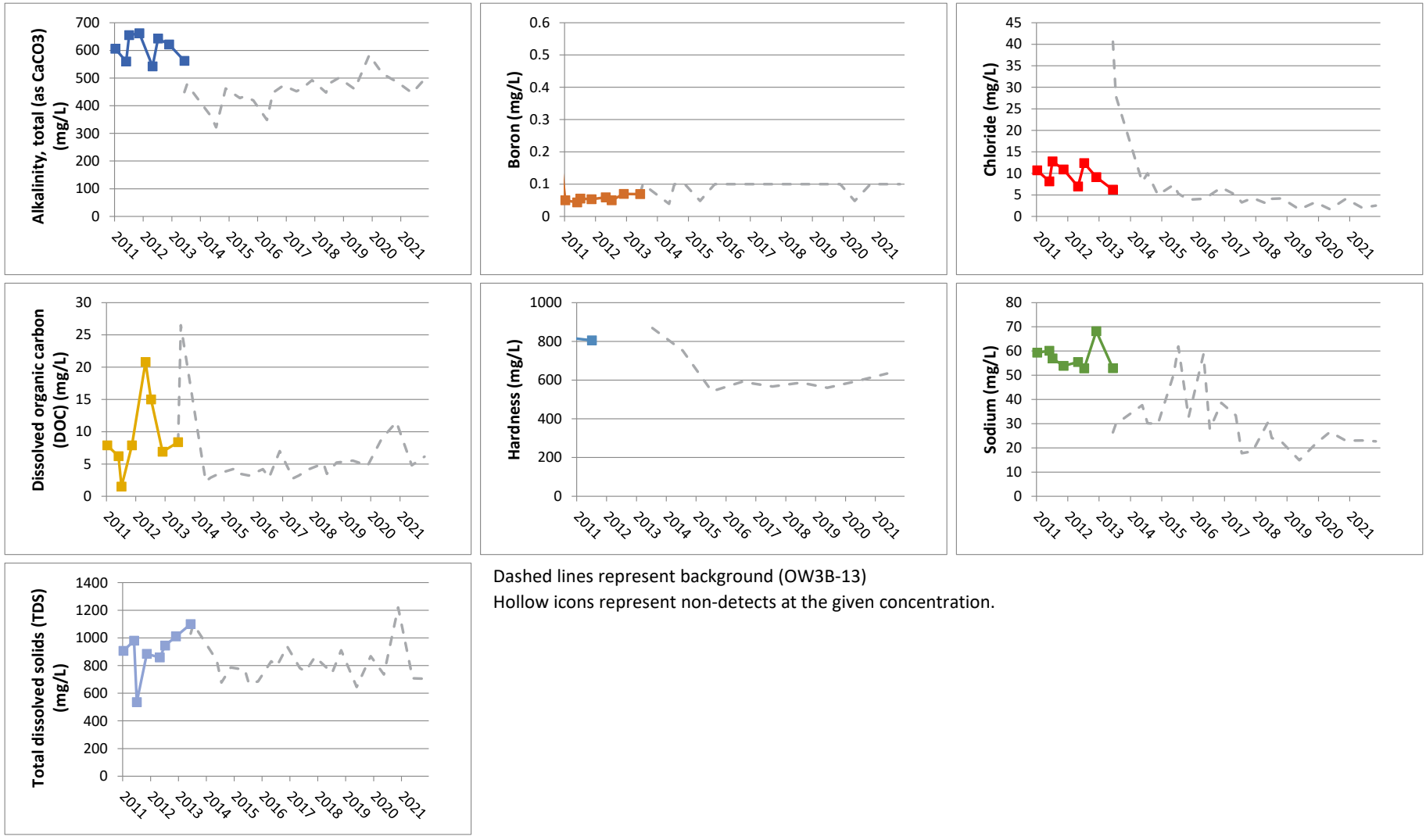






Dashed lines represent background concentrations (OW3B-13)
Hollow icons represent non-detects at the given concentration.

APPENDIX I-2.A - Figure 1
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW1-03
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO



Dashed lines represent background (OW3B-13)

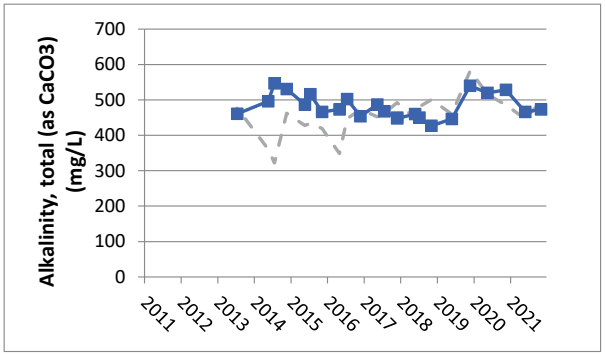
Hollow icons represent non-detects at the given concentration.

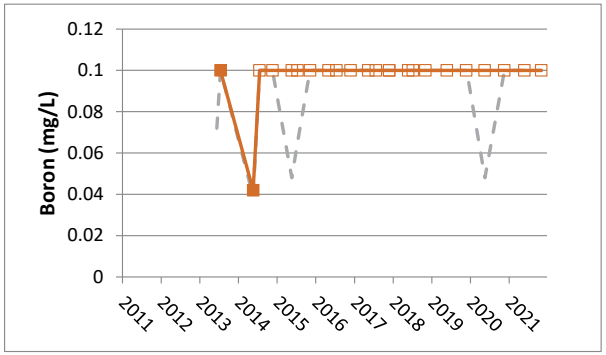
APPENDIX I-2.A - Figure 2

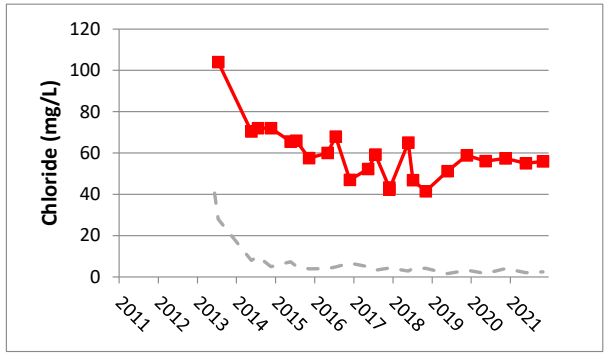
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW1B-07

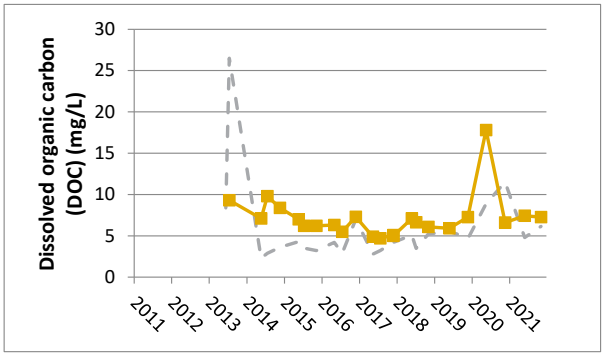
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

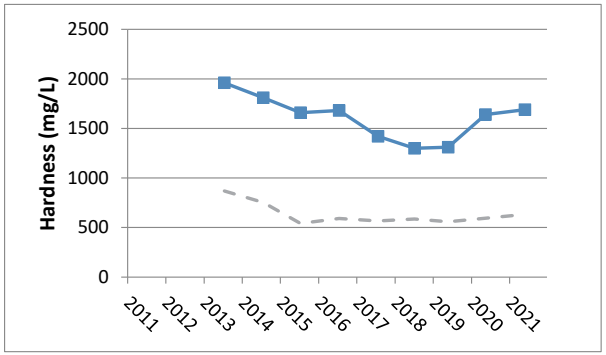
HALDIMAND COUNTRY, ONTARIO

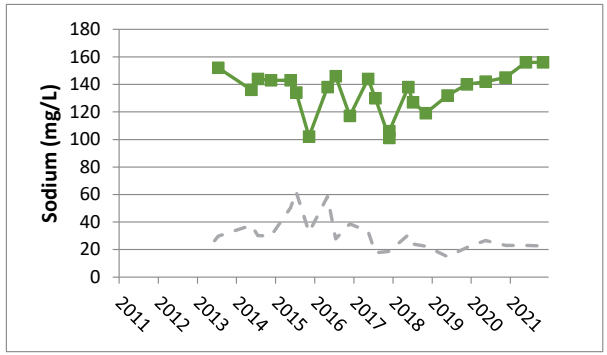


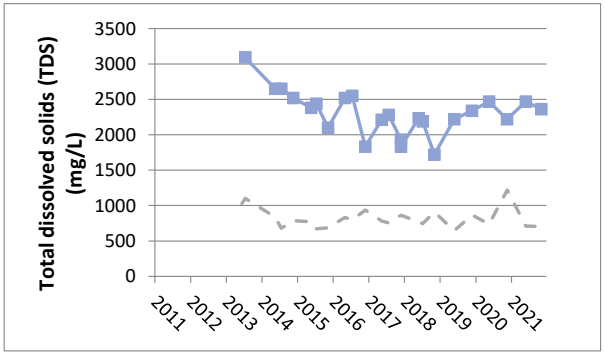












Dashed lines represent background (OW3B-13)

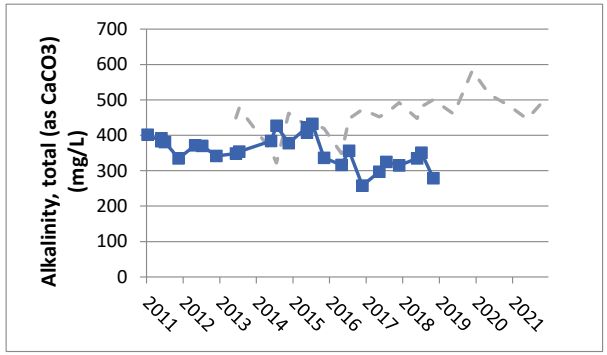
Hollow icons represent non-detects at the given concentration.

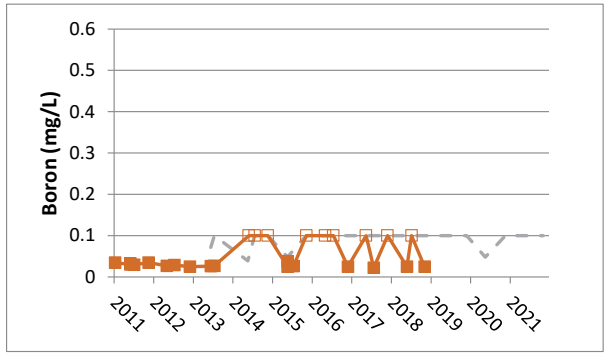
APPENDIX I-2.A - Figure 3

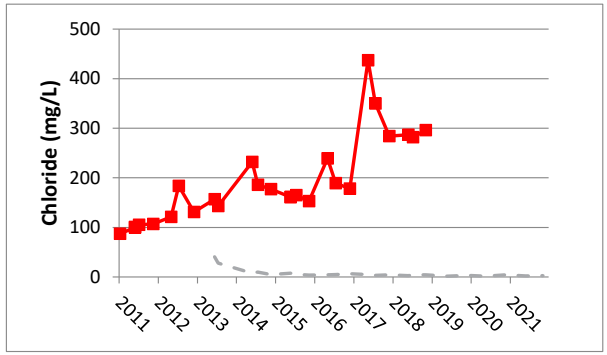
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW1B-13

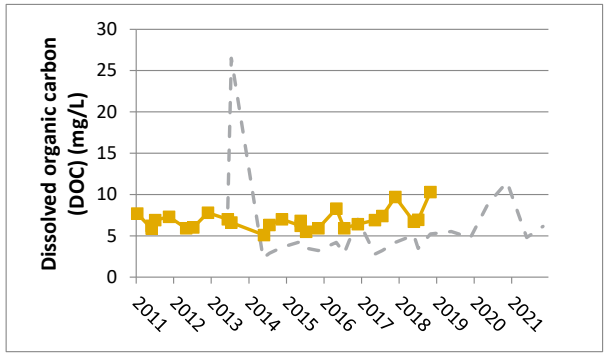
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

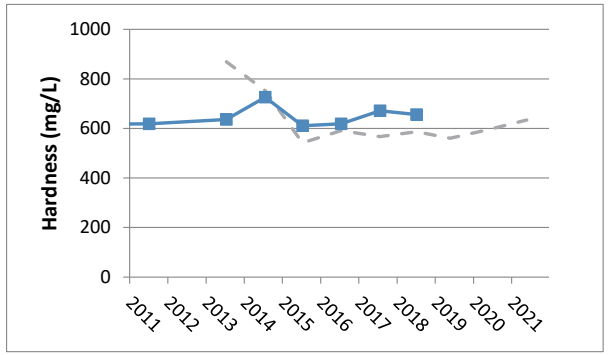
HALDIMAND COUNTRY, ONTARIO

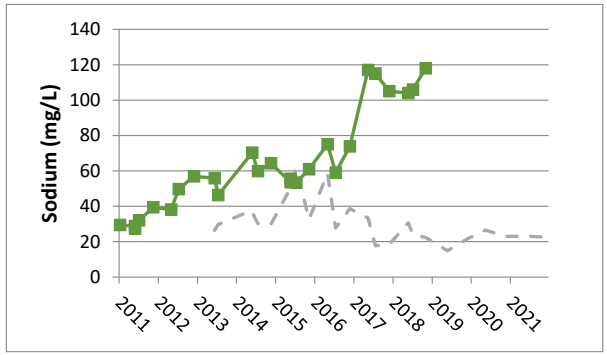


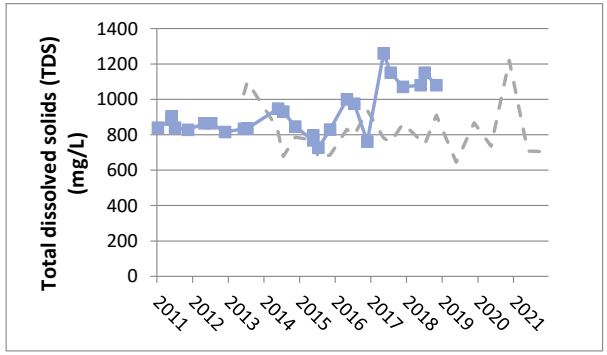












Dashed lines represent background (OW3B-13)

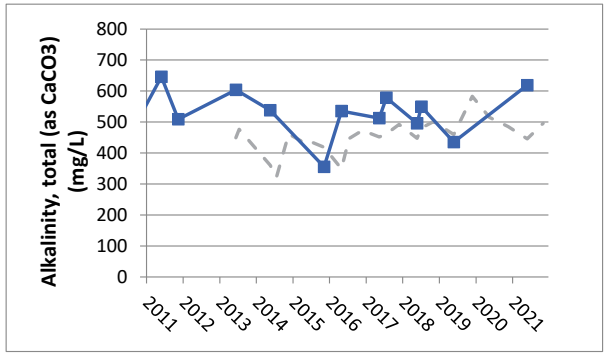
Hollow icons represent non-detects at the given concentration.

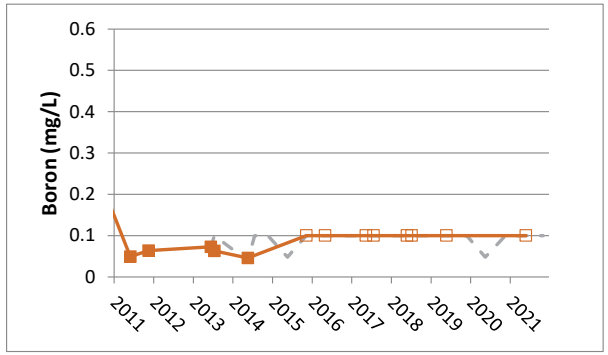
APPENDIX I-2.A - Figure 4

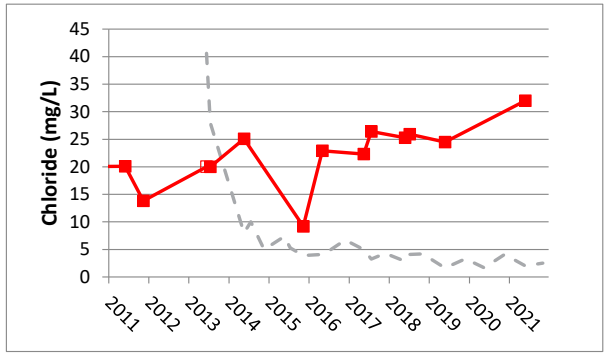
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW2-03

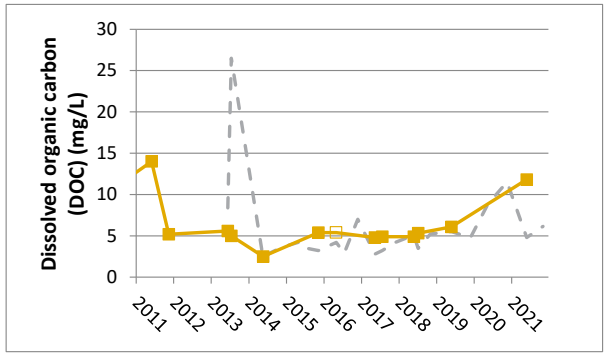
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

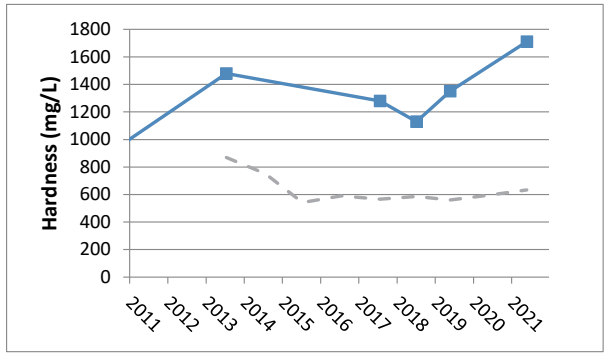
HALDIMAND COUNTRY, ONTARIO

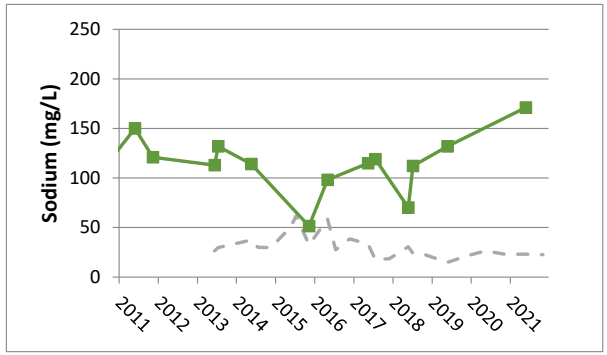


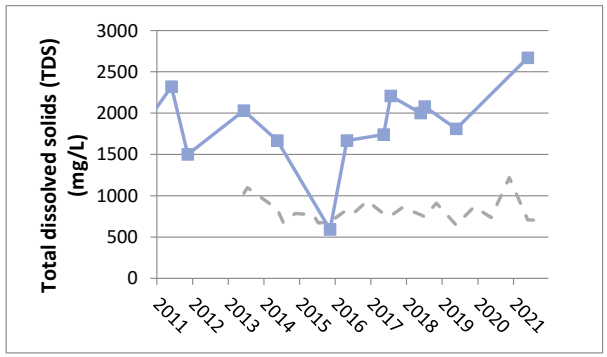












Dashed lines represent background (OW3B-13)

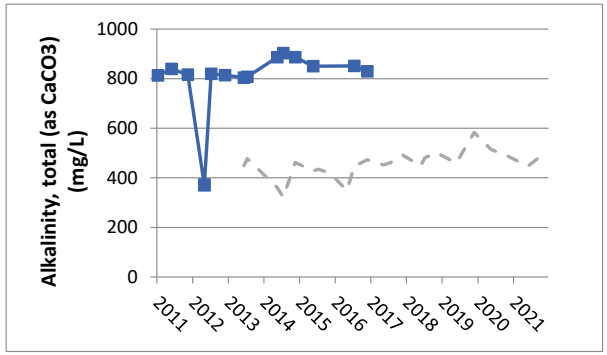
Hollow icons represent non-detects at the given concentration.

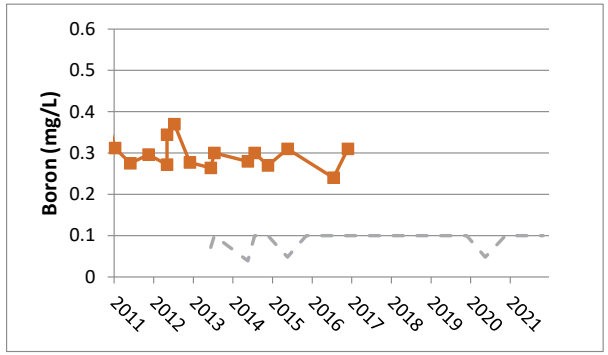
APPENDIX I-2.A - Figure 5

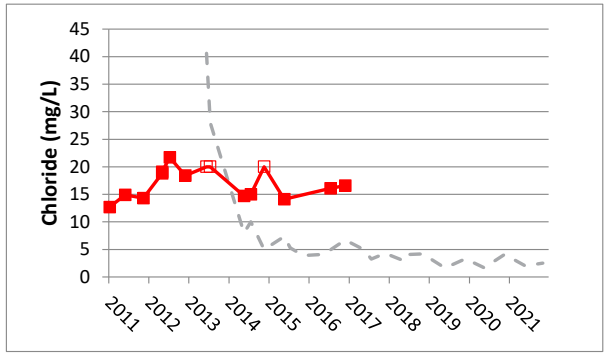
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW2B-07

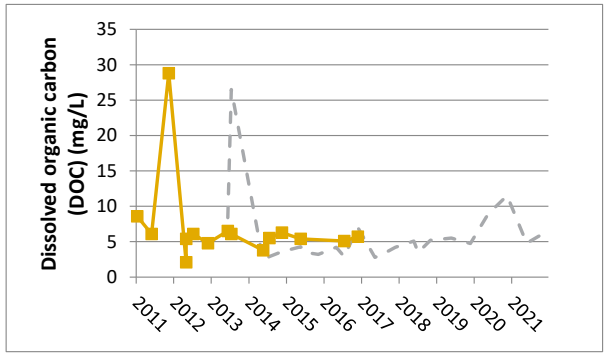
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

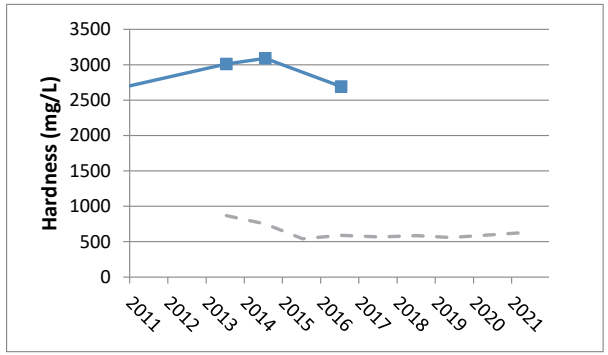
HALDIMAND COUNTRY, ONTARIO

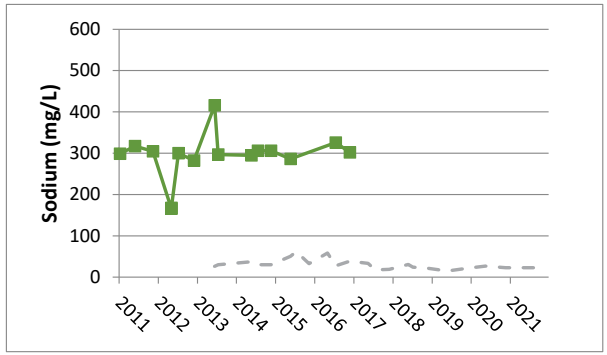


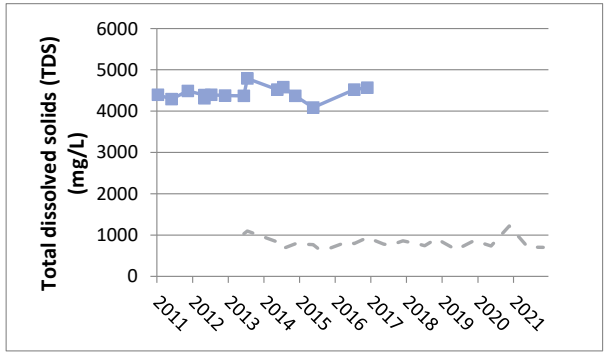












Dashed lines represent background (OW3B-13)

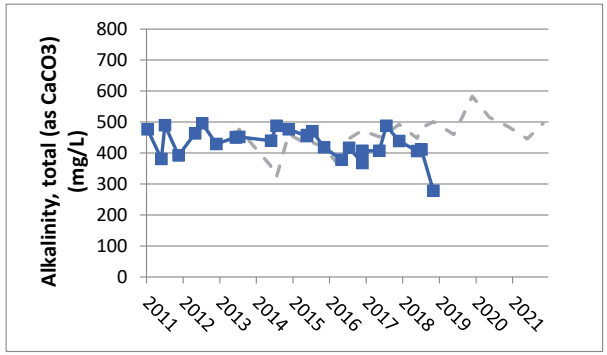
Hollow icons represent non-detects at the given concentration.

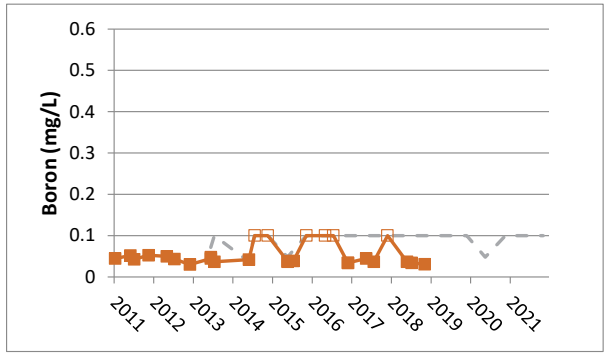
APPENDIX I-2.A - Figure 6

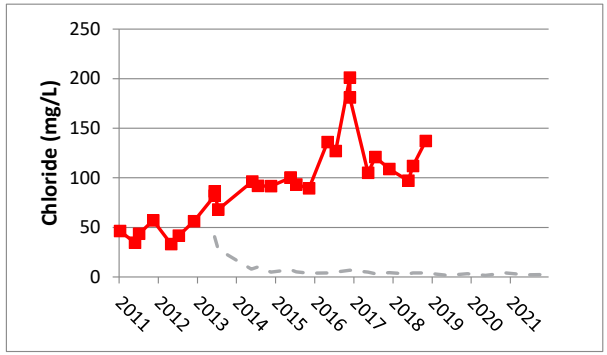
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW2C-01

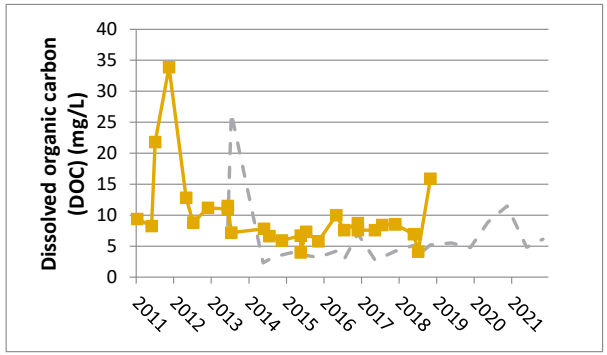
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

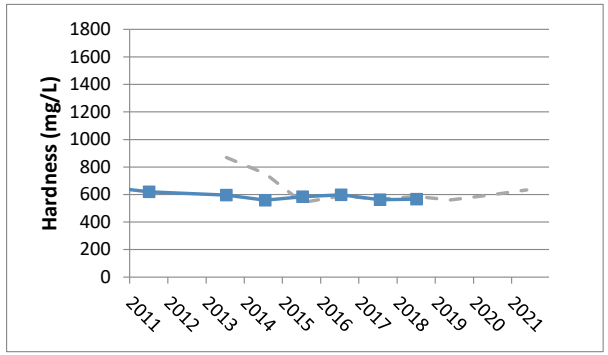
HALDIMAND COUNTRY, ONTARIO

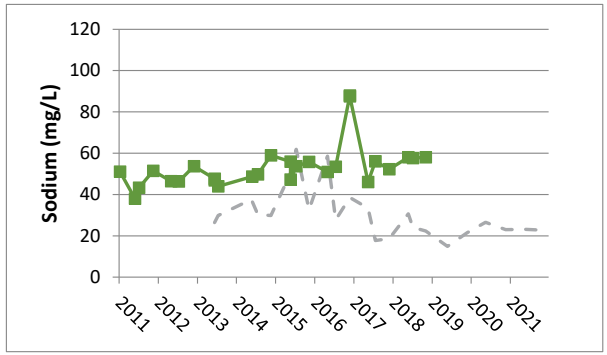


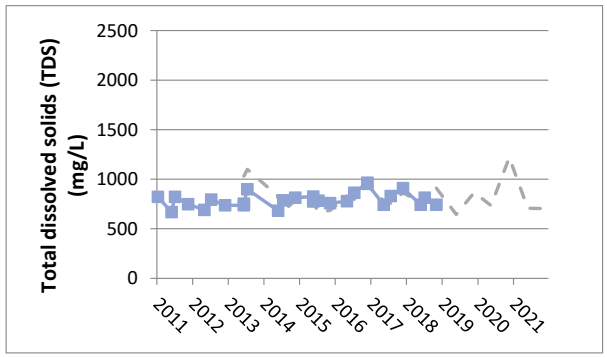






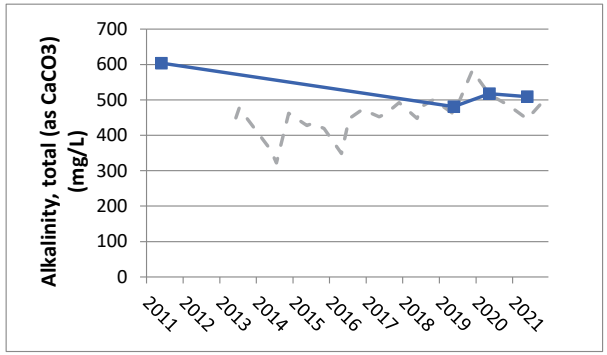


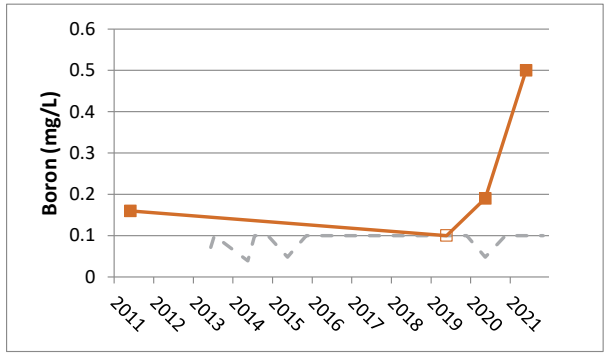


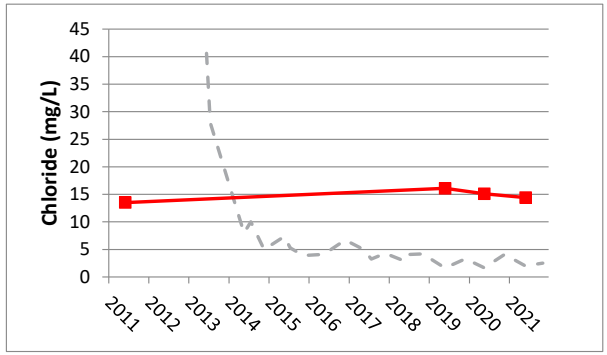


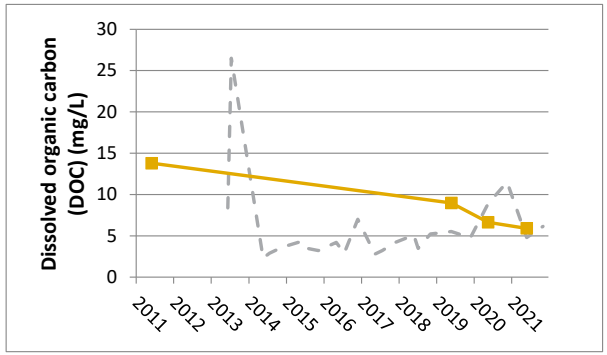
Dashed lines represent background (OW3B-13)
Hollow icons represent non-detects at the given concentration.

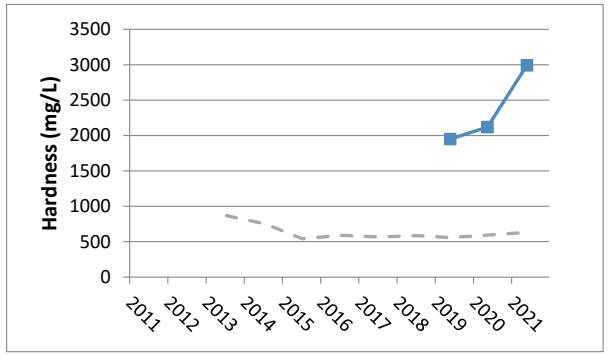
APPENDIX I-2.A - Figure 7
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW3-03
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

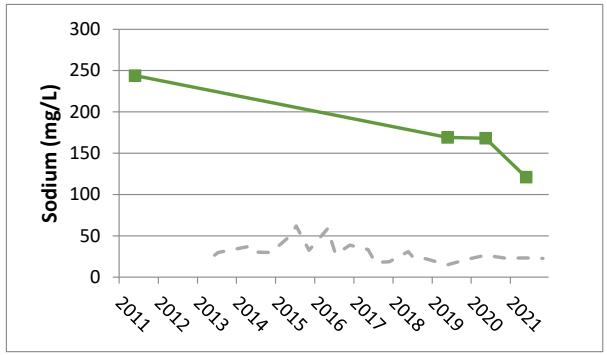


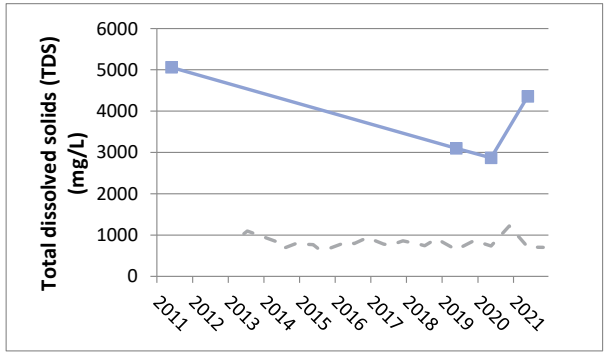












Dashed lines represent background (OW3B-13)

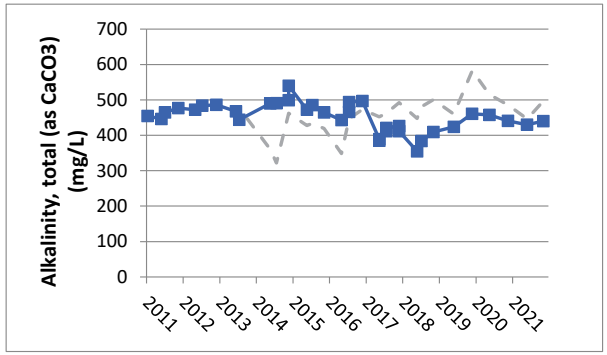
Hollow icons represent non-detects at the given concentration.

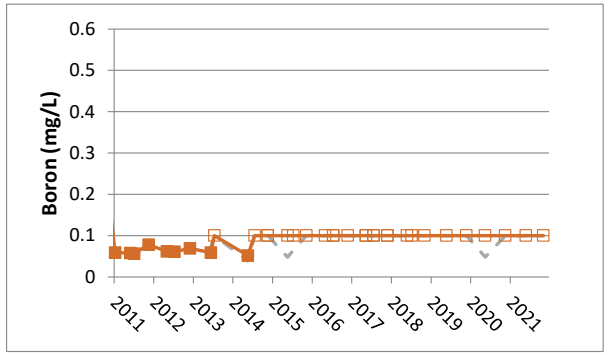
APPENDIX I-2.A - Figure 8

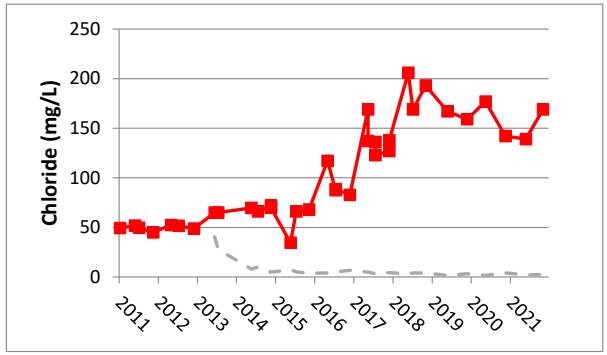
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW5B-09

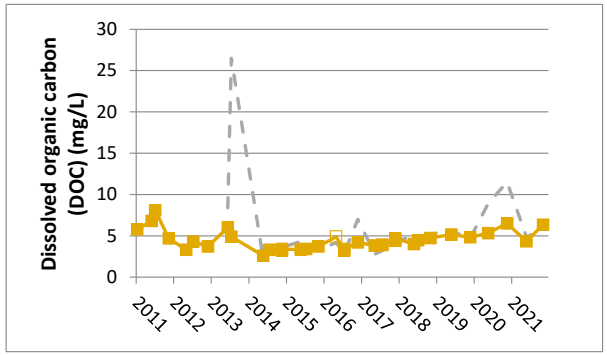
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

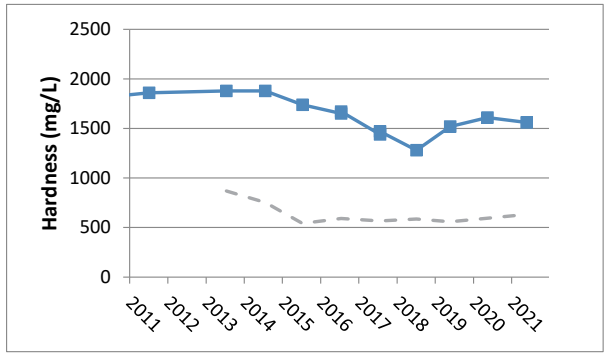
HALDIMAND COUNTRY, ONTARIO

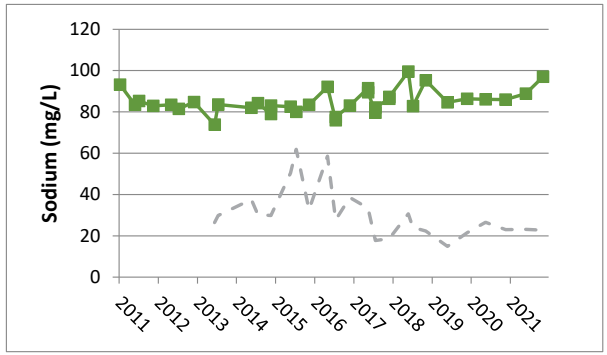


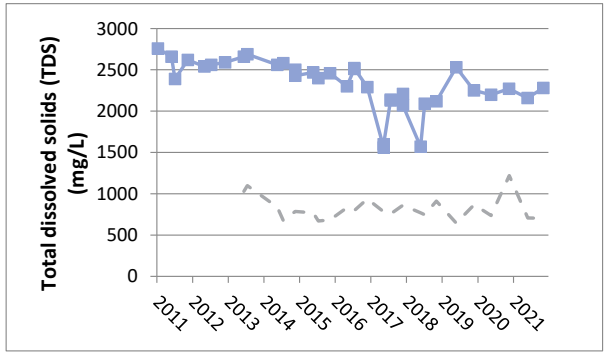












Dashed lines represent background (OW3B-13)

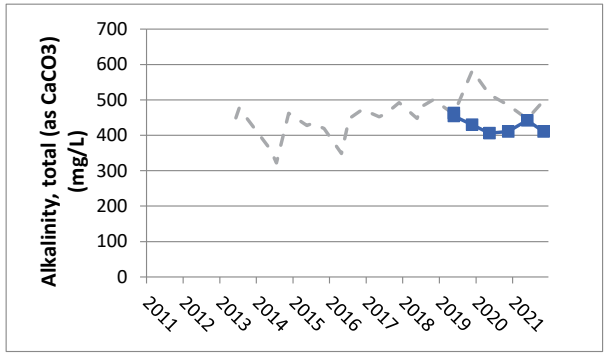
Hollow icons represent non-detects at the given concentration.

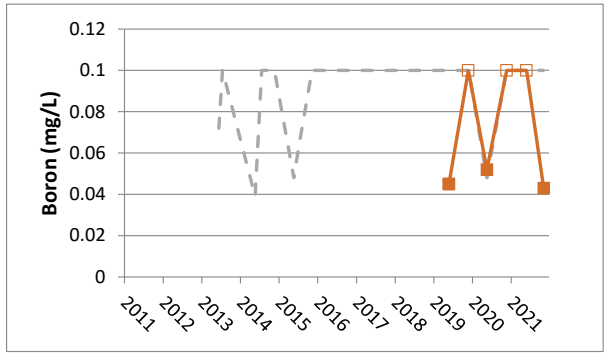
APPENDIX I-2.A - Figure 9

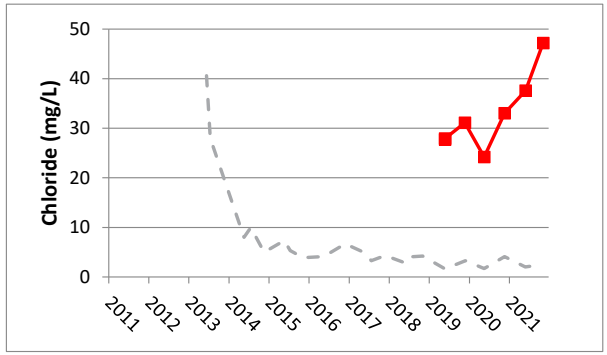
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW6B-07

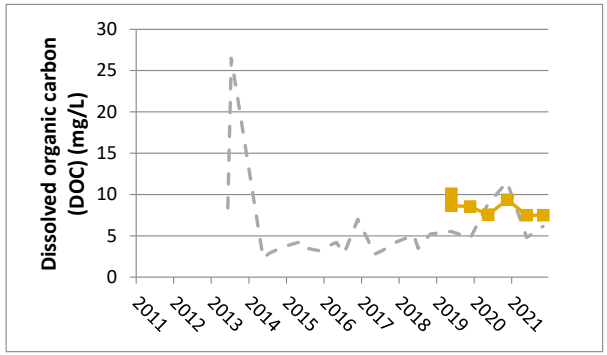
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

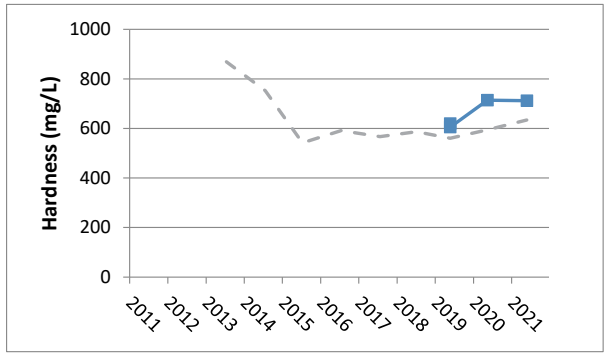
HALDIMAND COUNTRY, ONTARIO

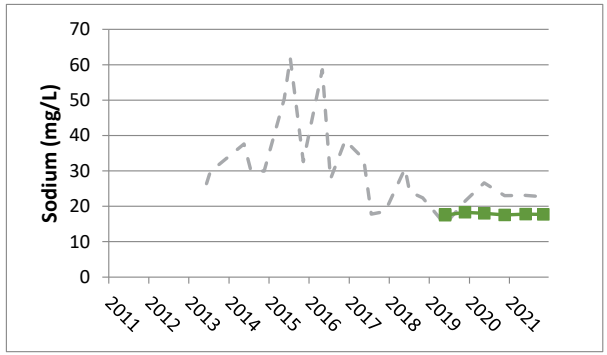


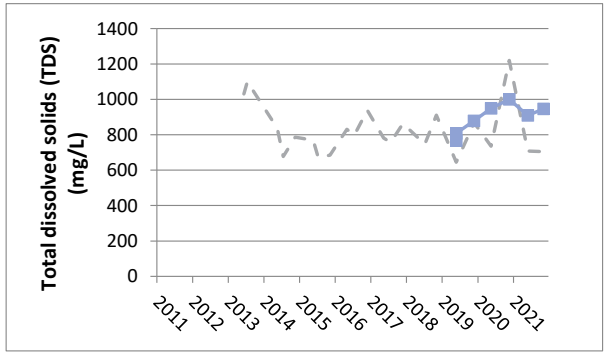






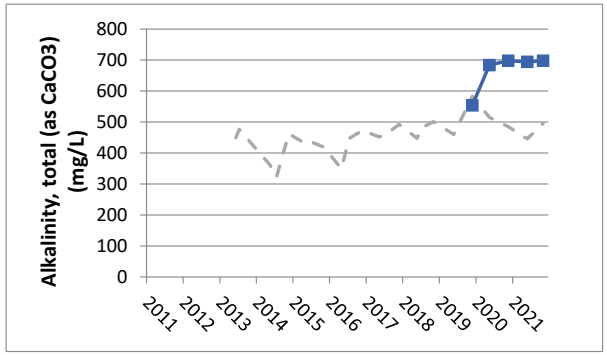


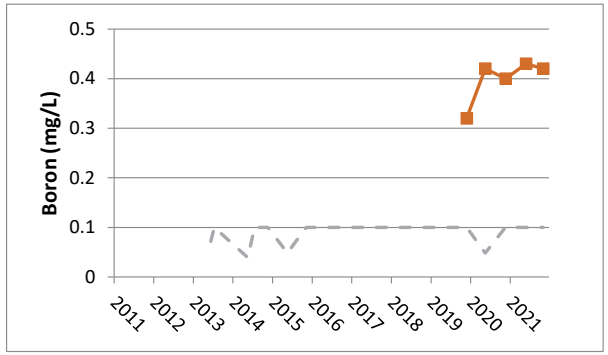


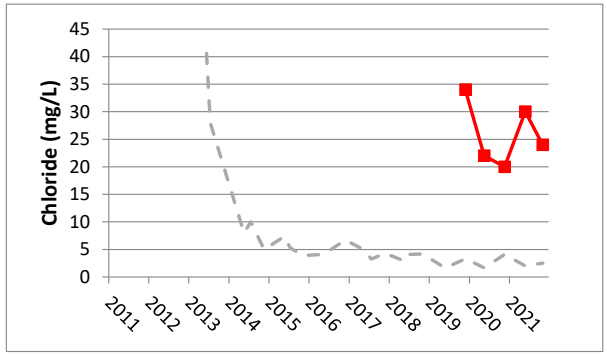


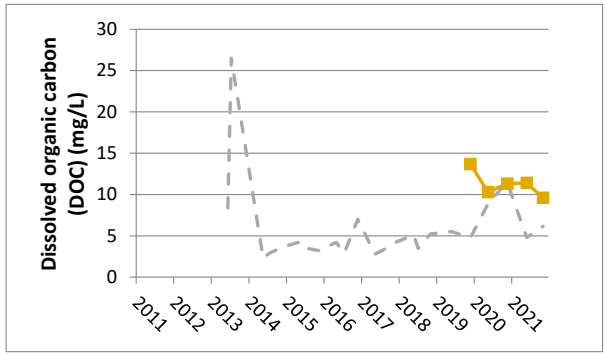
Dashed lines represent background (OW3B-13)
Hollow icons represent non-detects at the given concentration.

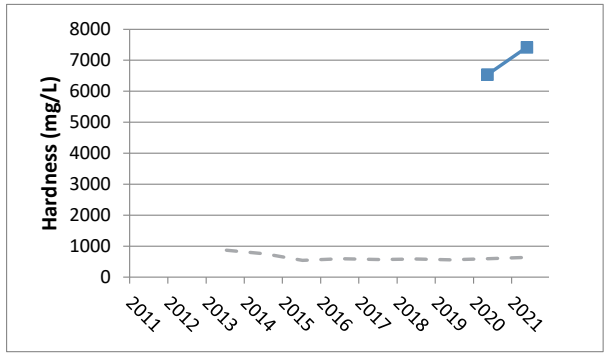
APPENDIX I-2.A - Figure 10
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW10B-18
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

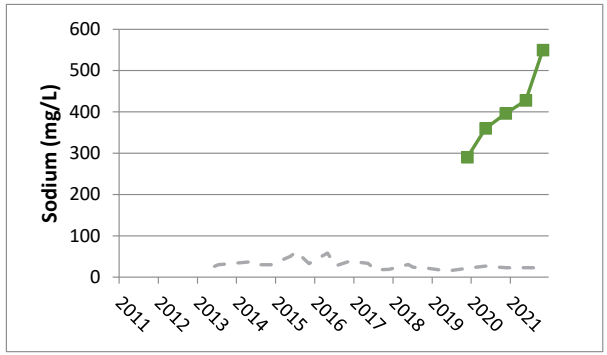


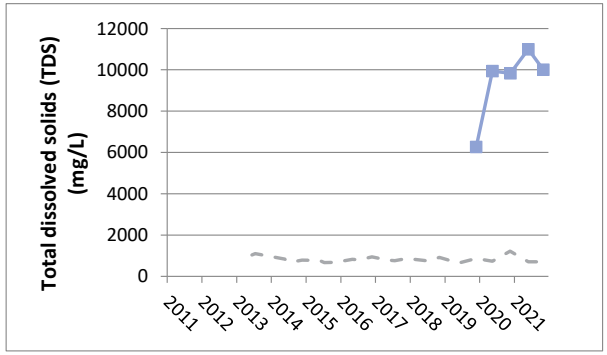






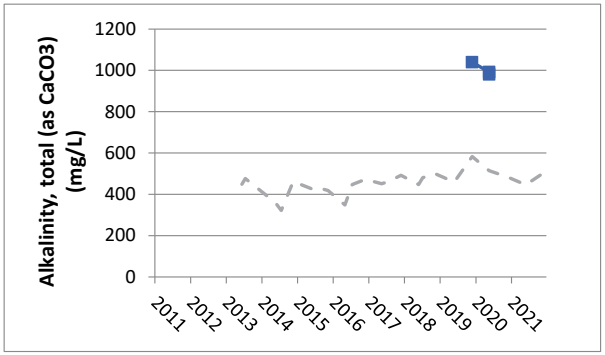


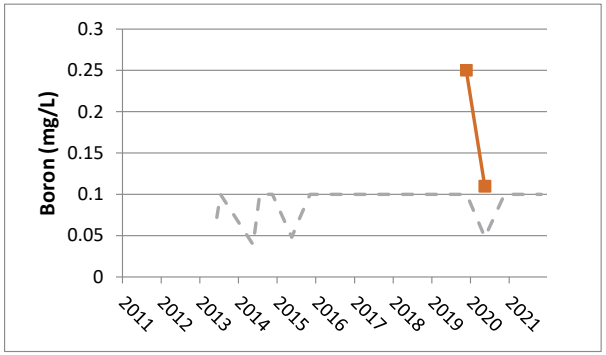


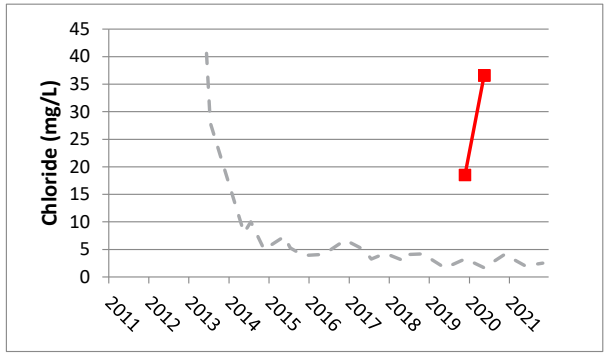


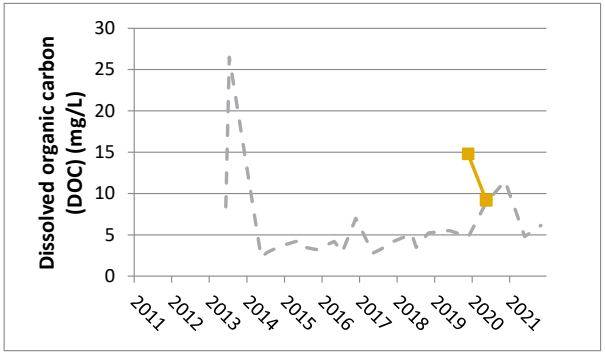
Dashed lines represent background (OW3B-13)
Hollow icons represent non-detects at the given concentration.

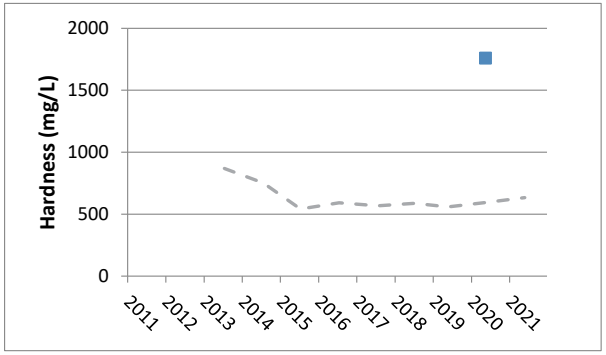
APPENDIX I-2.A - Figure 11
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW11B-19
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

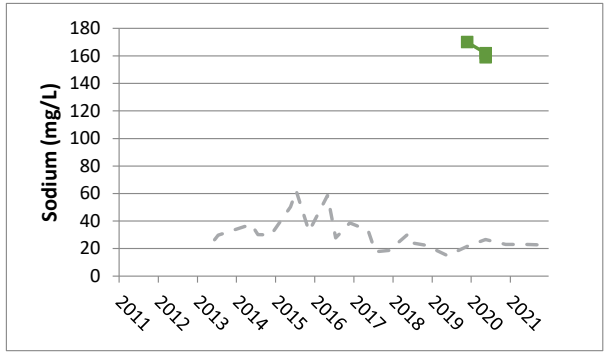


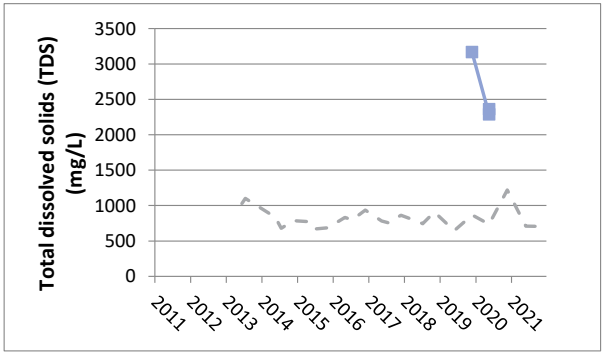






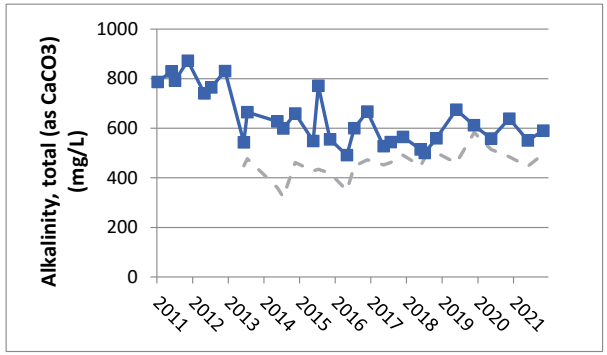


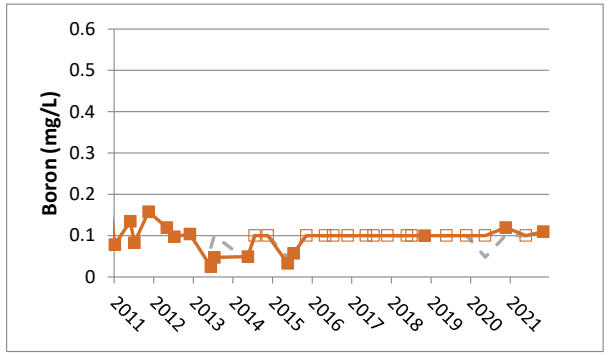


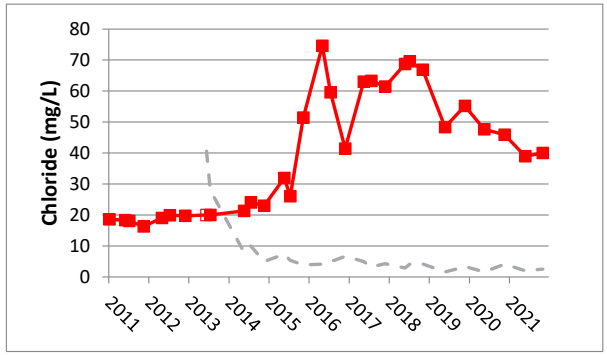


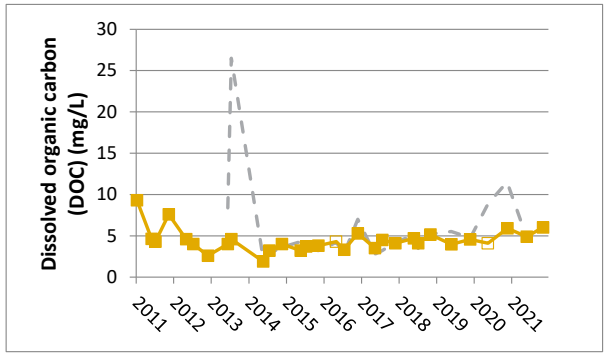
Dashed lines represent background (OW3B-13)
Hollow icons represent non-detects at the given concentration.

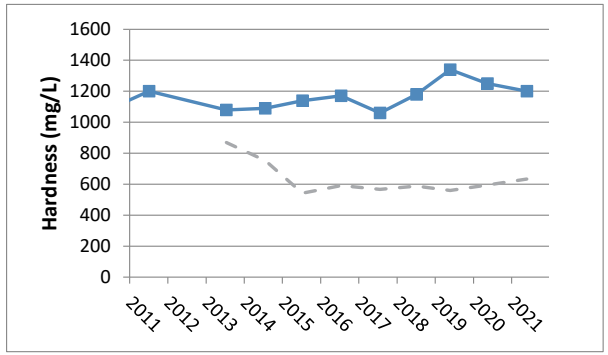
APPENDIX I-2.A - Figure 12
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - MW12B-19
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

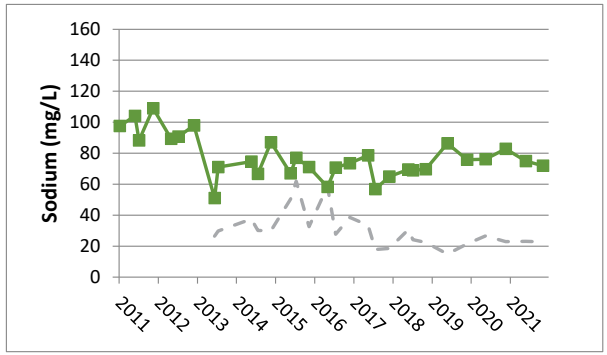


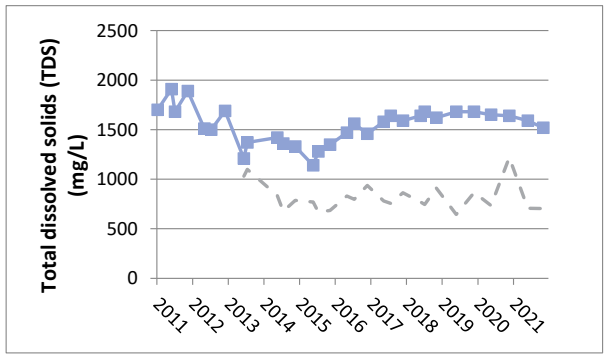






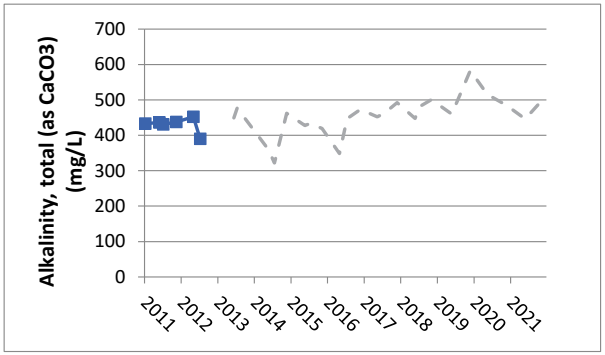


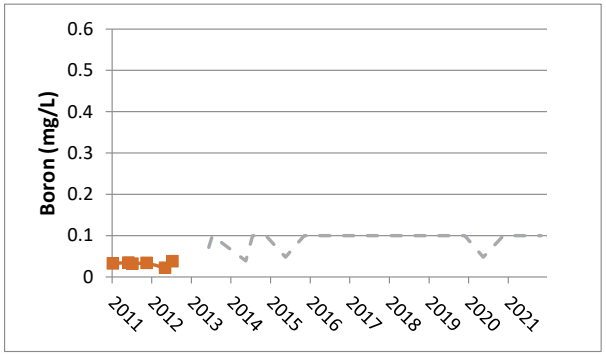


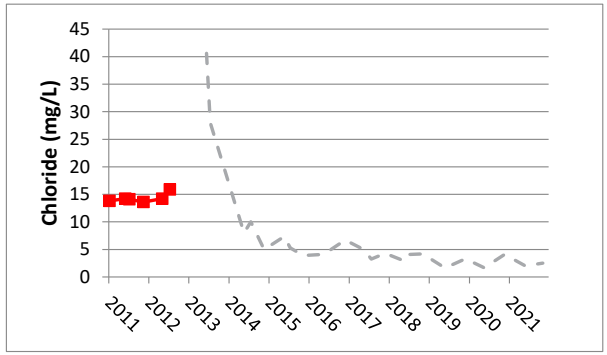


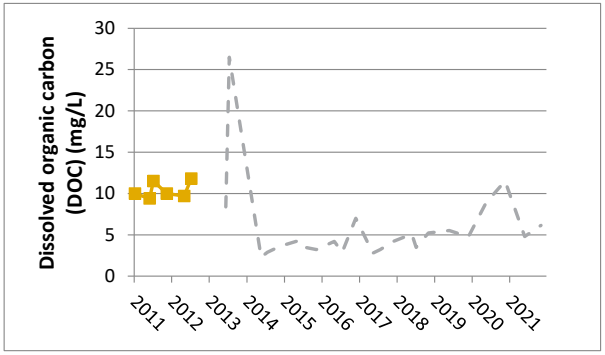
Dashed lines represent background (OW3B-13)
Hollow icons represent non-detects at the given concentration.

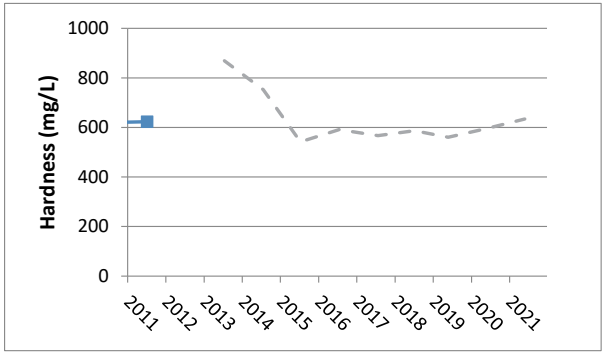
APPENDIX I-2.A - Figure 13
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - OW1B-06
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

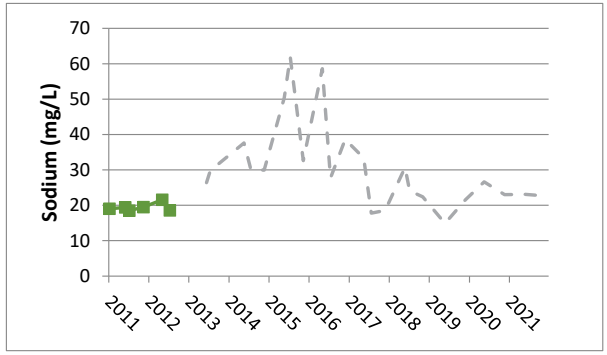


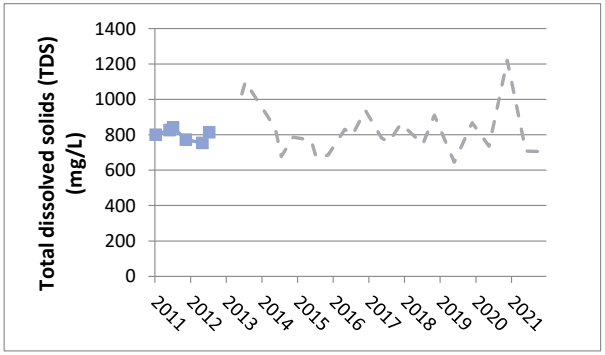












Dashed lines represent background (OW3B-13)

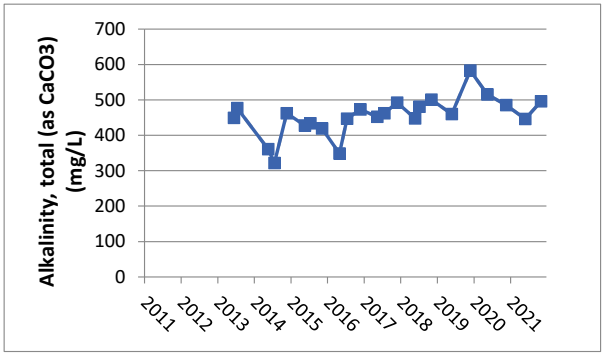
Hollow icons represent non-detects at the given concentration.

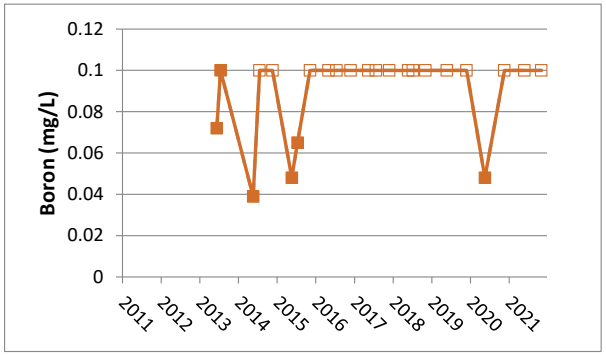
APPENDIX I-2.A - Figure 14

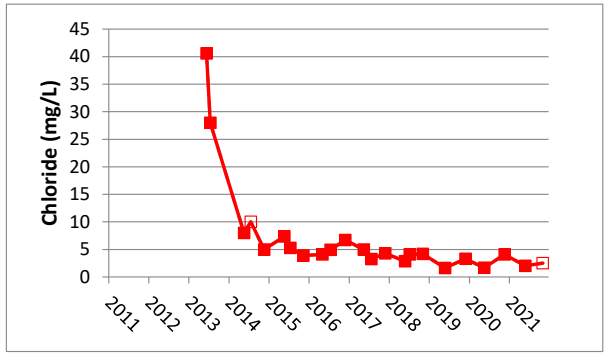
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - OW3B-07

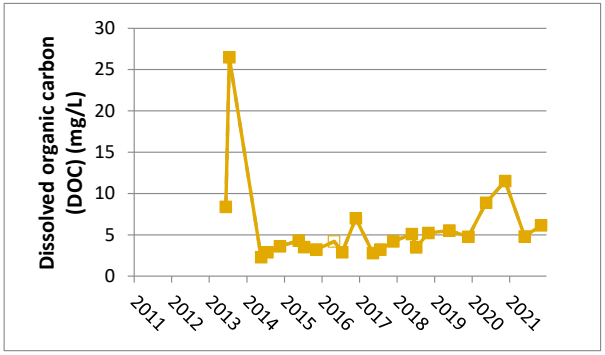
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

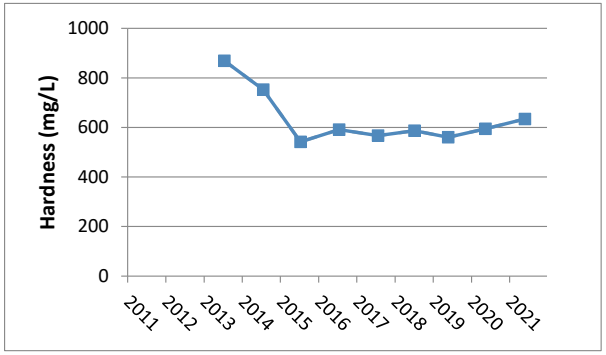
HALDIMAND COUNTRY, ONTARIO

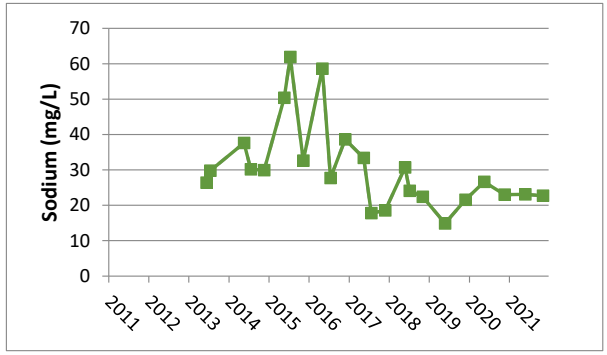


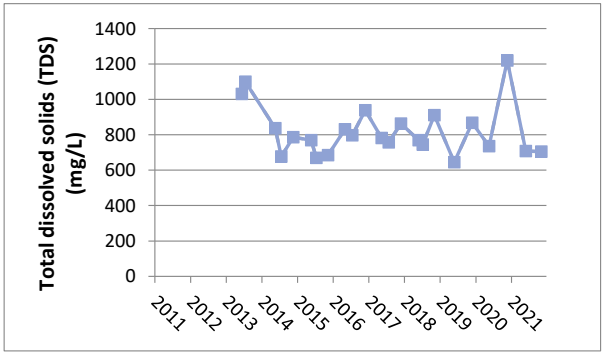












Dashed lines represent background (OW3B-13)

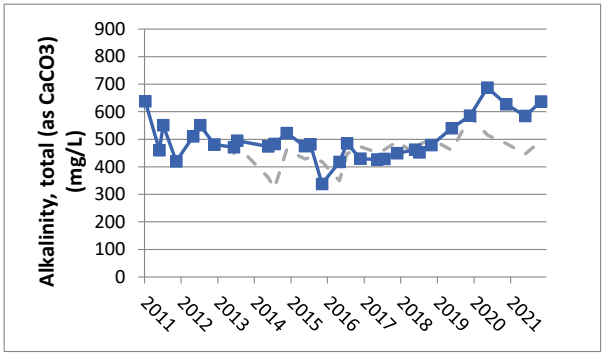
Hollow icons represent non-detects at the given concentration.

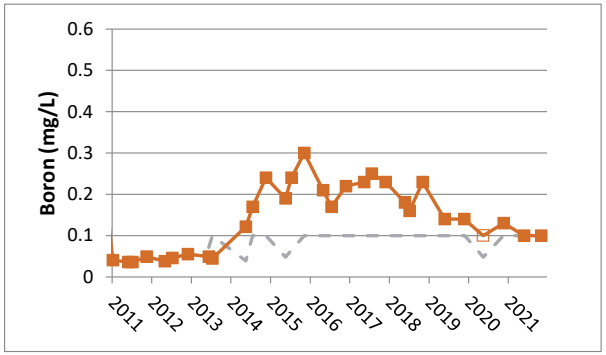
APPENDIX I-2.A - Figure 15

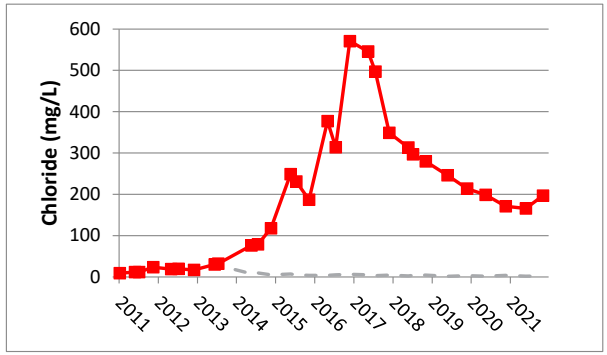
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - OW3B-13

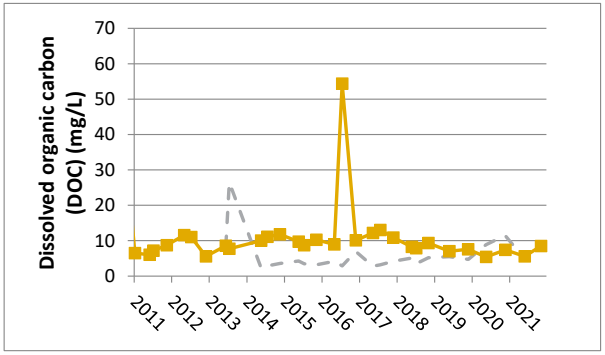
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

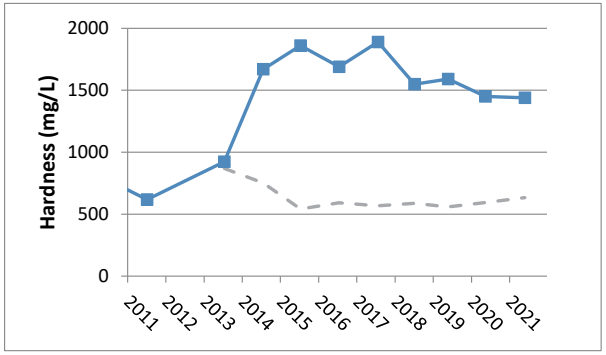
HALDIMAND COUNTRY, ONTARIO

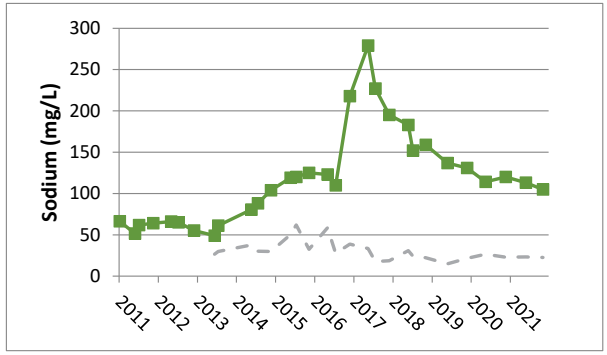


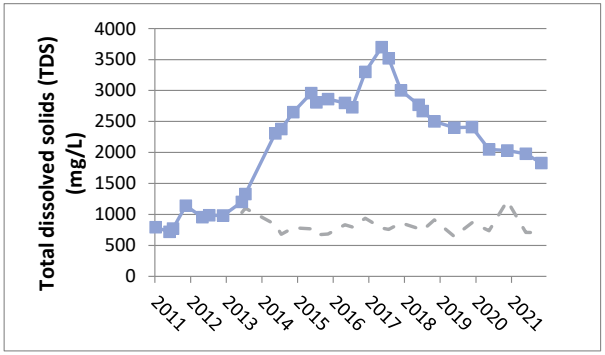












Dashed lines represent background (OW3B-13)

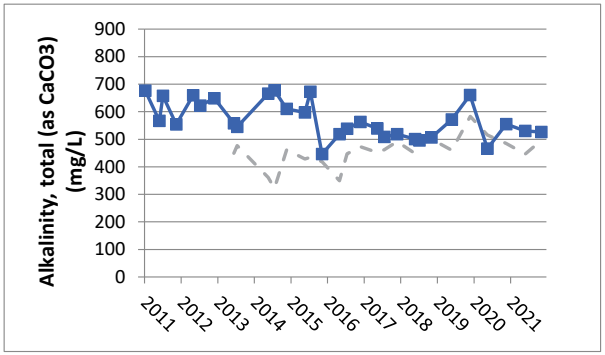
Hollow icons represent non-detects at the given concentration.

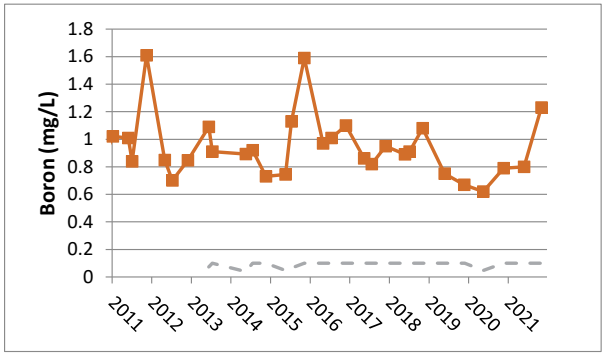
APPENDIX I-2.A - Figure 16

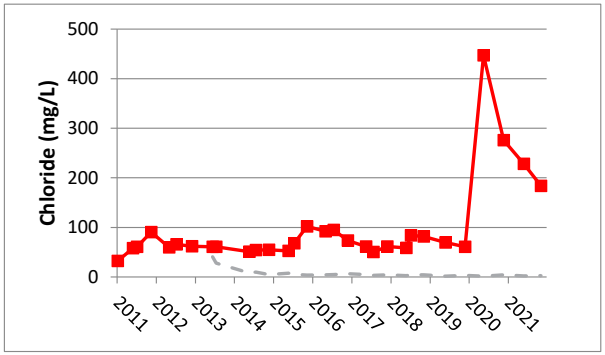
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - OW5B-06

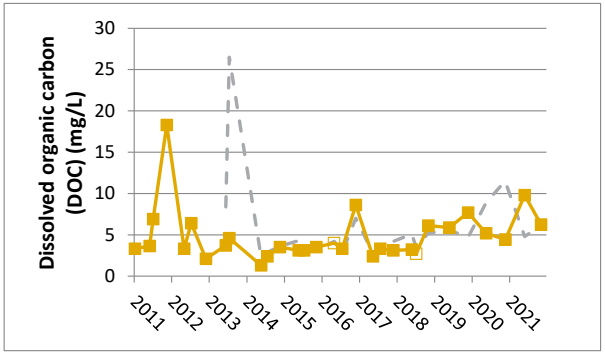
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

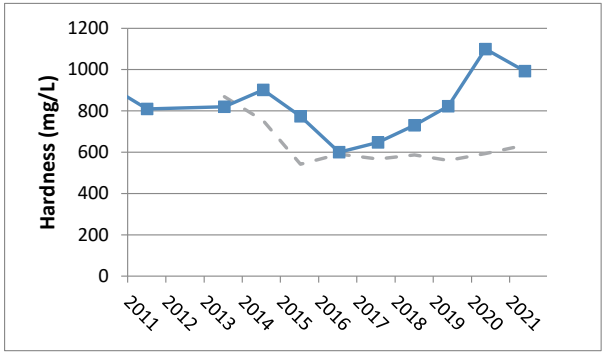
HALDIMAND COUNTRY, ONTARIO

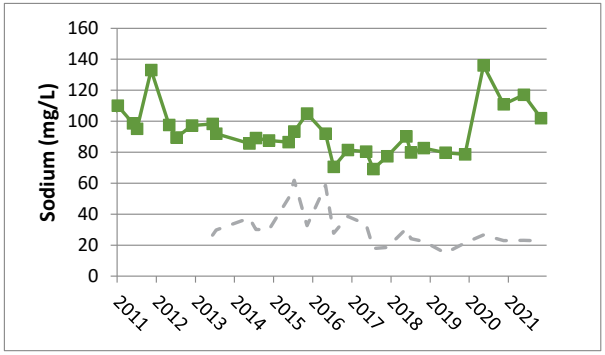


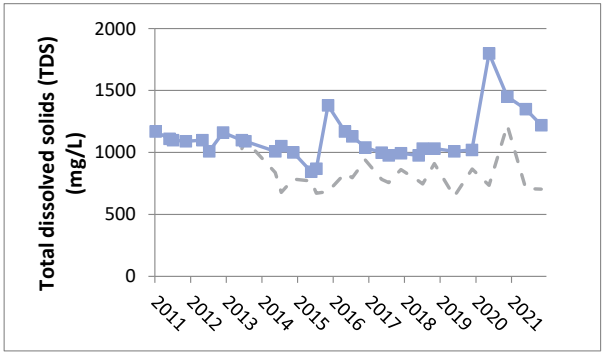












Dashed lines represent background (OW3B-13)

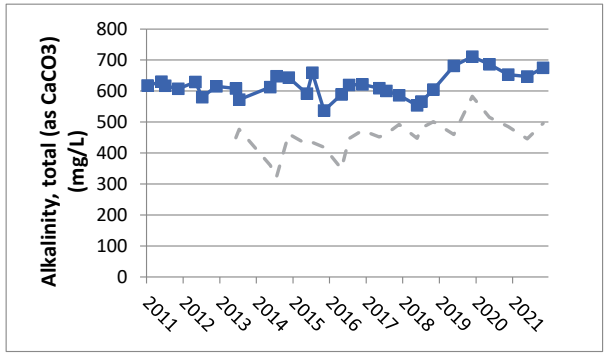
Hollow icons represent non-detects at the given concentration.

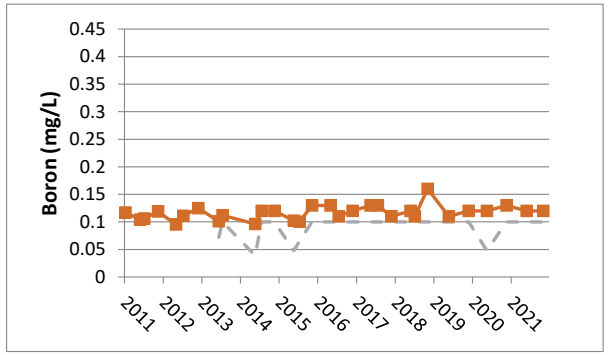
APPENDIX I-2.A - Figure 17

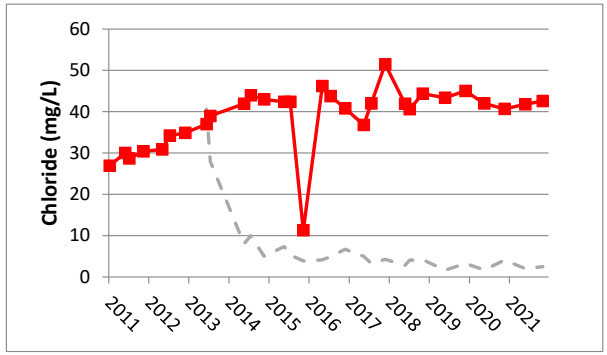
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - OW8B-06

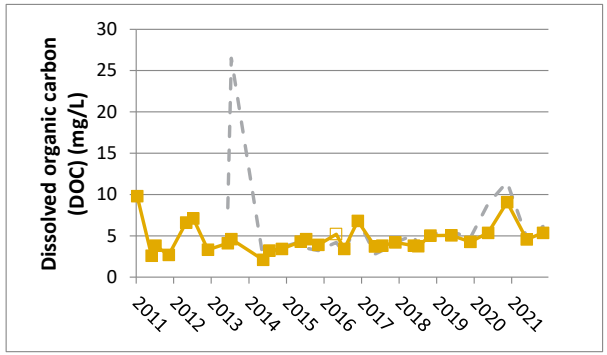
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

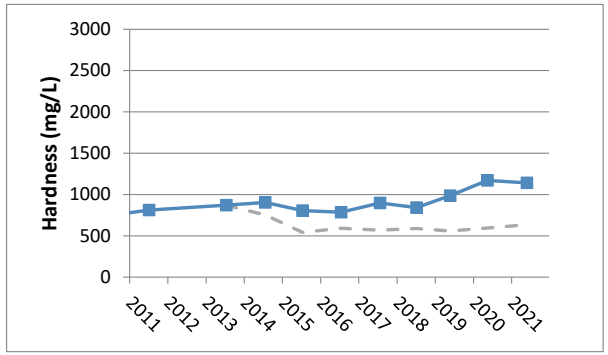
HALDIMAND COUNTRY, ONTARIO

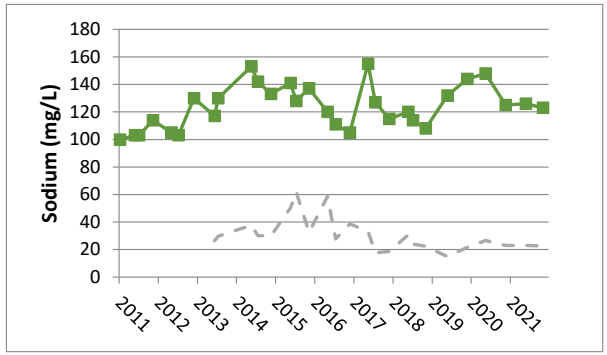


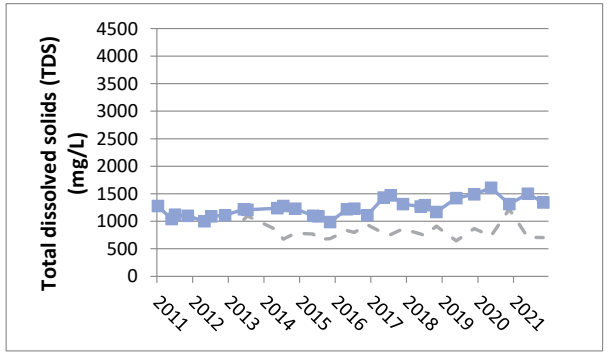












Dashed lines represent background (OW3B-13)

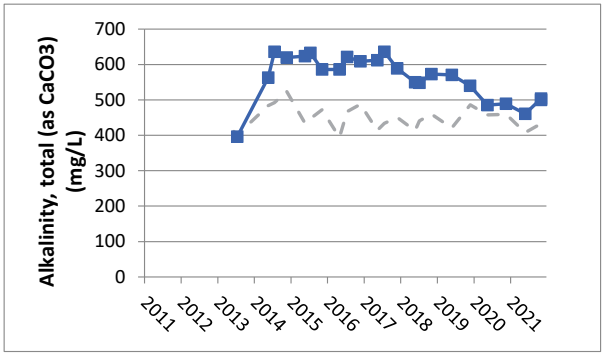
Hollow icons represent non-detects at the given concentration.

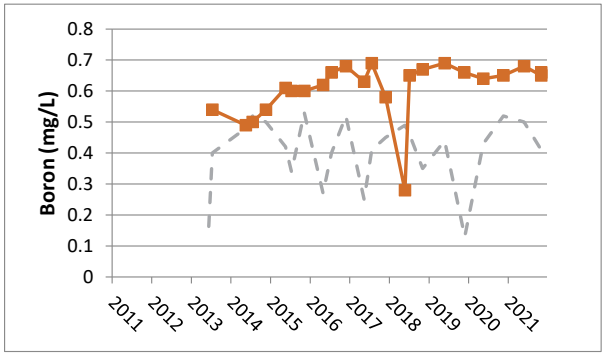
APPENDIX I-2.A - Figure 18

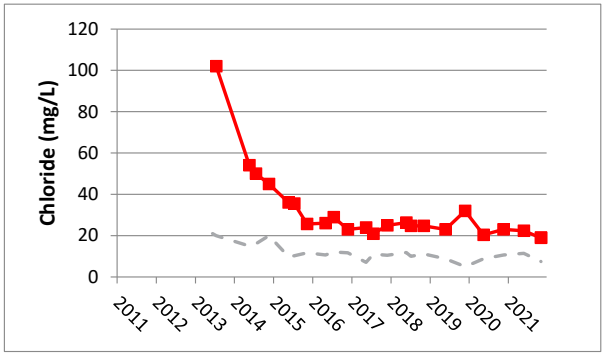
SHALLOW OVERBURDEN - CONCENTRATION VERSUS TIME PLOTS - OW9B-06

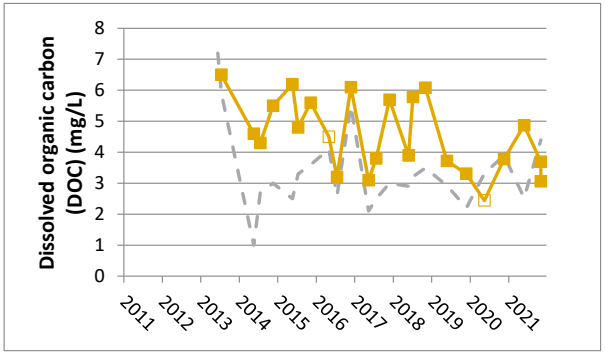
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL

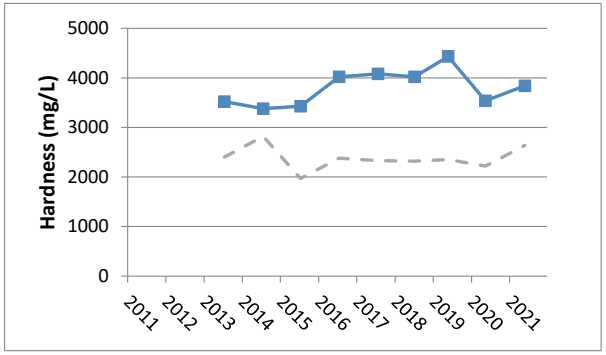
HALDIMAND COUNTRY, ONTARIO

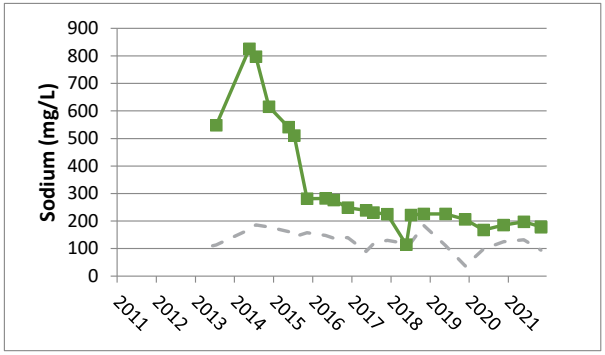


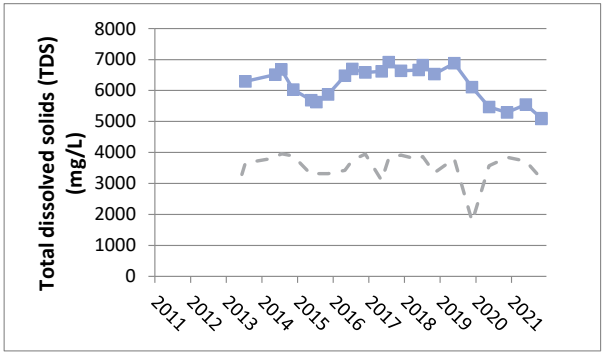






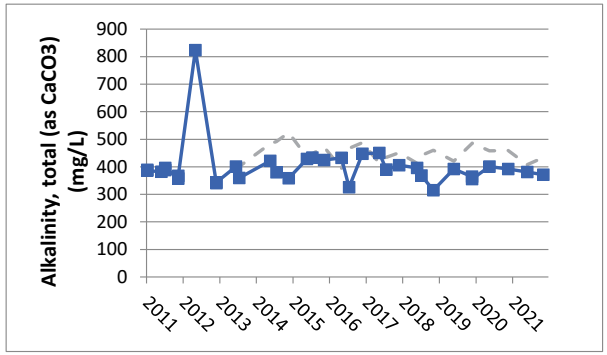


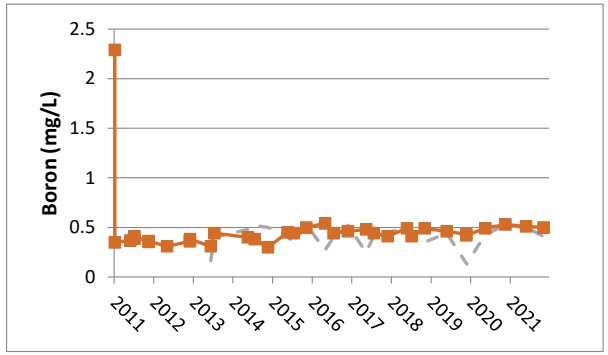


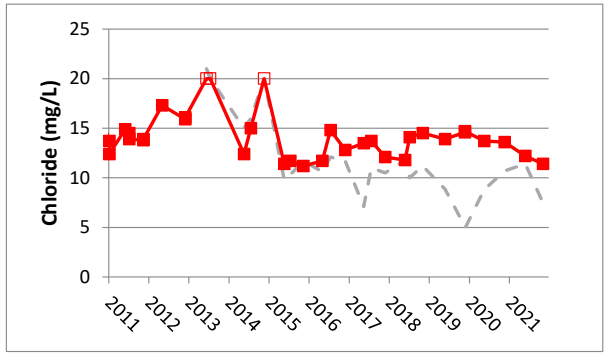


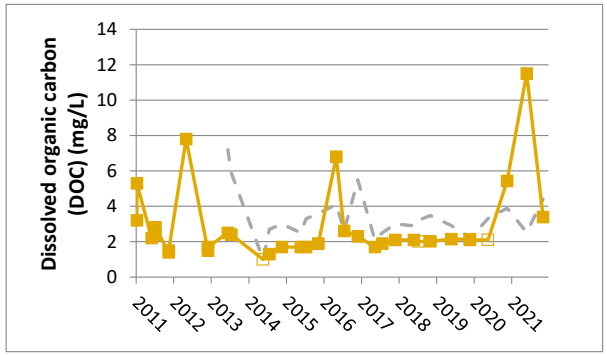
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

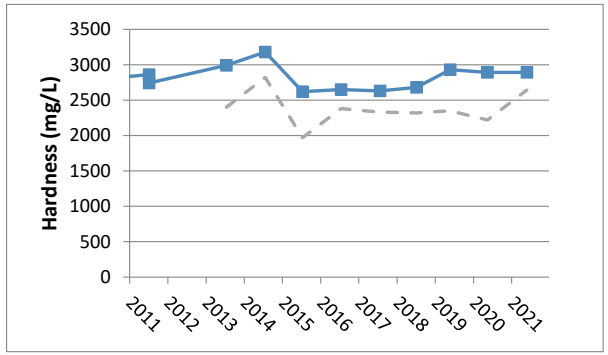
APPENDIX I-2.B - Figure 1
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW1A-13
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

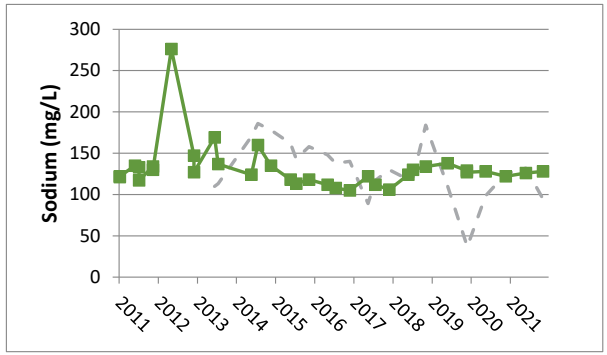


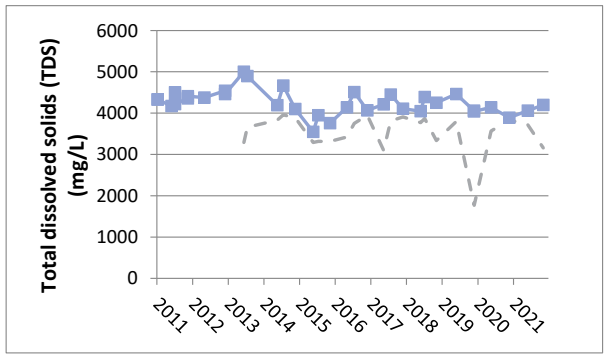






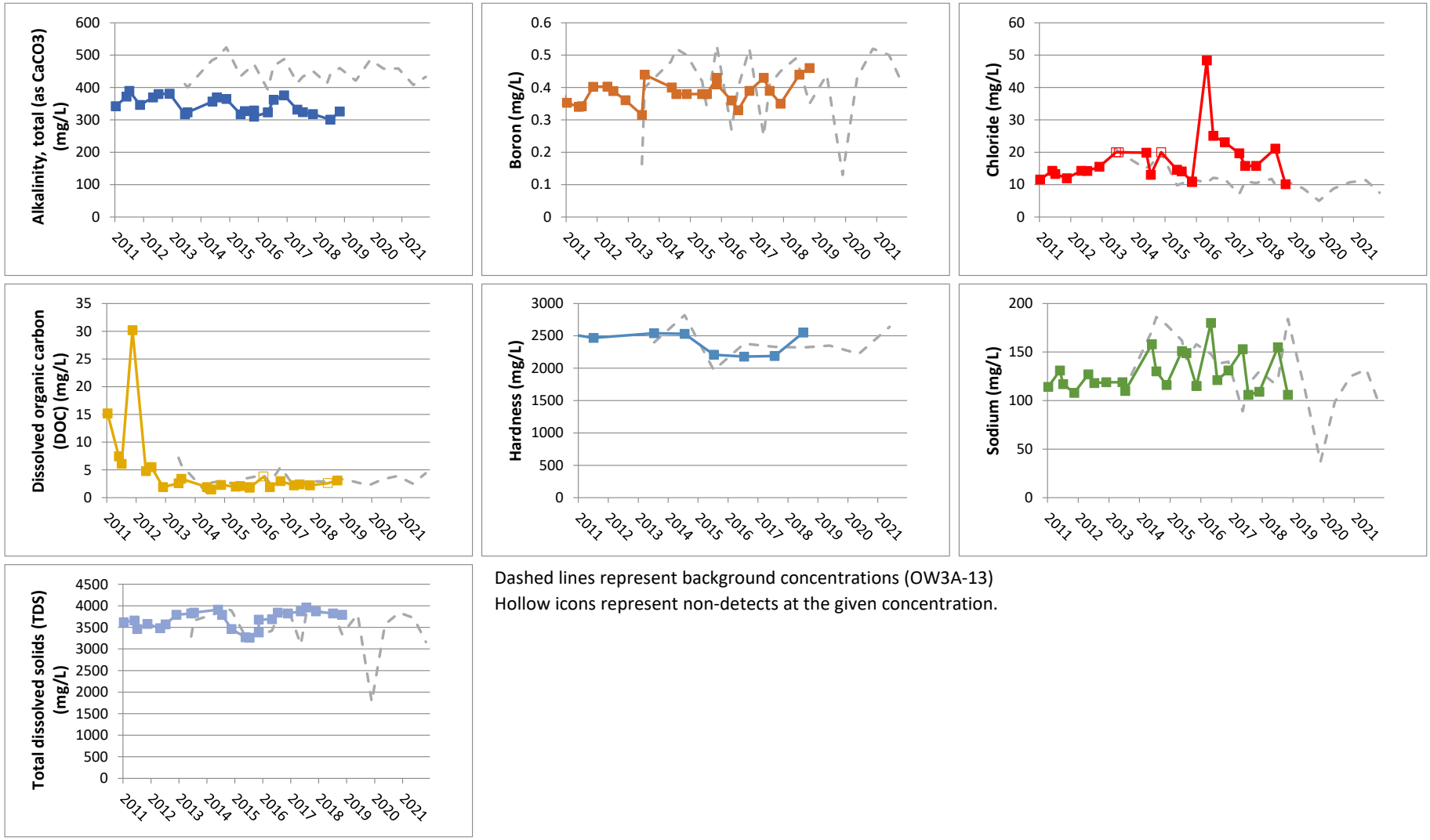






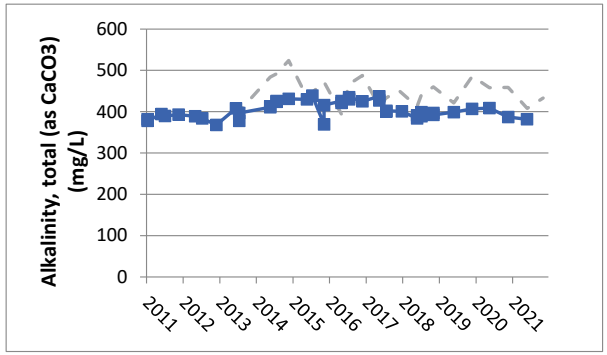
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

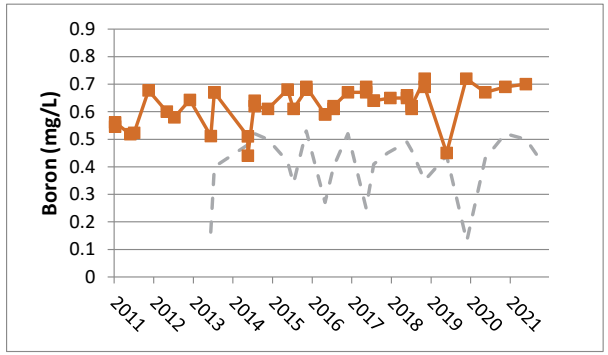
APPENDIX I-2.B - Figure 2
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW2A-01
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

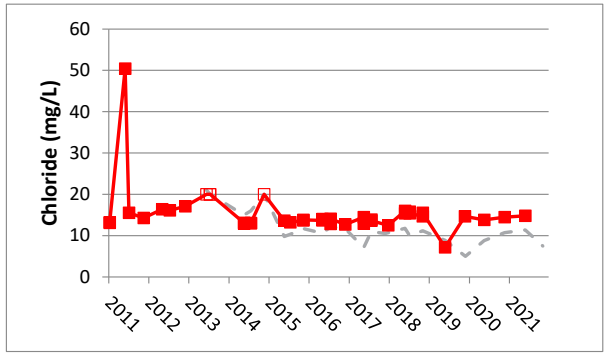


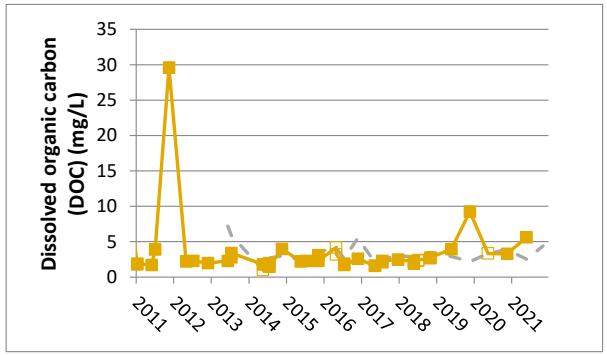
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

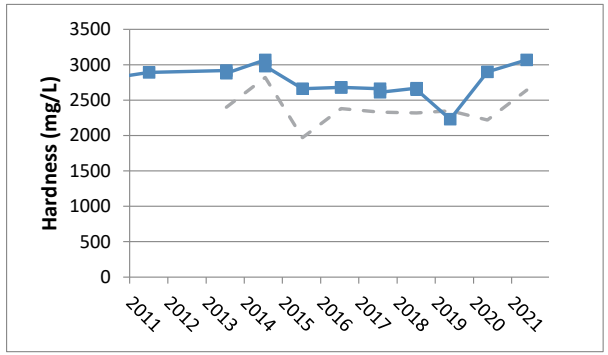
APPENDIX I-2.B - Figure 3
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW4A-09
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

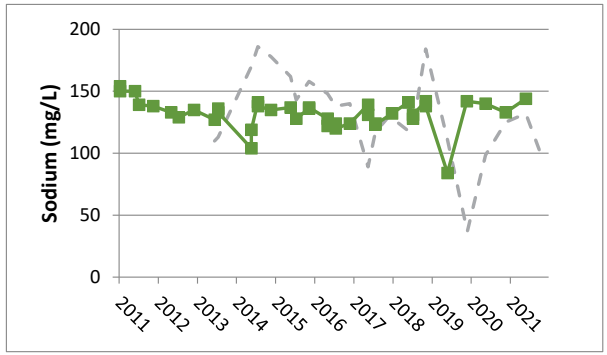


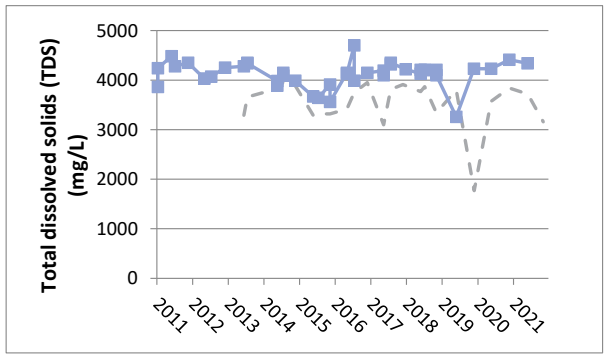






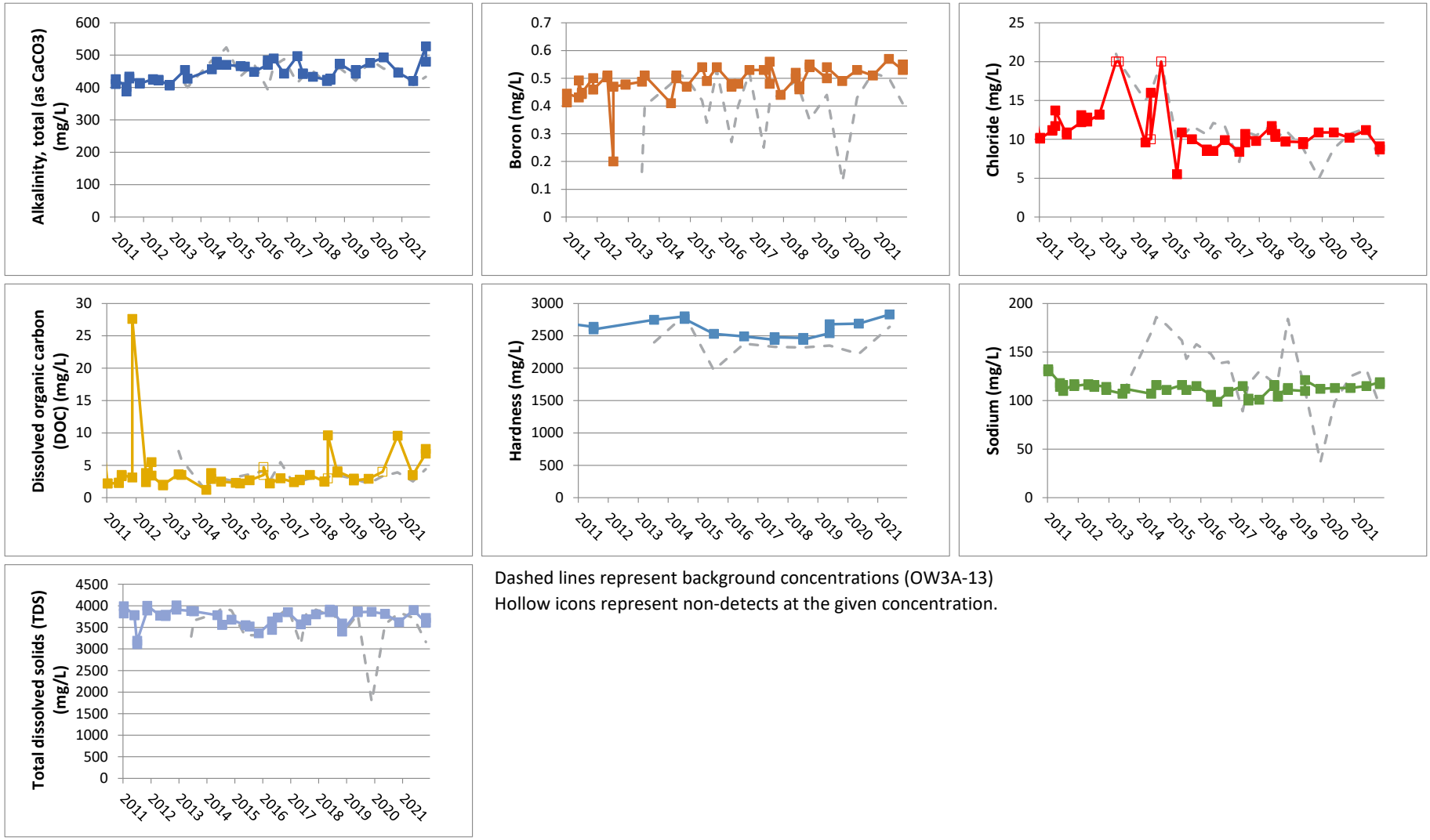






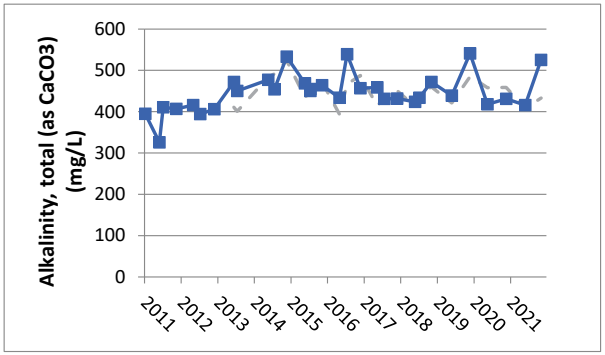
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

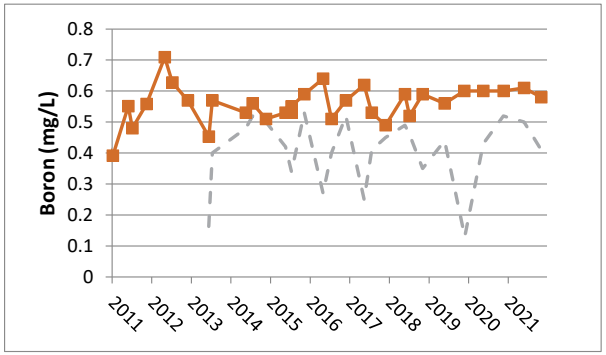
APPENDIX I-2.B - Figure 4
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW5A-09
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

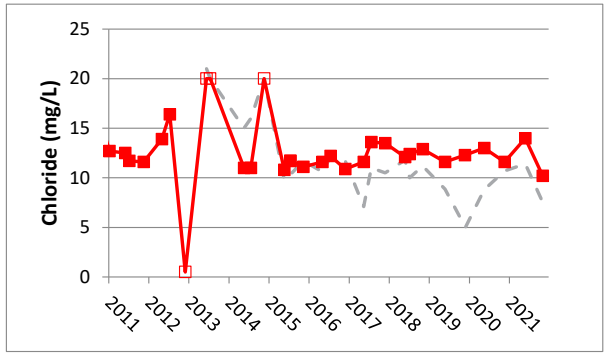


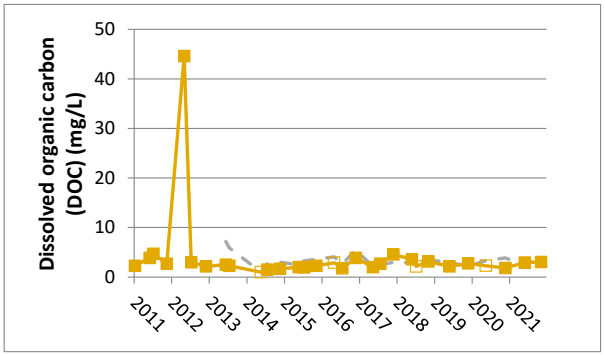
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

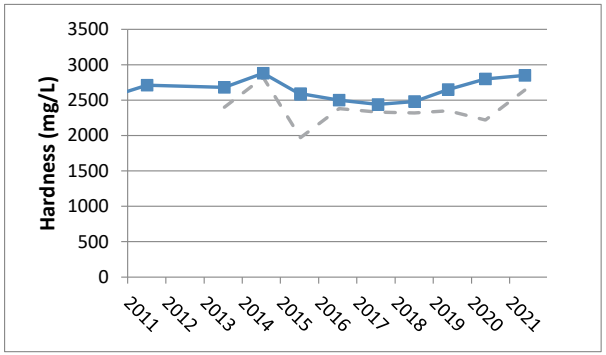
APPENDIX I-2.B - Figure 5
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW6A-07
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

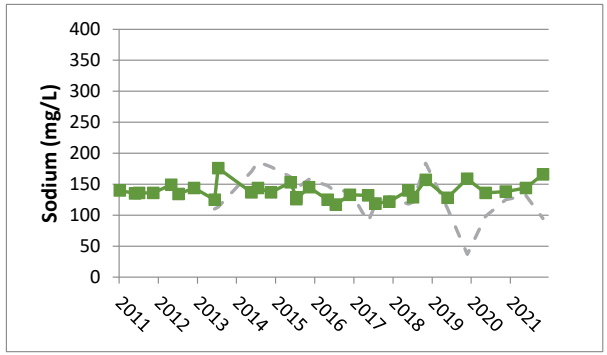


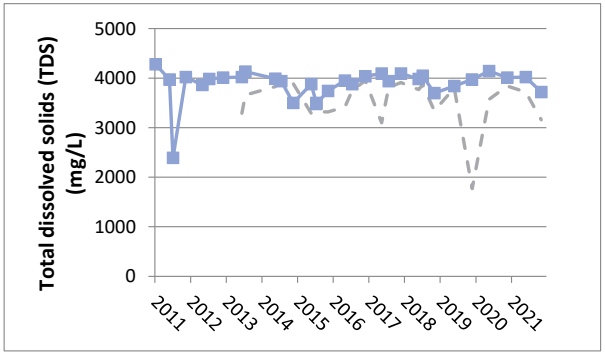






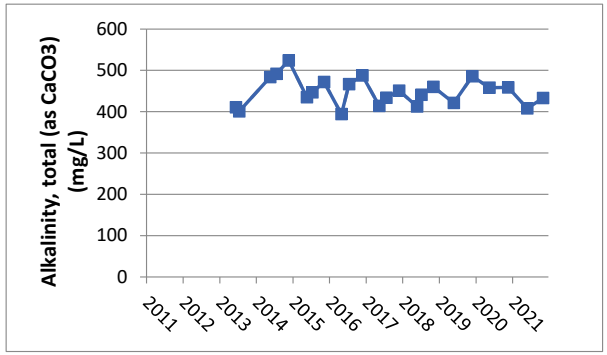


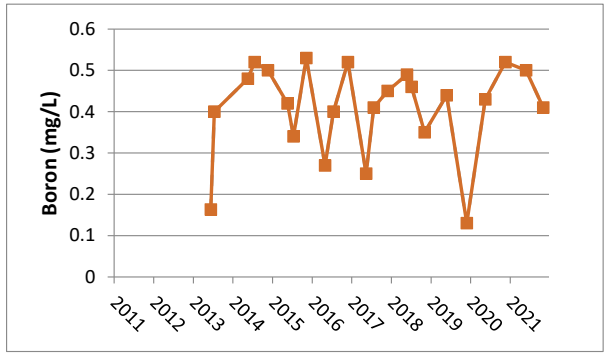


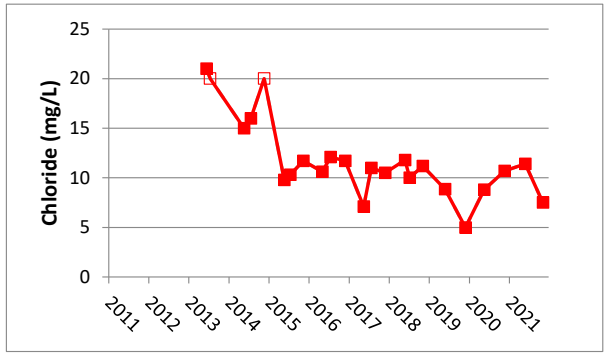


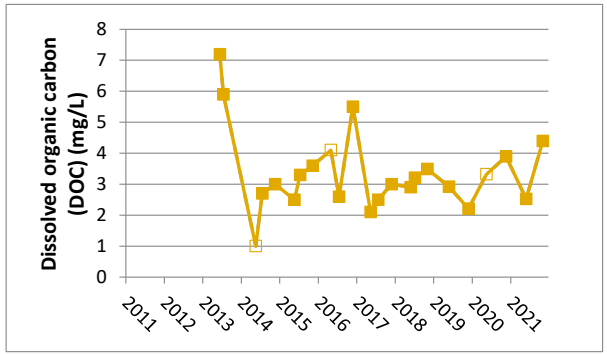
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

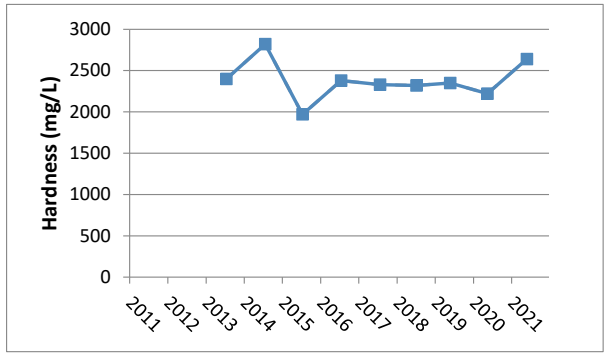
APPENDIX I-2.B - Figure 6
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - OW1A-06
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

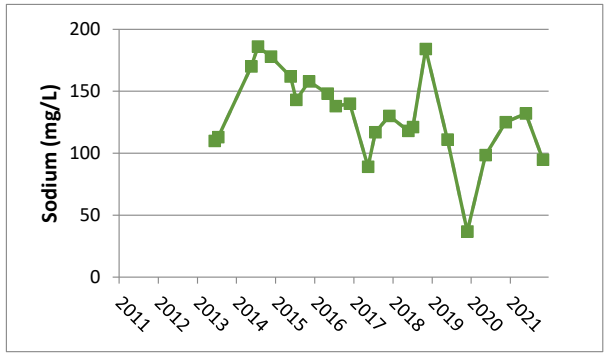


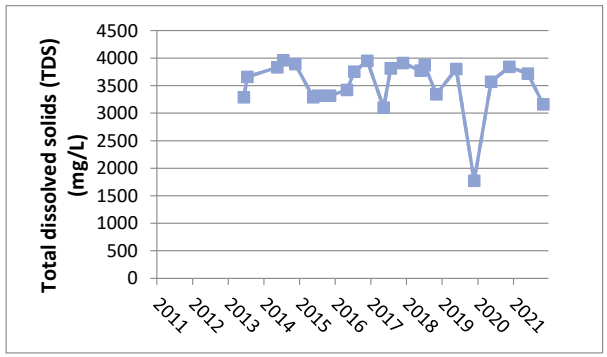






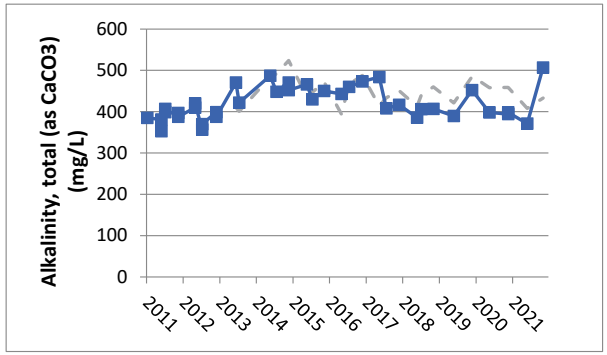


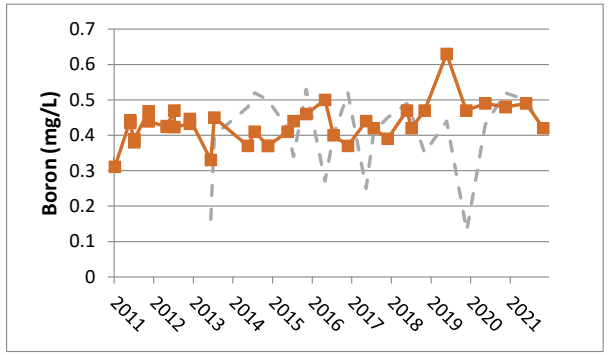


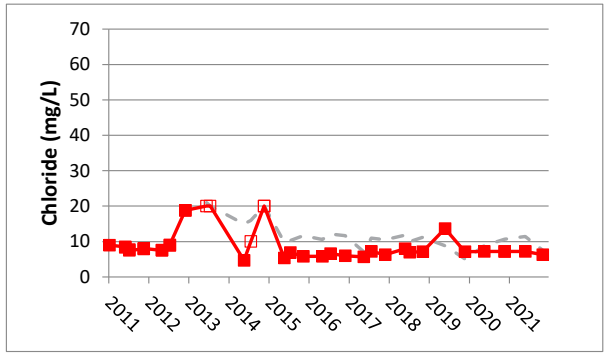


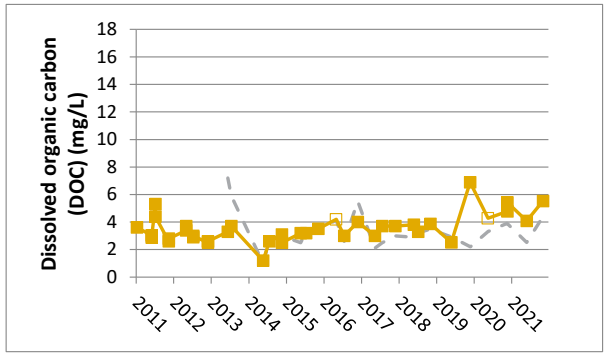
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

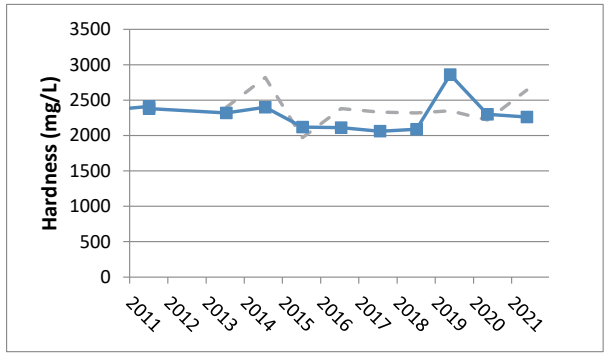
APPENDIX I-2.B - Figure 7
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - OW3A-13
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

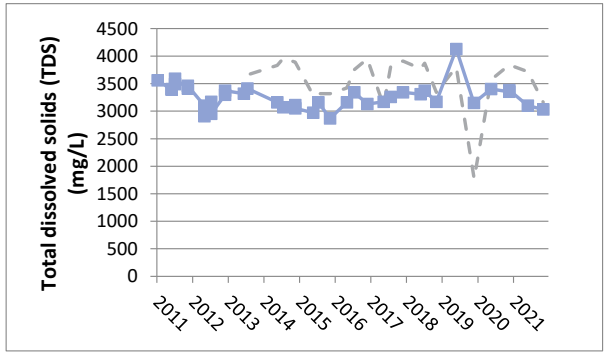






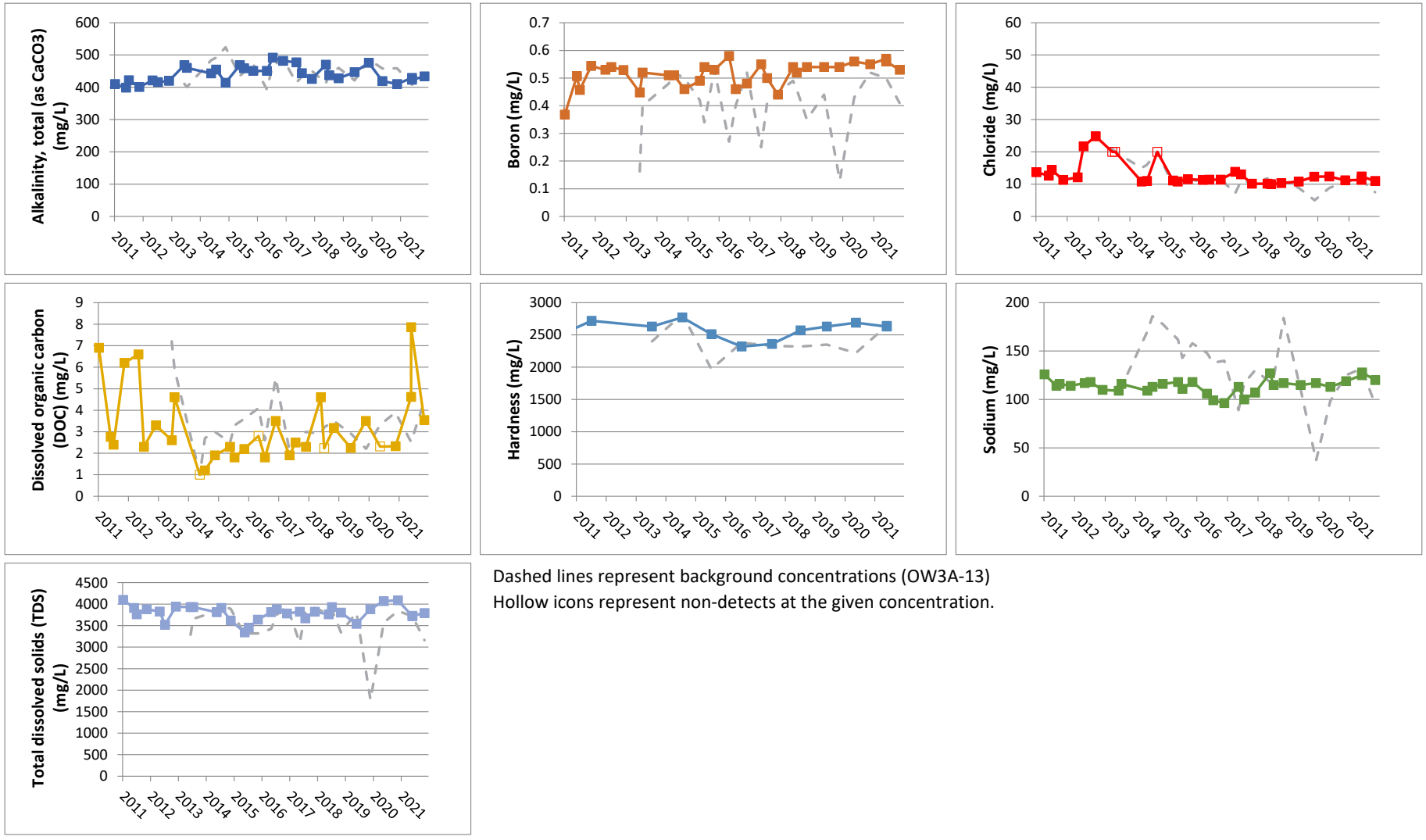






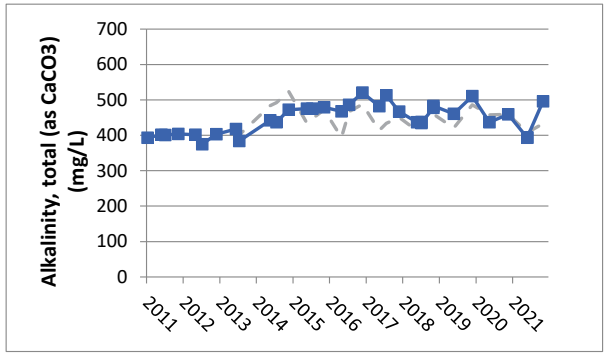
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

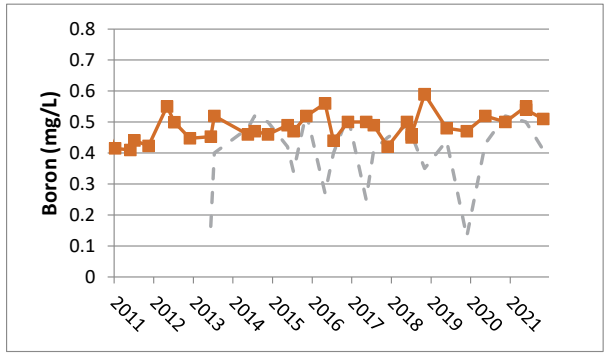
APPENDIX I-2.B - Figure 8
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - OW5A-06
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

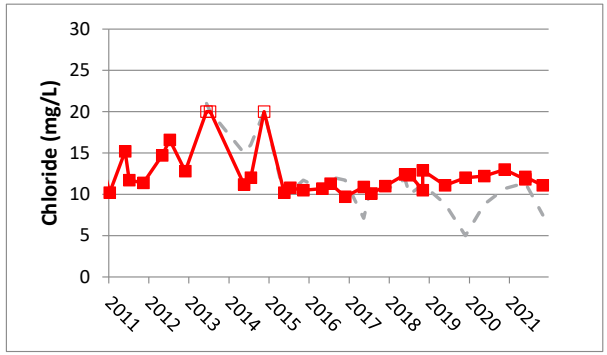


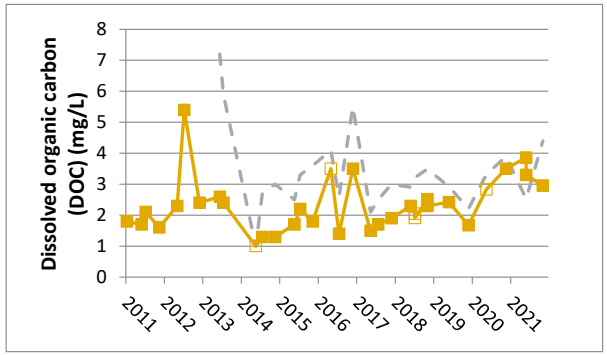
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

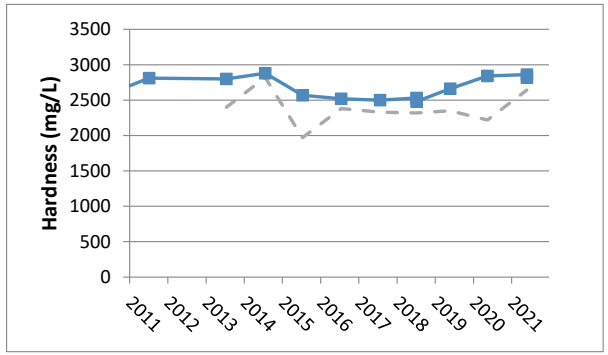
APPENDIX I-2.B - Figure 9
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - OW8A-06
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

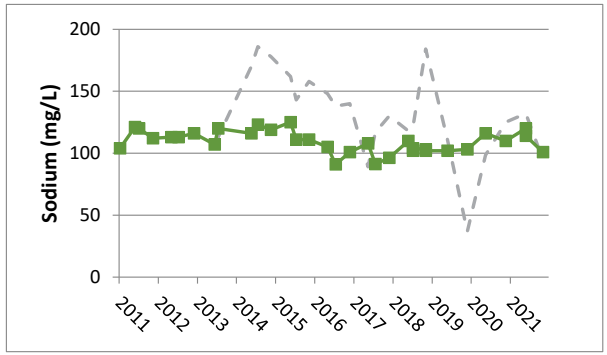


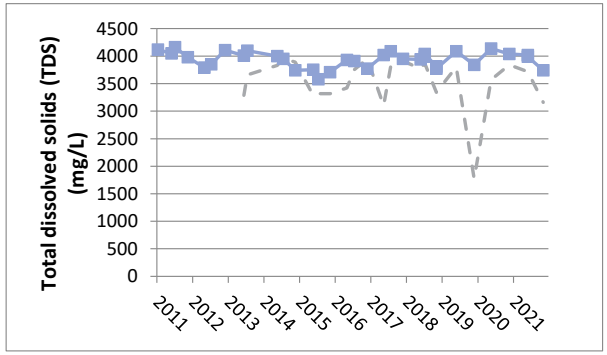






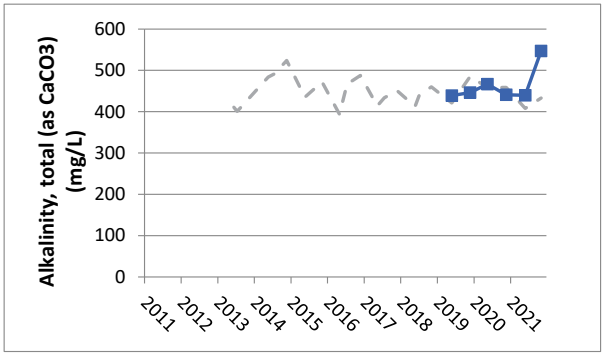


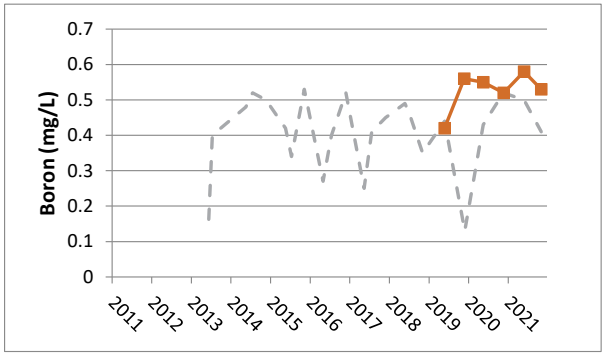


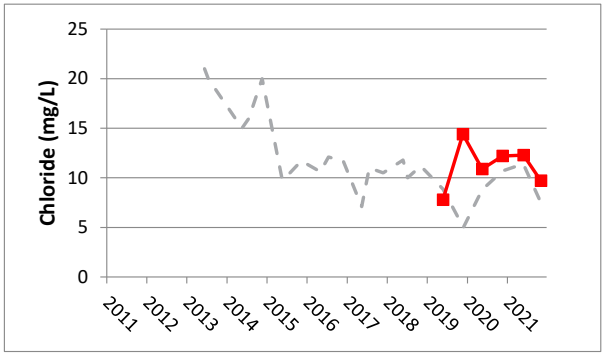


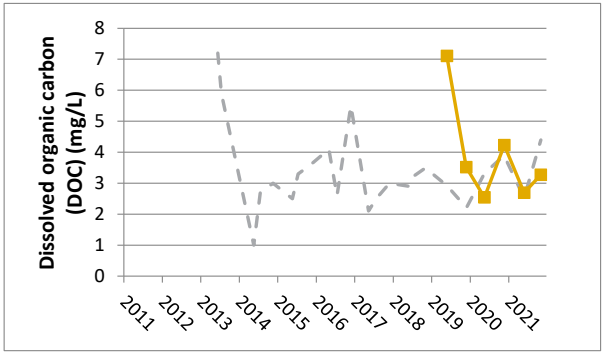
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

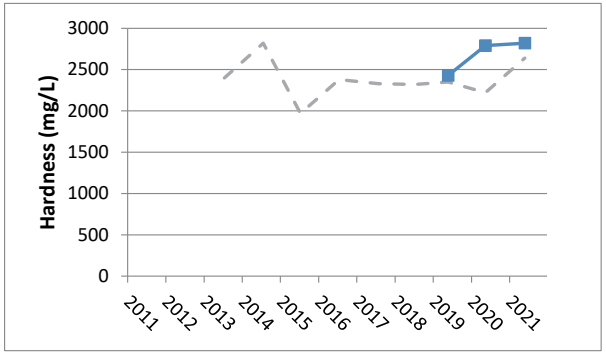
APPENDIX I-2.B - Figure 10
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - OW9A-06
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

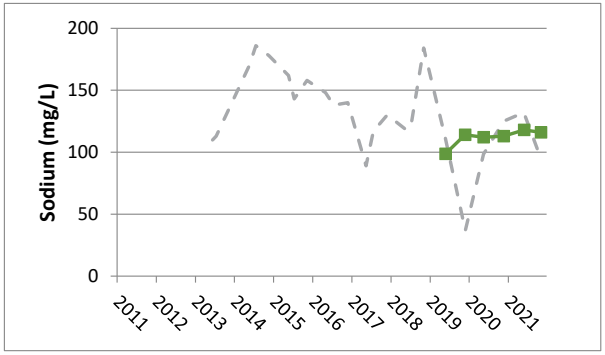


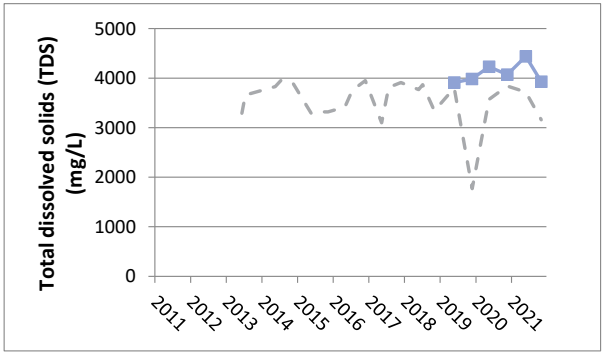






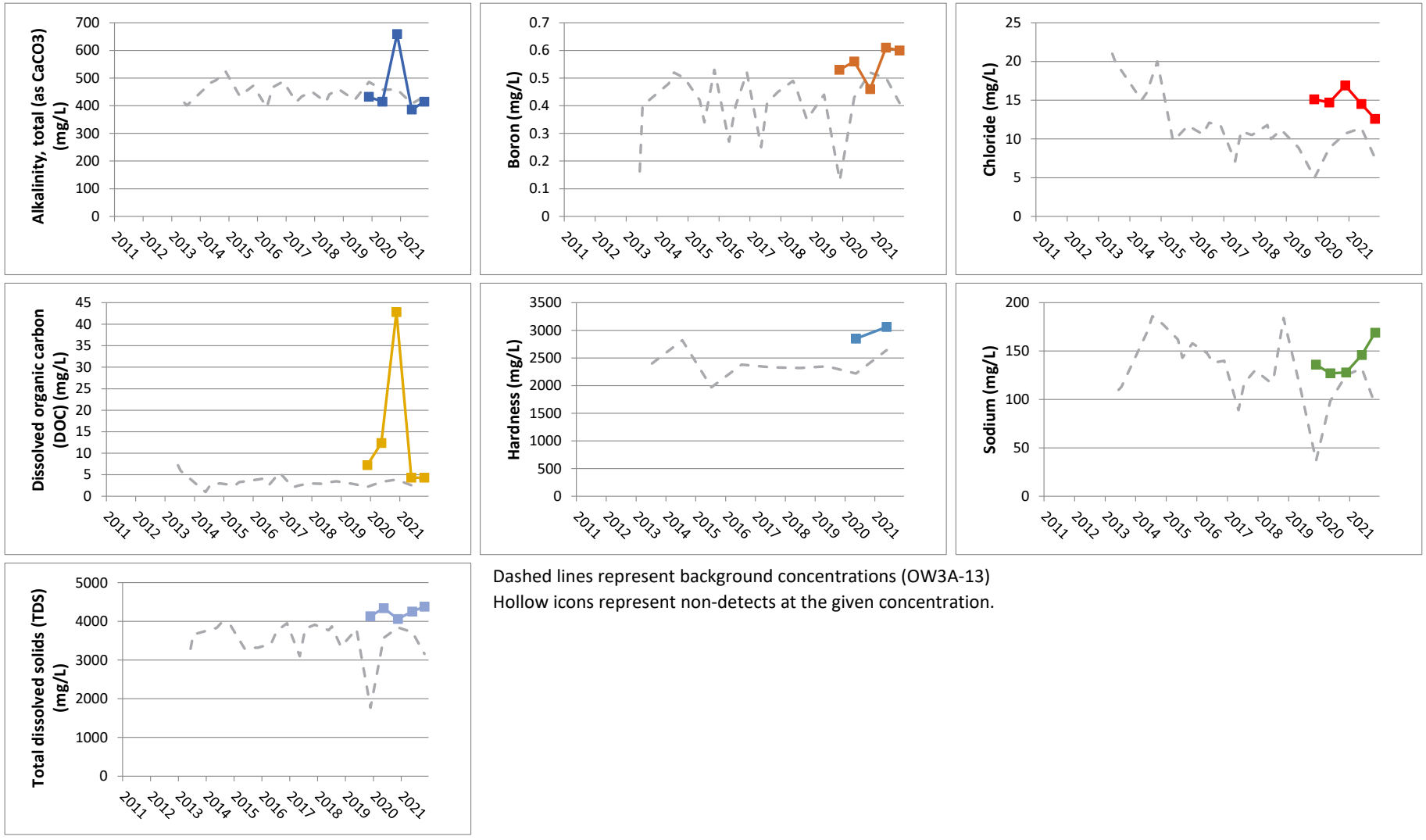






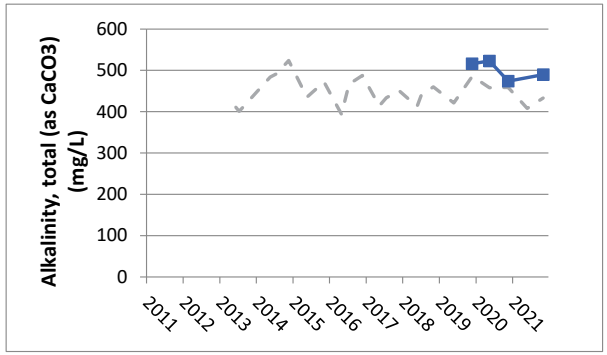
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

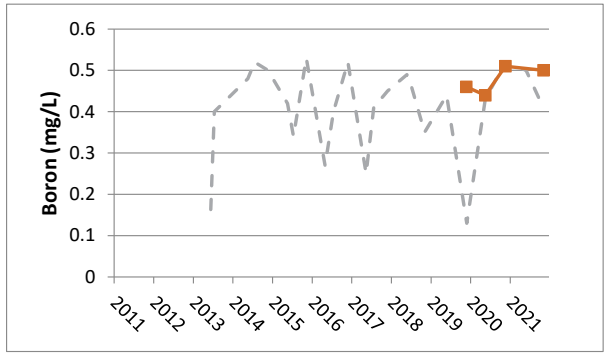
APPENDIX I-2.A - Figure 11
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW10A-18
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

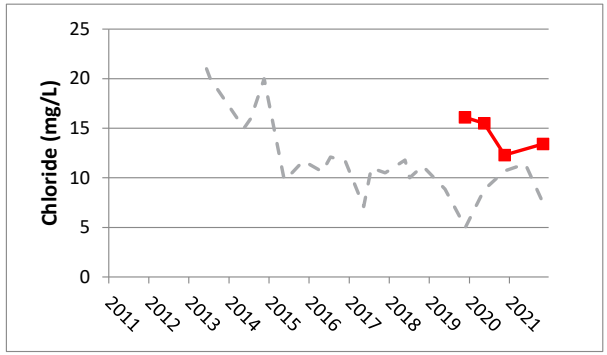


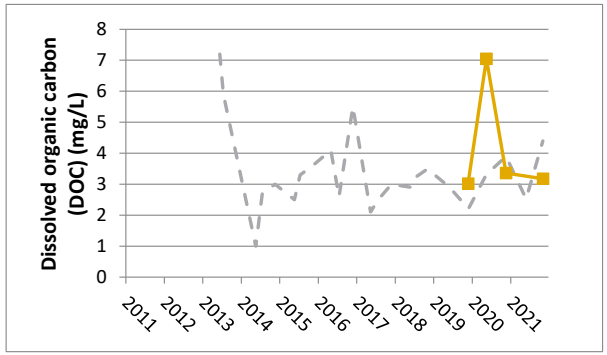
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

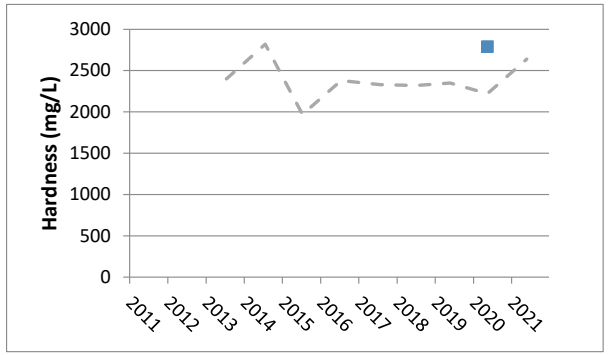
APPENDIX I-2.A - Figure 12
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW11A-19
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

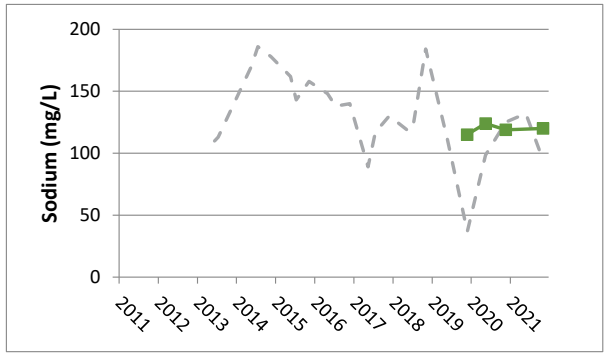


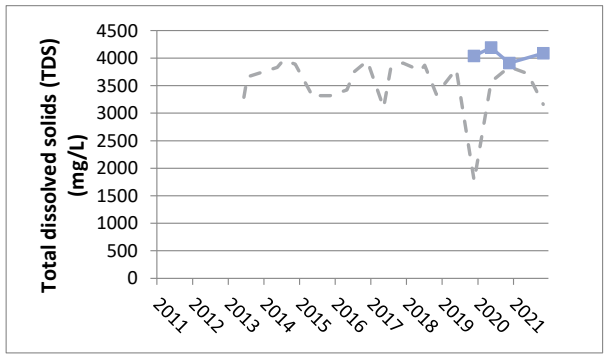






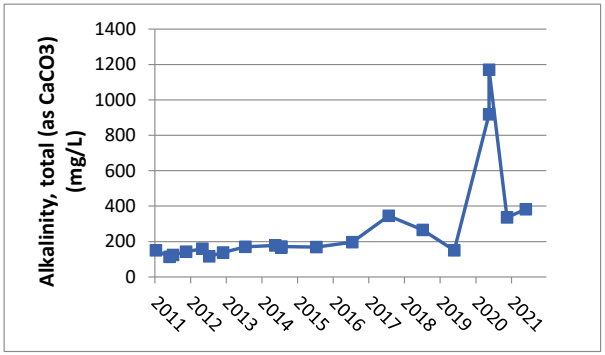


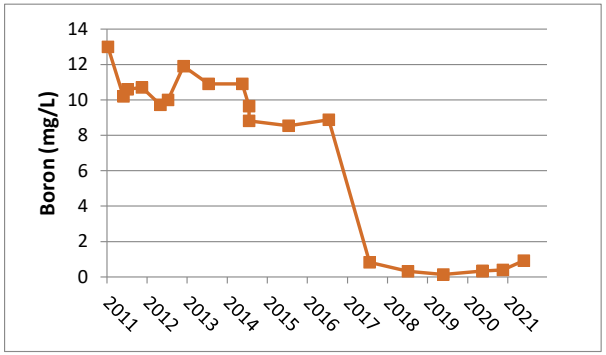


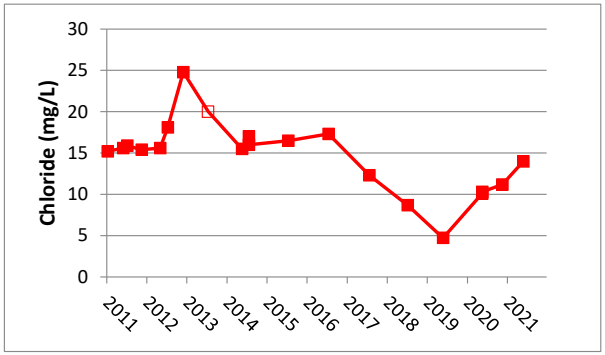


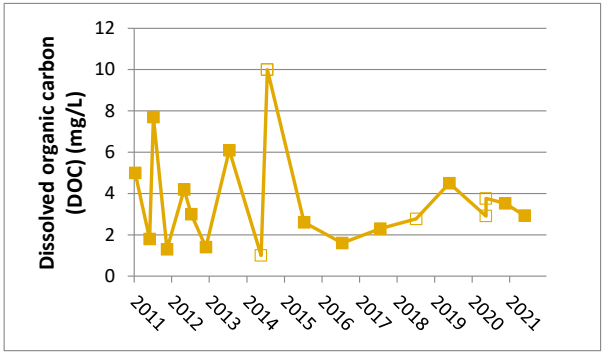
Dashed lines represent background concentrations (OW3A-13)
Hollow icons represent non-detects at the given concentration.

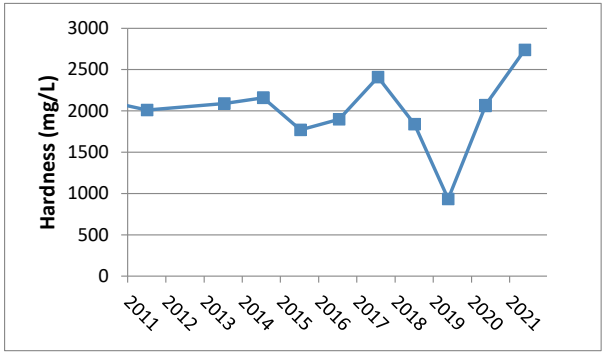
APPENDIX I-2.A - Figure 13
BASAL OVERBURDEN/SHALLOW BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW12A-19
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

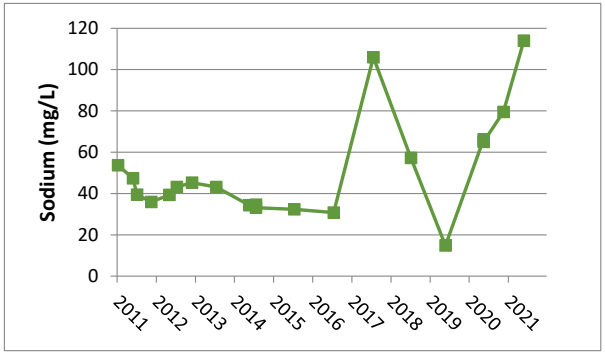


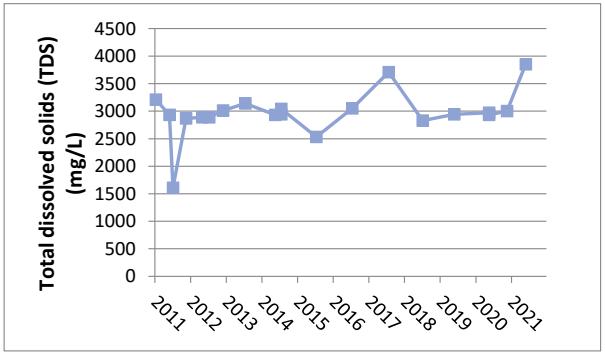






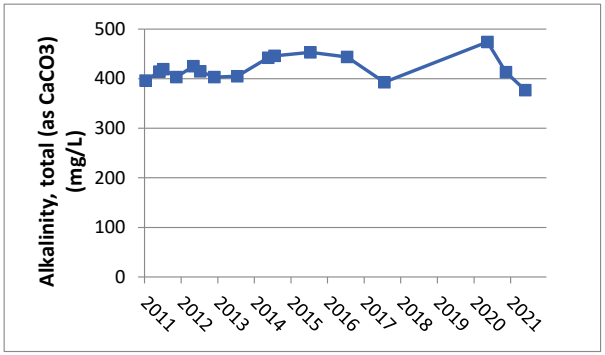


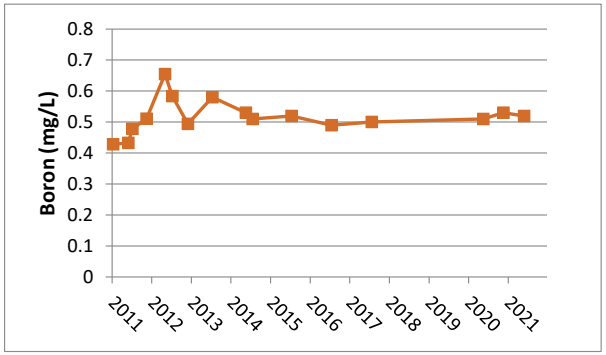


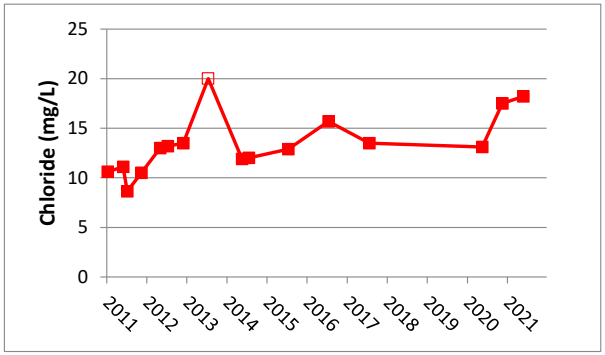


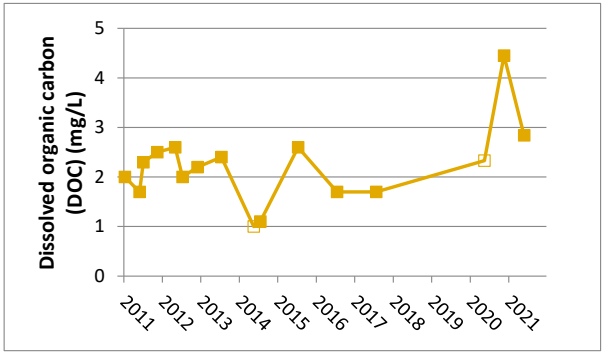
Hollow icons represent non-detects at the given concentration.

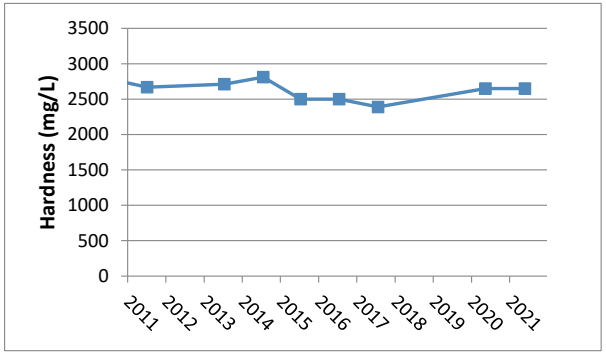
APPENDIX I-2.C - Figure 1
BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW1D-07
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

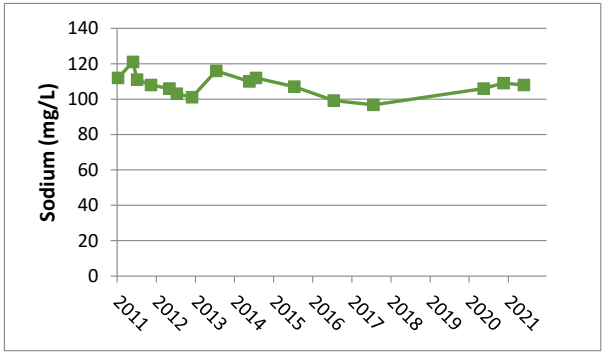


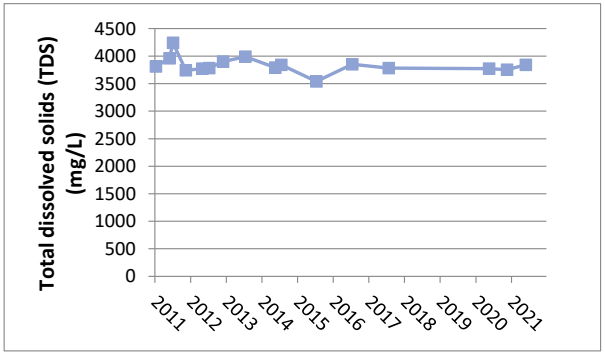






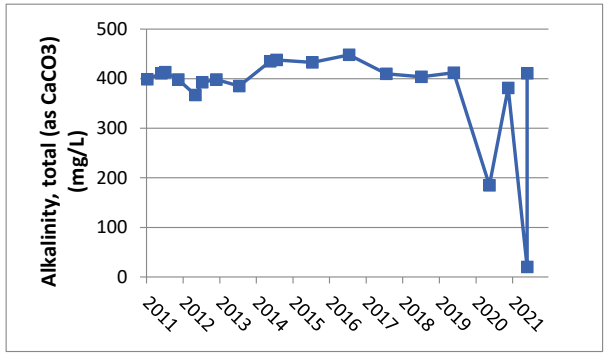


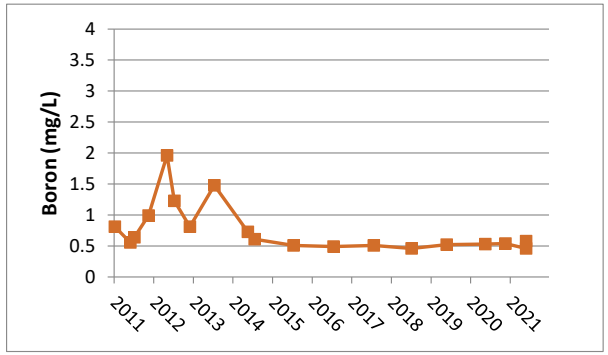


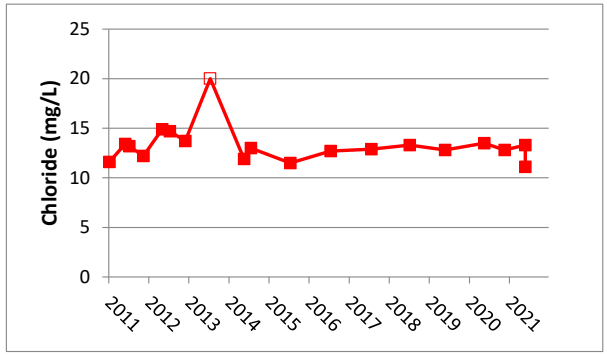


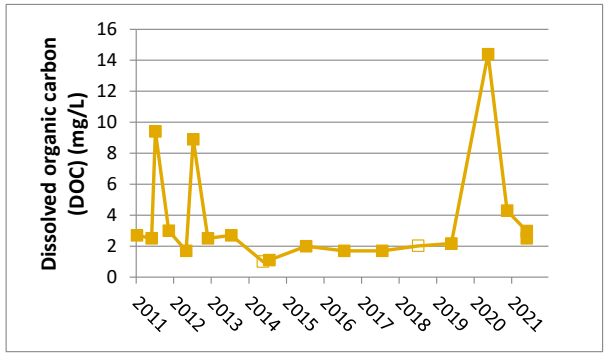
Hollow icons represent non-detects at the given concentration.

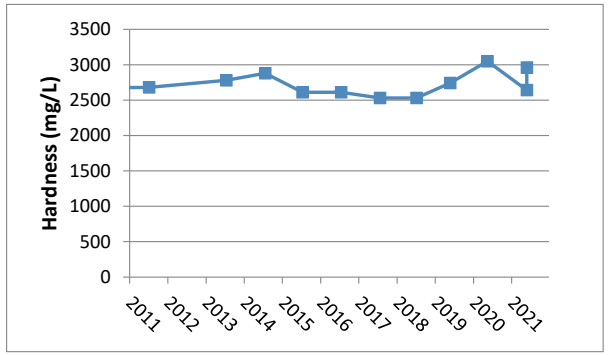
APPENDIX I-2.C - Figure 2
BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW1S-07
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

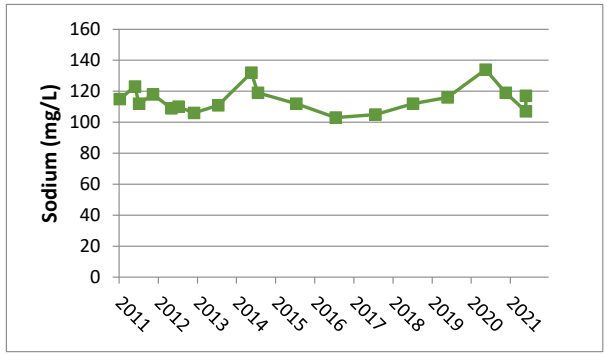


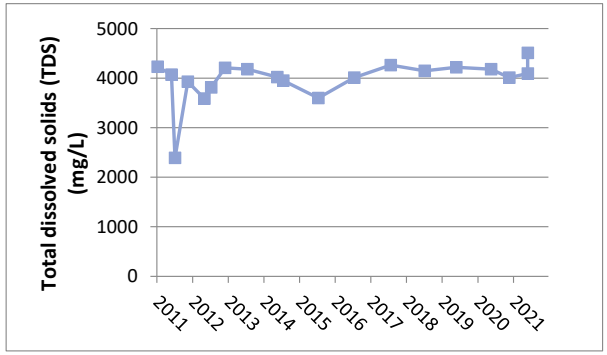






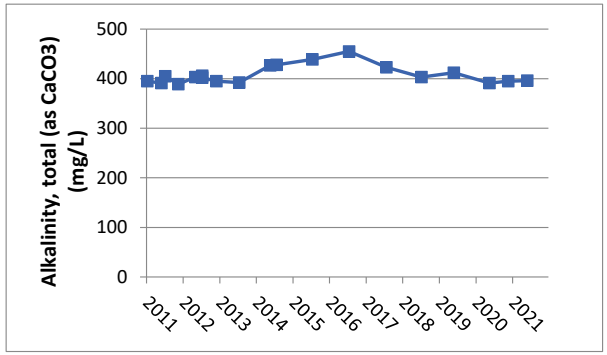


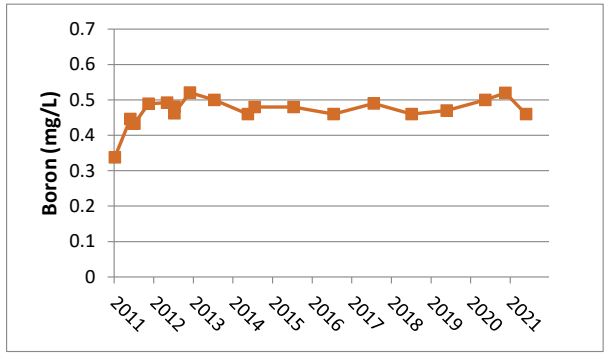


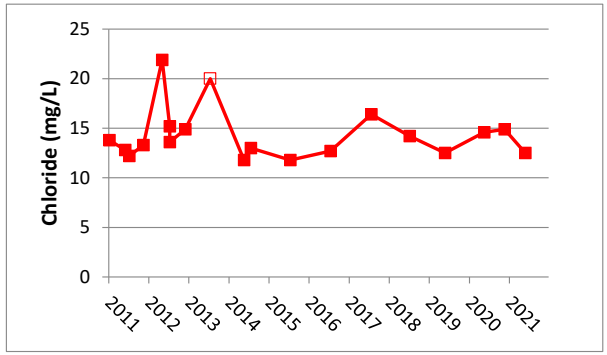


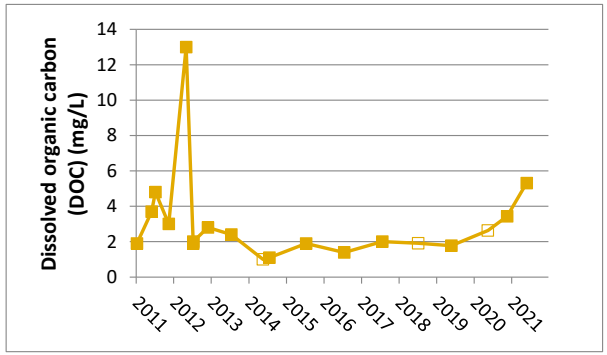
Hollow icons represent non-detects at the given concentration.

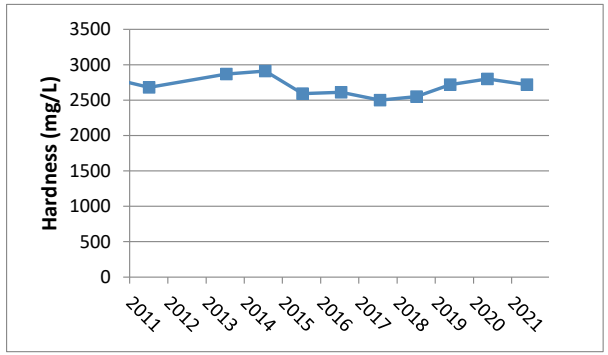
APPENDIX I-2.C - Figure 3
BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW2D-07
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

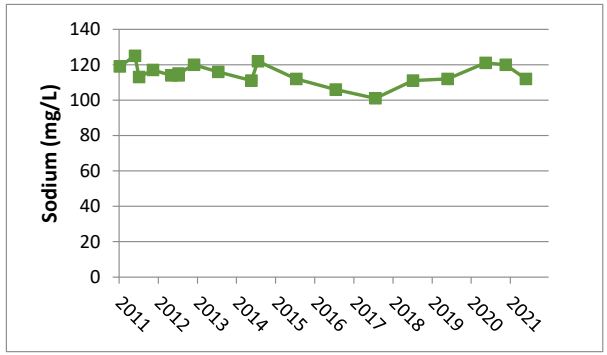


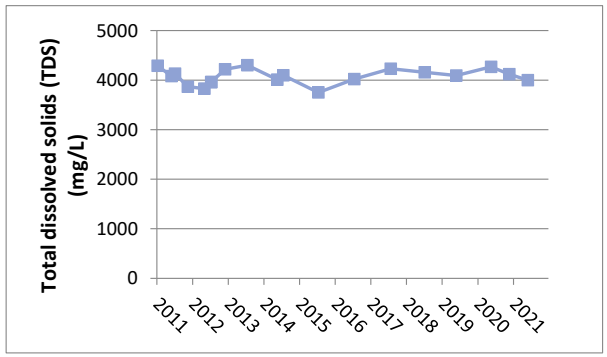






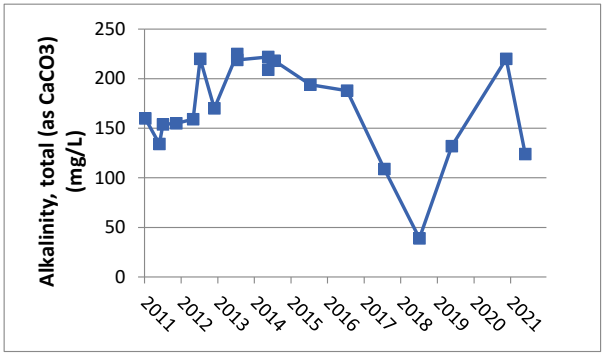


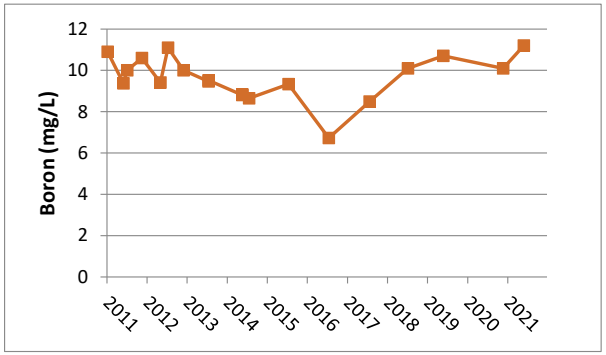


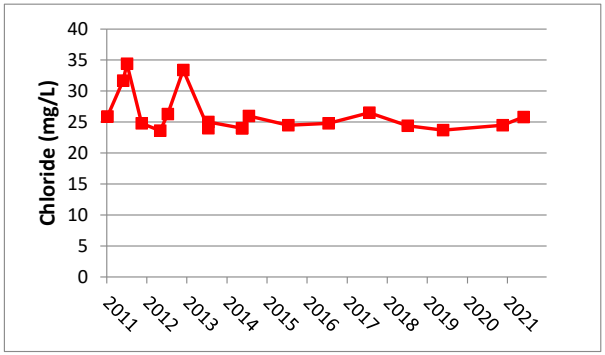


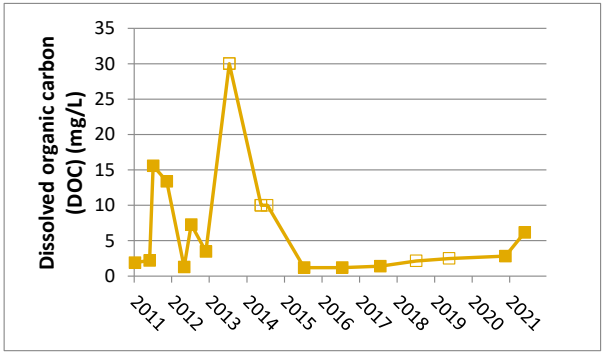
Hollow icons represent non-detects at the given concentration.

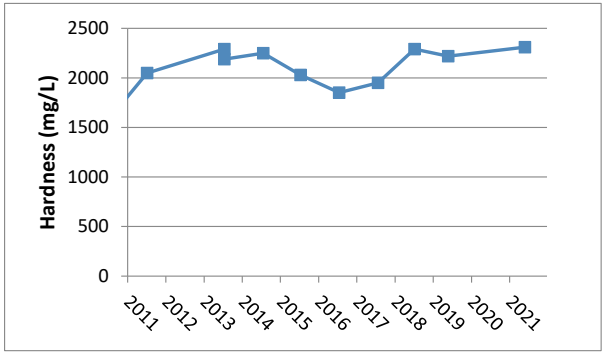
APPENDIX I-2.C - Figure 4
BEDROCK - CONCENTRATION VERSUS TIME PLOTS - MW2S-07
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

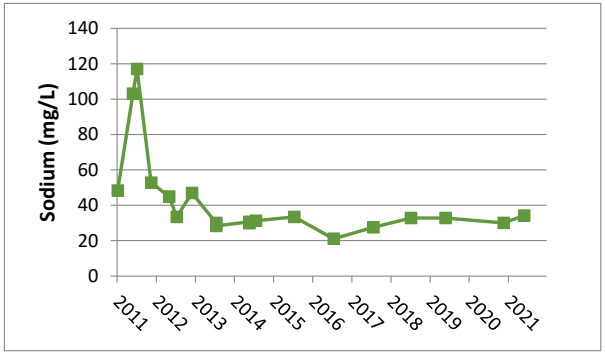


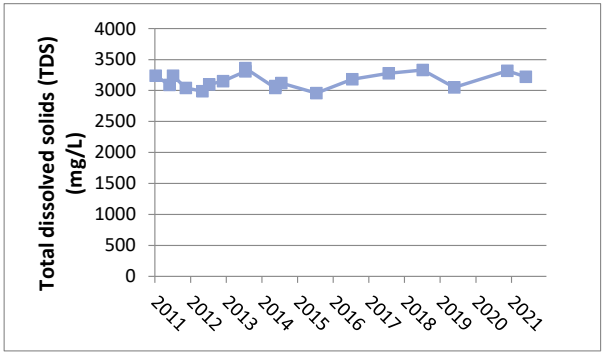






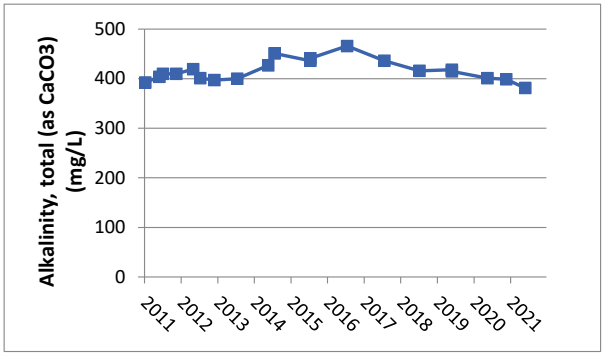


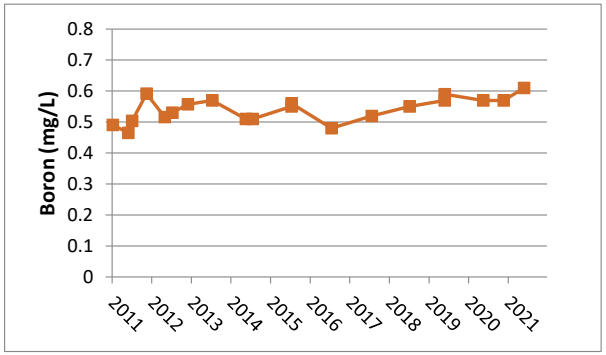


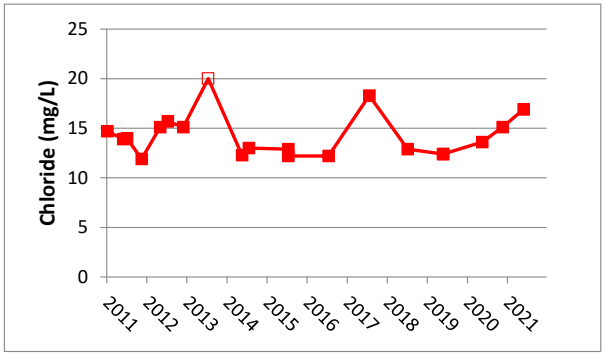


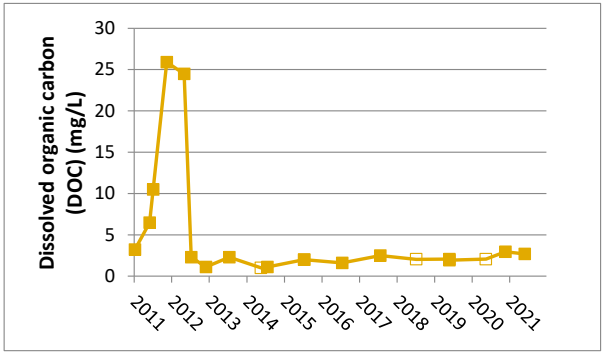
Hollow icons represent non-detects at the given concentration.

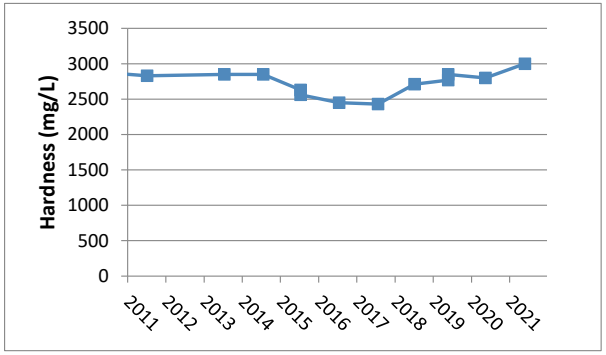
APPENDIX I-2.C - Figure 5
BEDROCK - CONCENTRATION VERSUS TIME PLOTS - OW8D-07
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

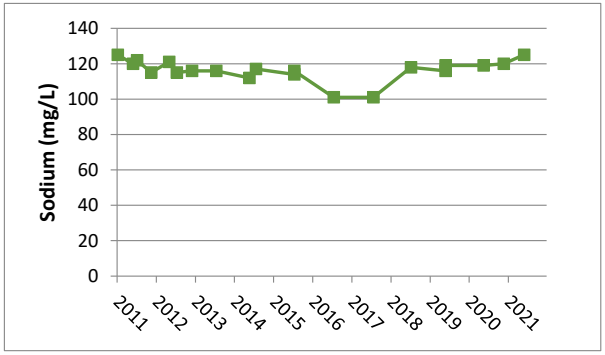


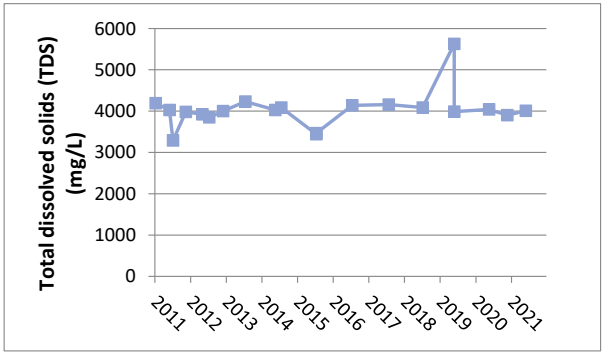






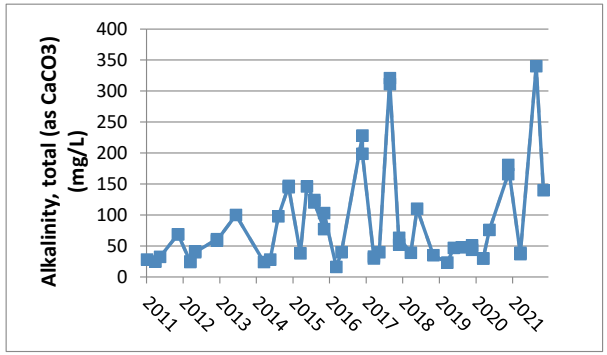


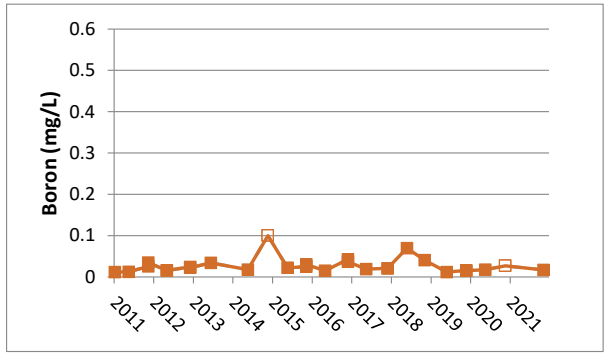


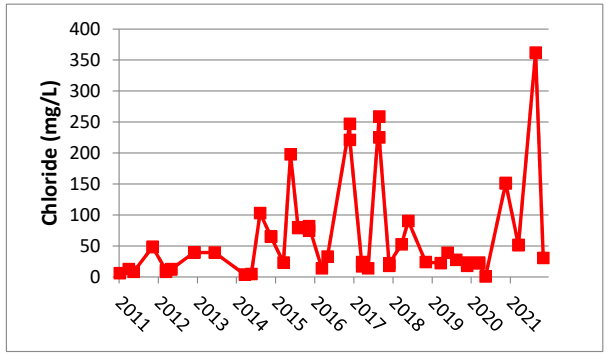


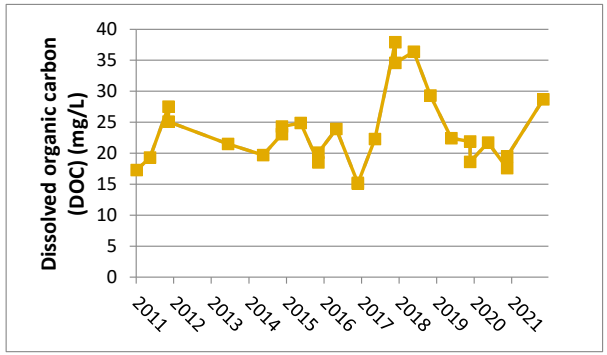
Hollow icons represent non-detects at the given concentration.

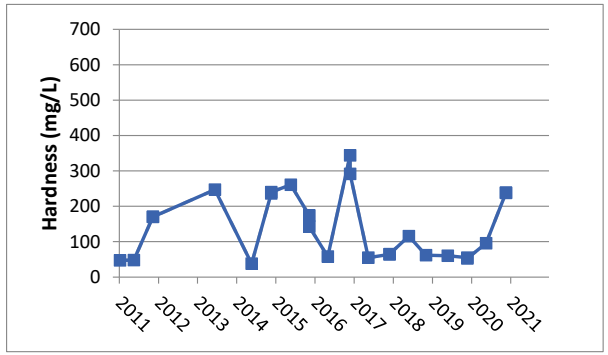
APPENDIX I-2.C - Figure 6
BEDROCK - CONCENTRATION VERSUS TIME PLOTS - OW8S-07
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

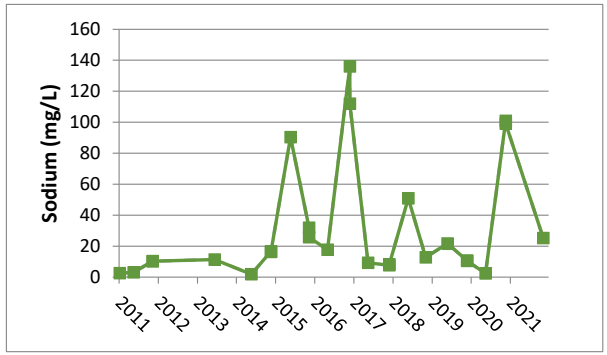


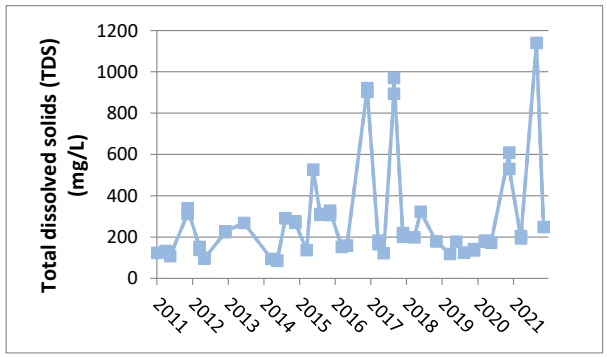






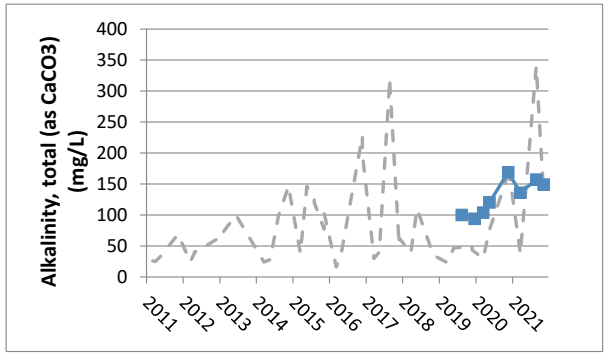


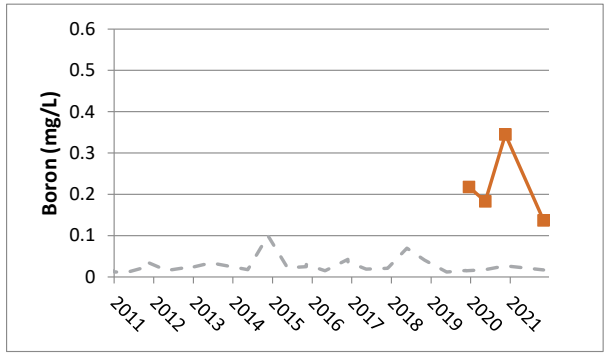


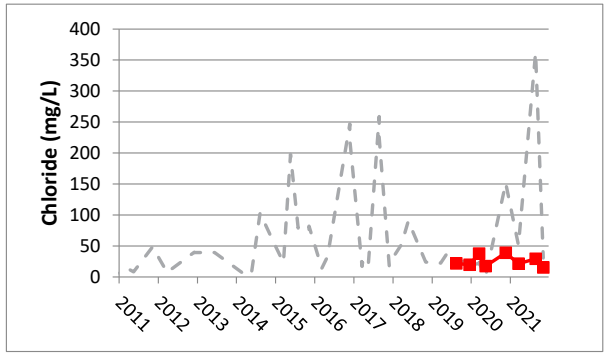


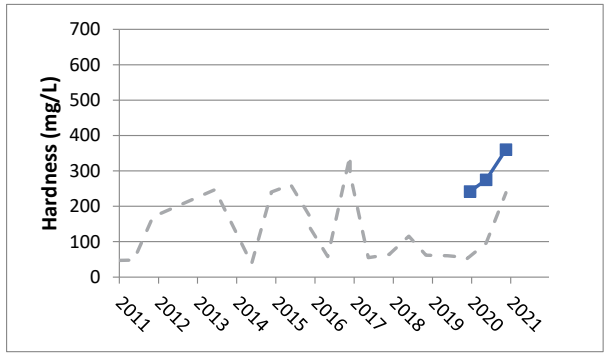
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

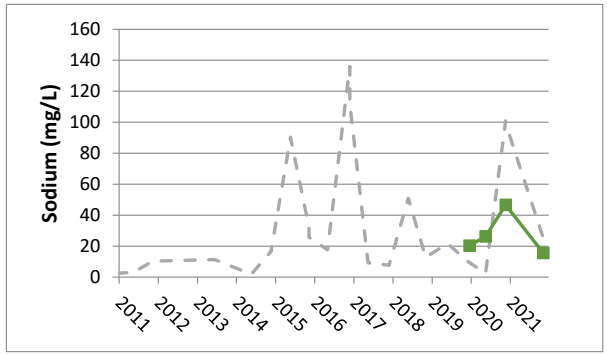
APPENDIX I-2.D - Figure 1
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW1
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

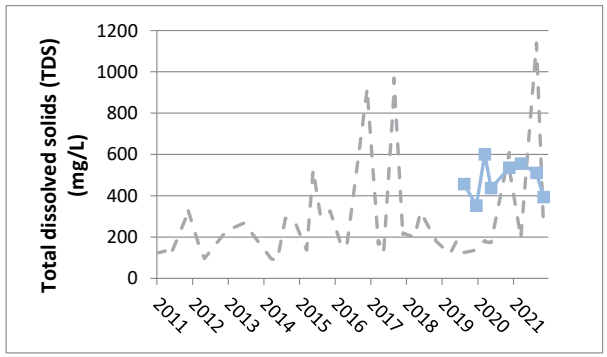






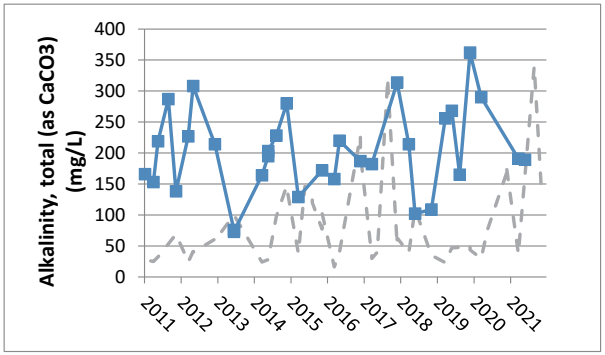


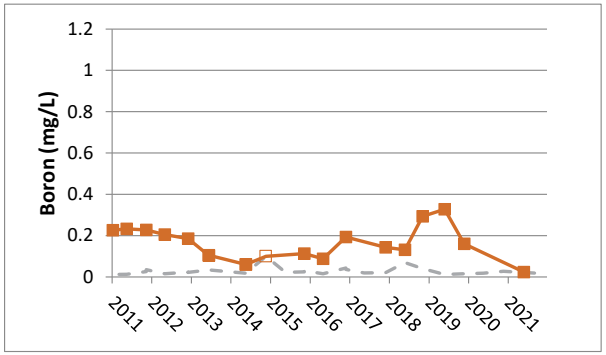


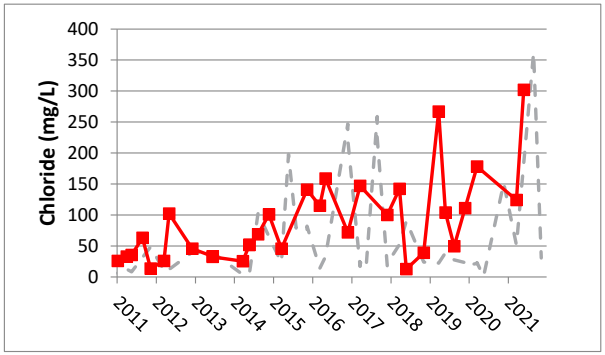


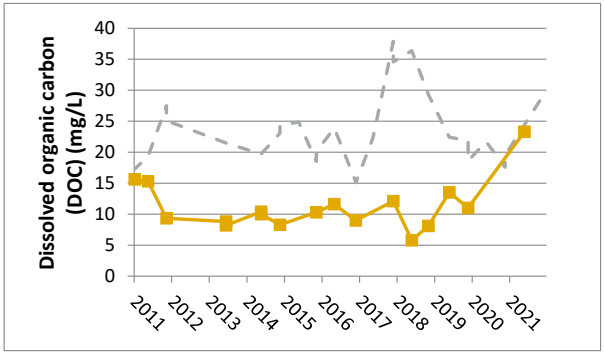
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

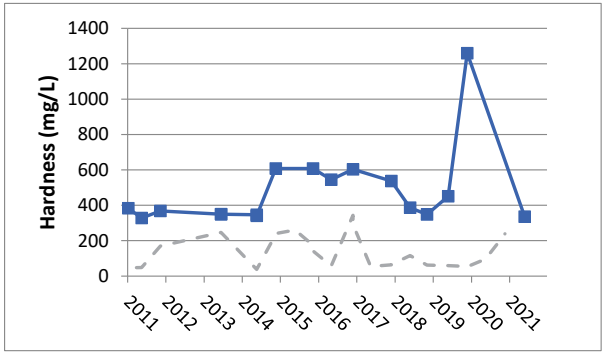
APPENDIX I-2.D - Figure 2
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW2
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

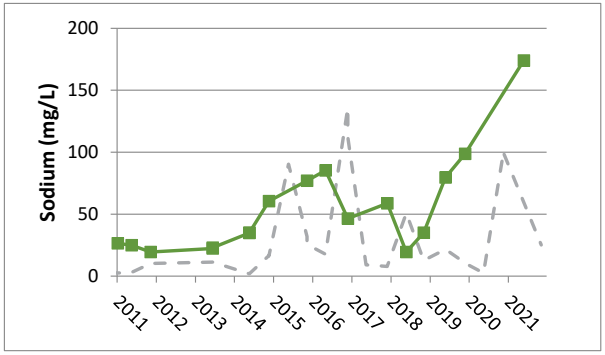


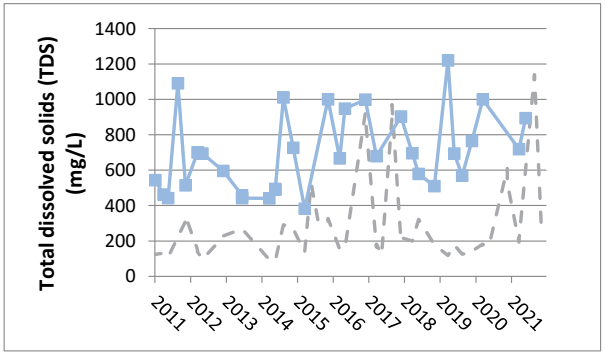






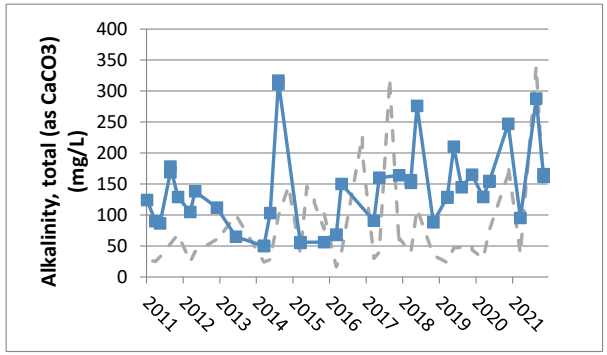


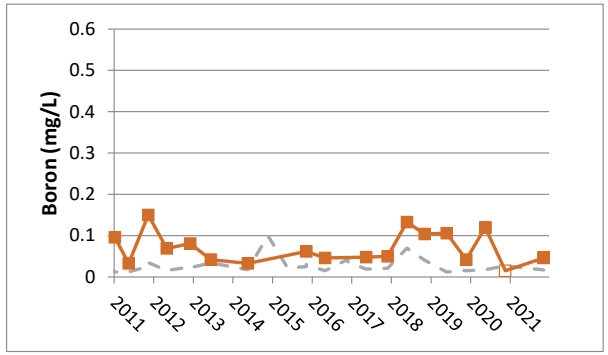


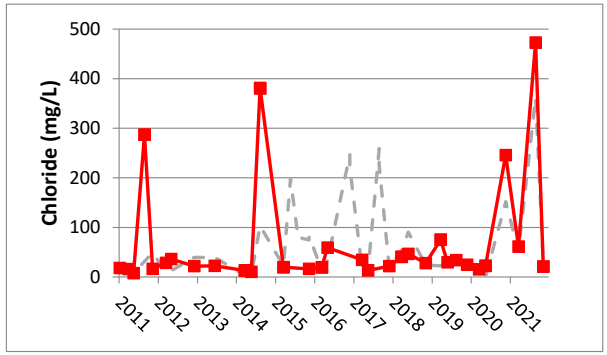


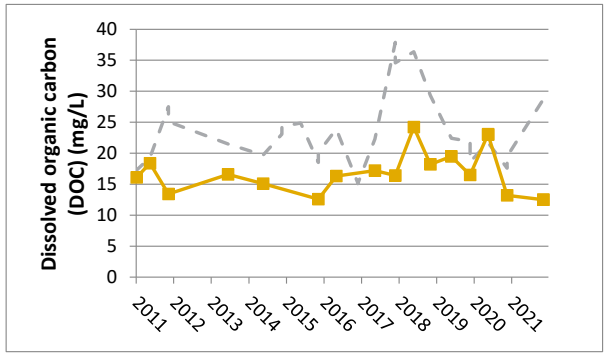
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

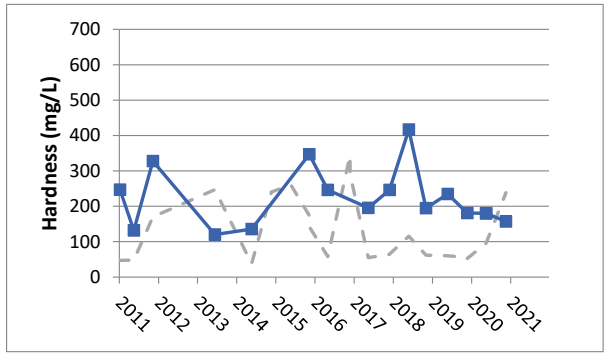
APPENDIX I-2.D - Figure 3
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW3
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

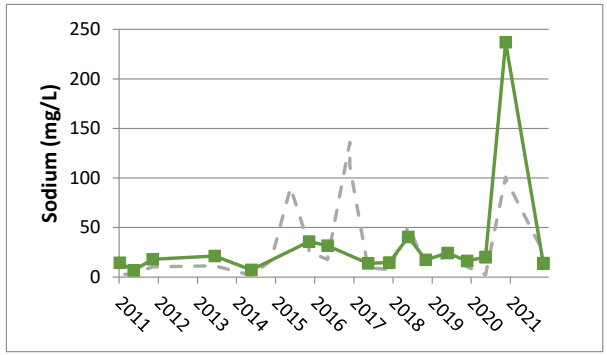


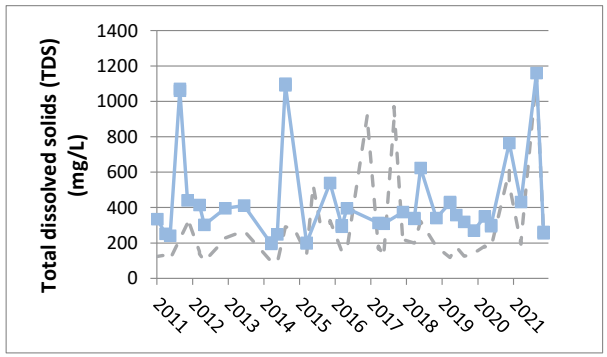






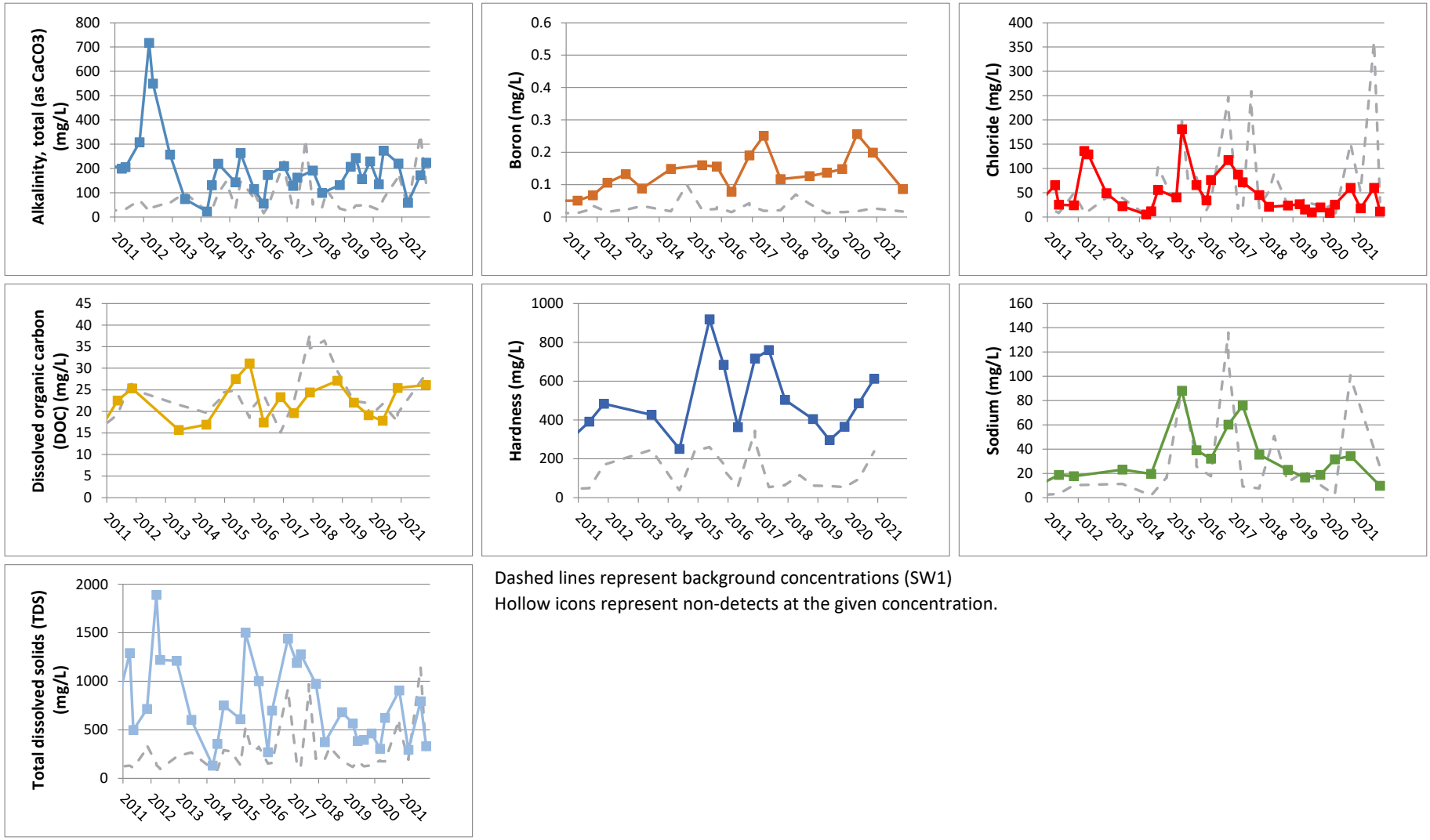






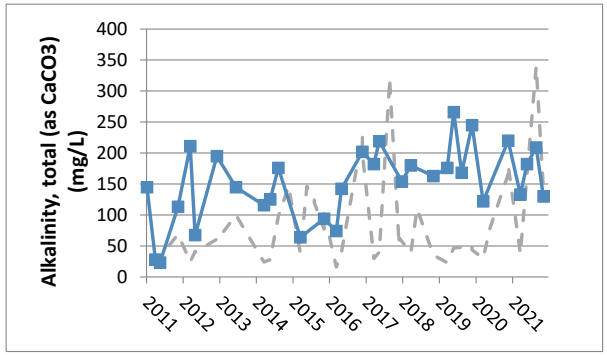
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

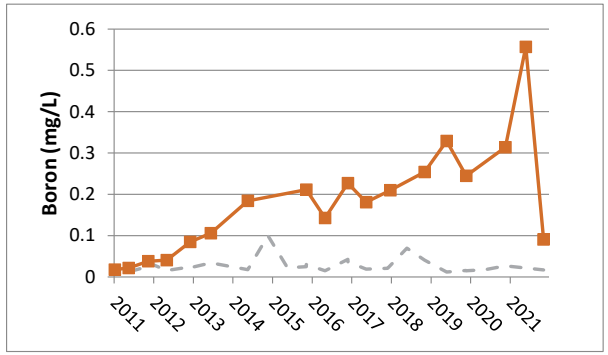
APPENDIX I-2.D - Figure 4
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW4
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

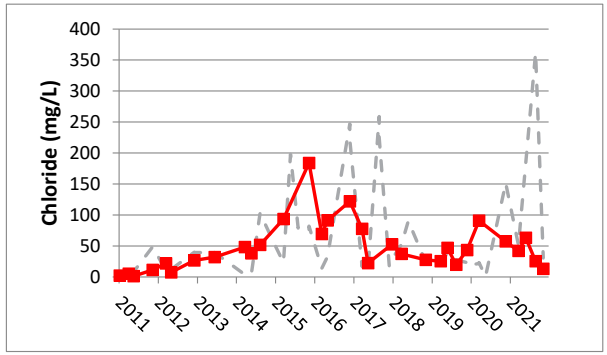


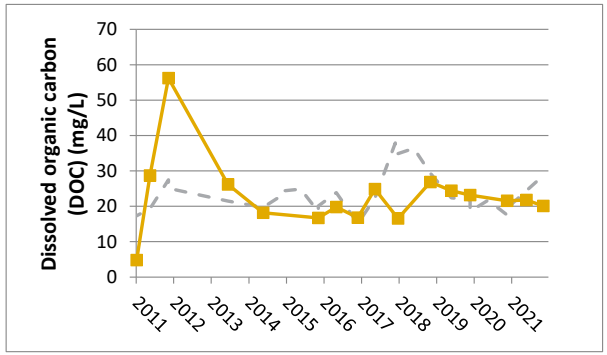
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

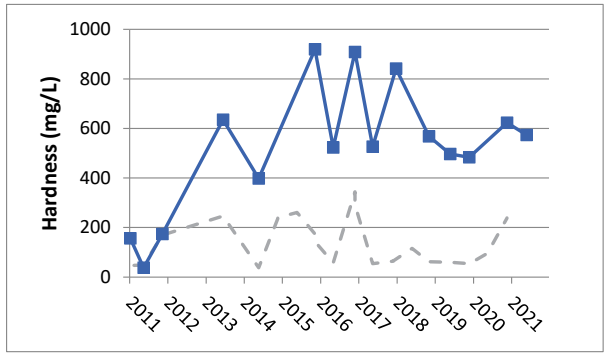
APPENDIX I-2.D - Figure 5
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW5
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

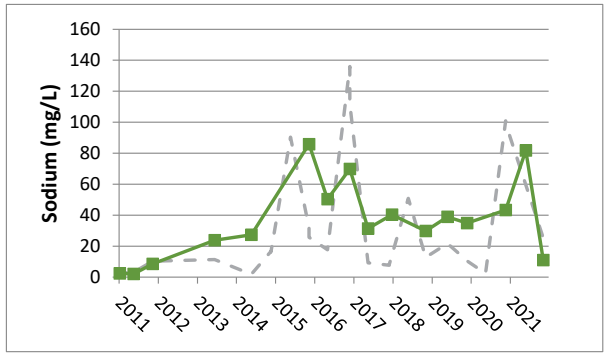


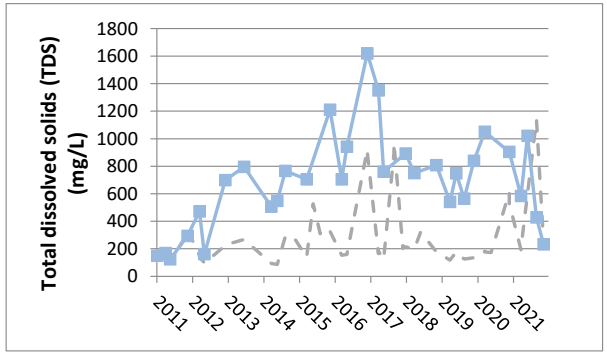






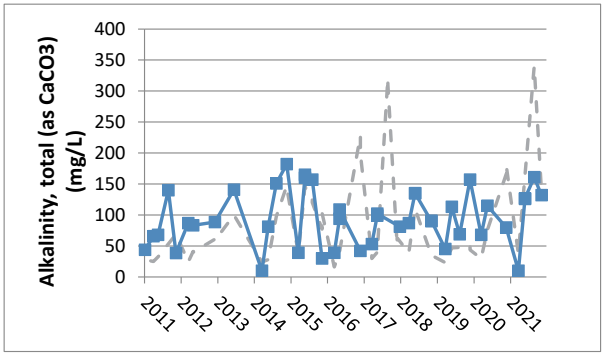


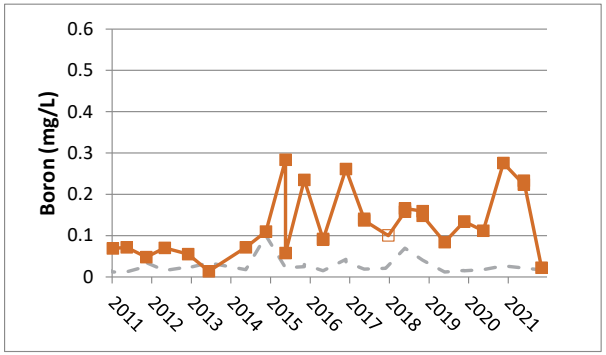


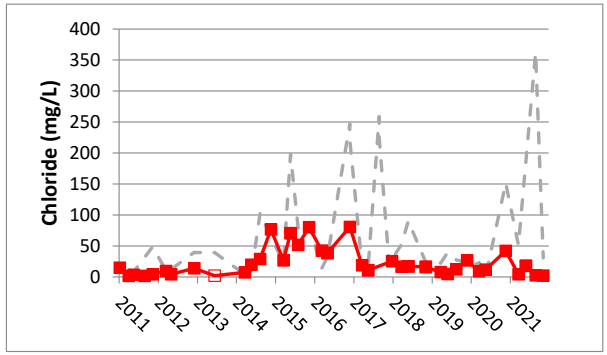


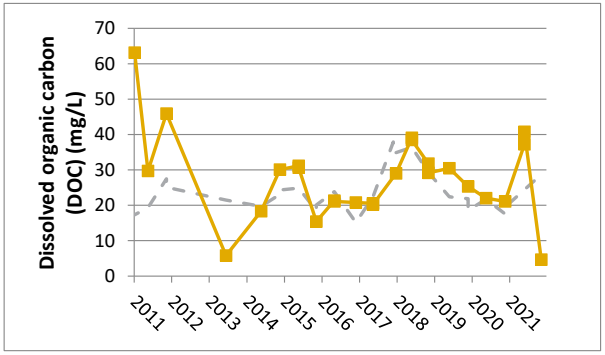
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

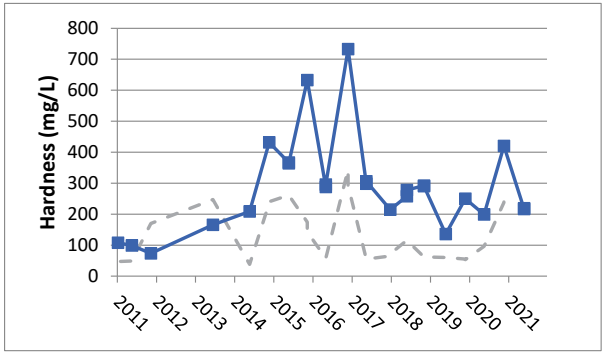
APPENDIX I-2.D - Figure 6
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW6
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

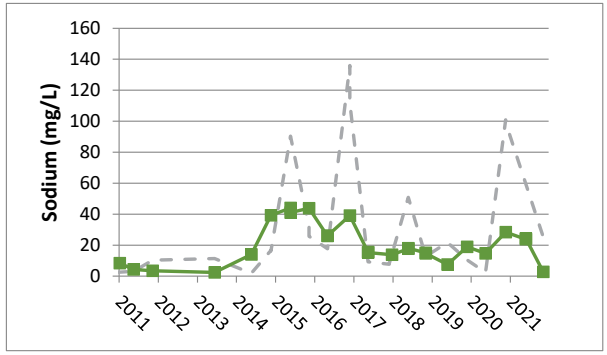


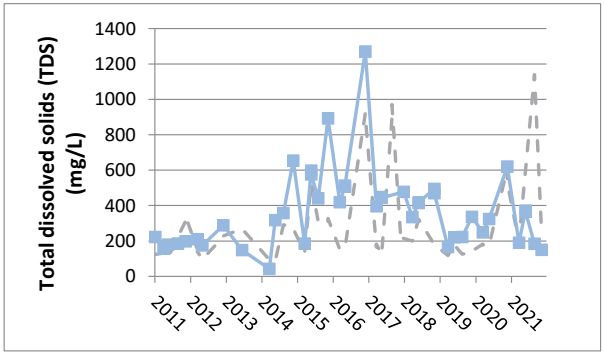






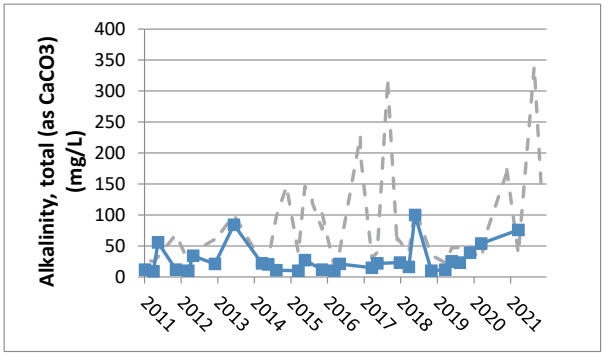


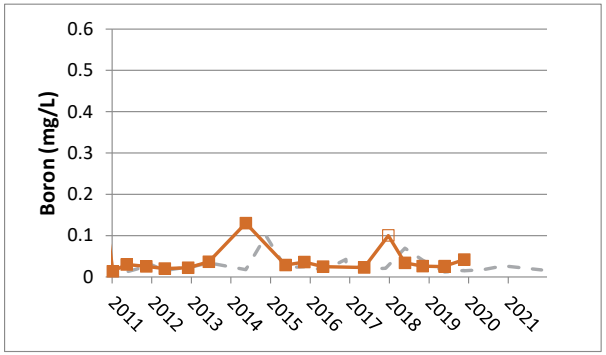


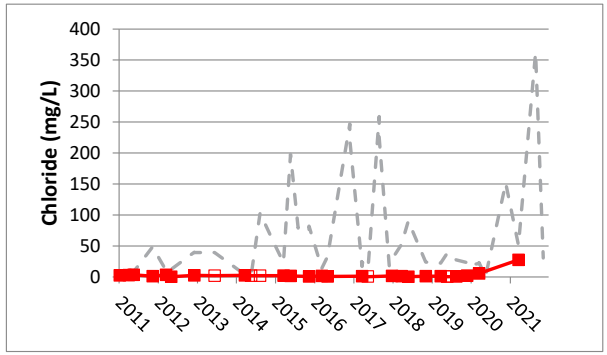


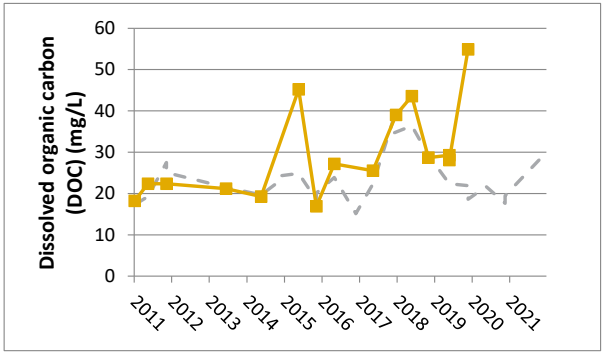
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

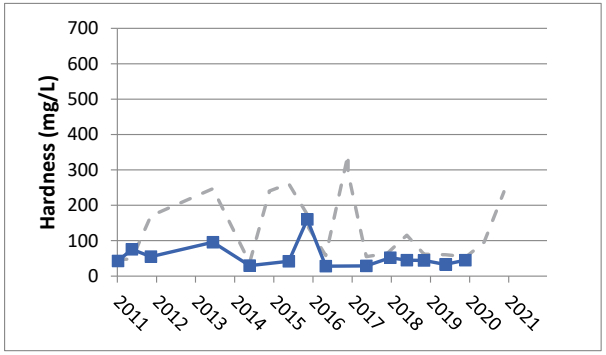
APPENDIX I-2.D - Figure 7
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW7
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

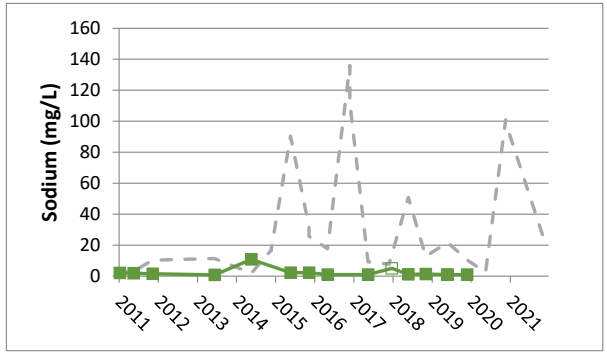


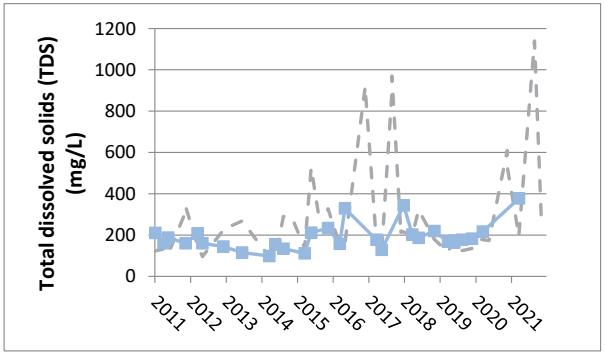






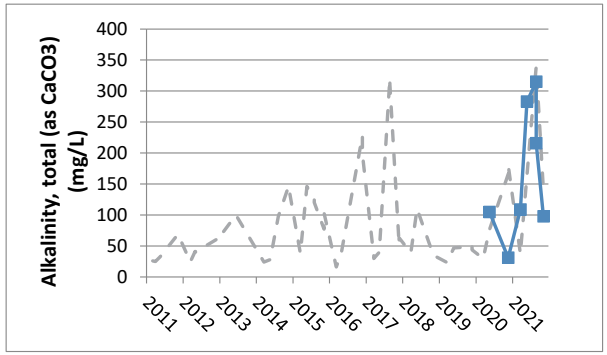


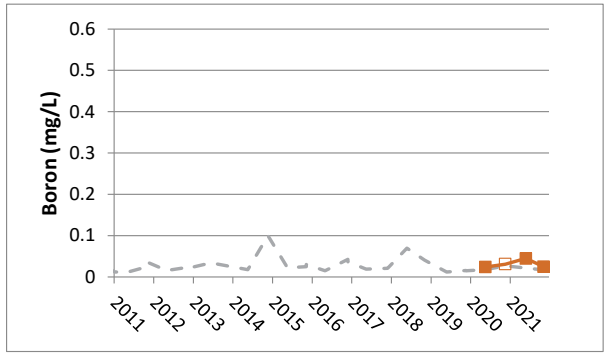


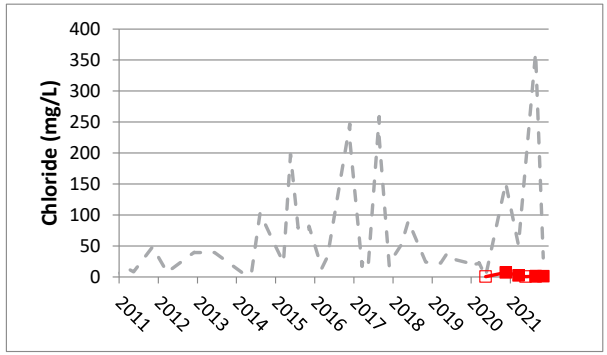


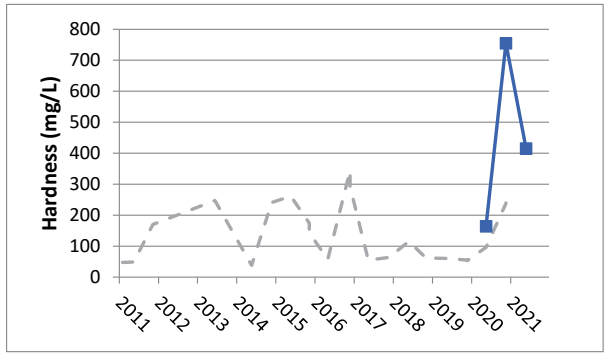
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

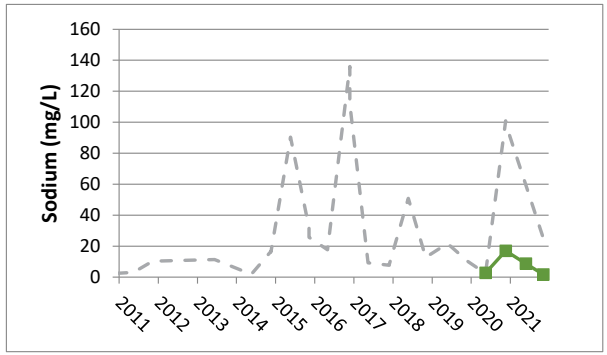
APPENDIX I-2.D - Figure 8
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW8
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

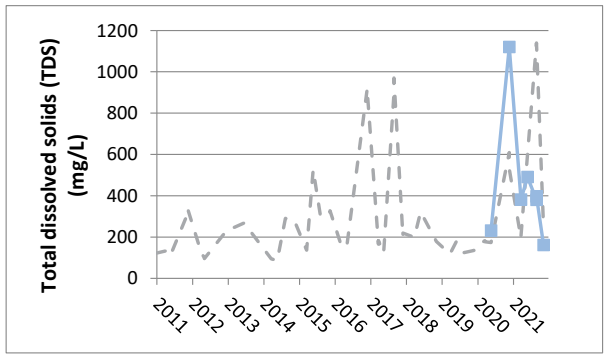






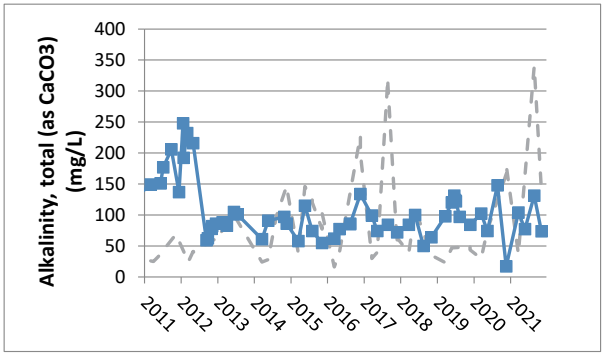


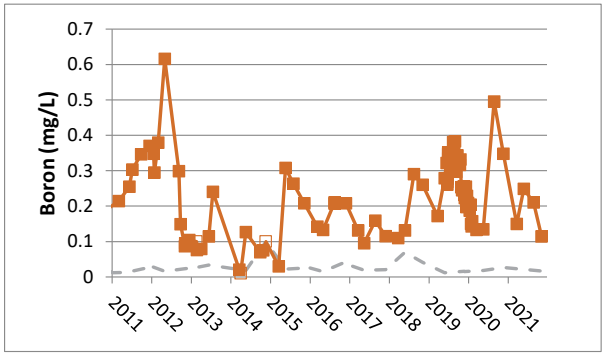


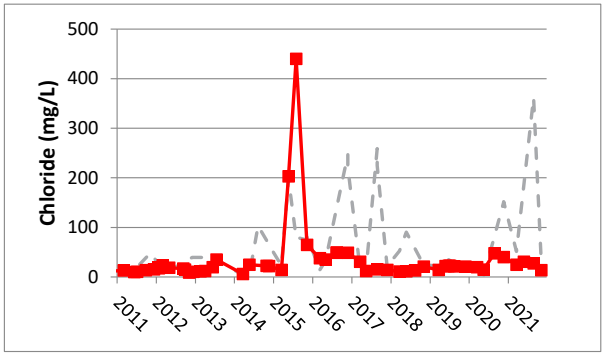


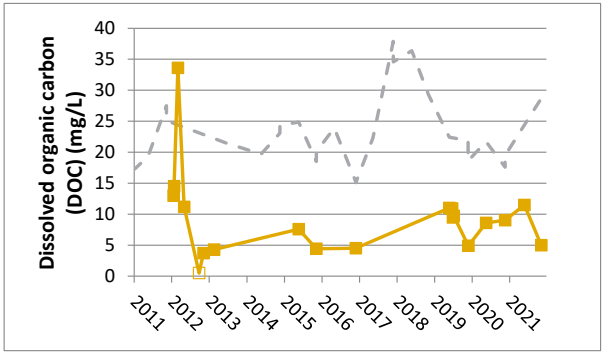
Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

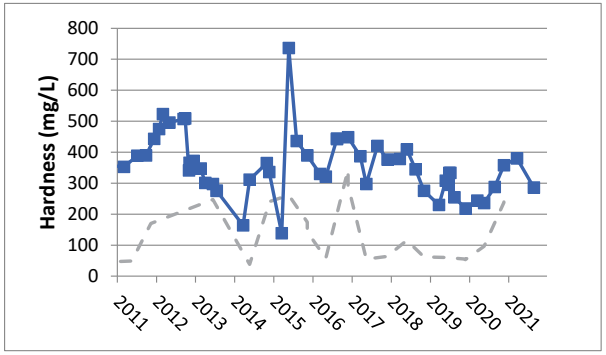
APPENDIX I-2.D - Figure 9
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SW9
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

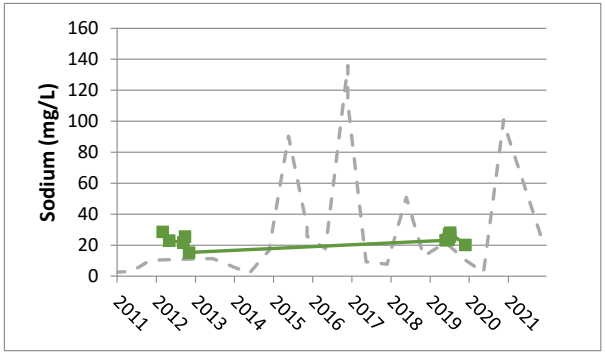


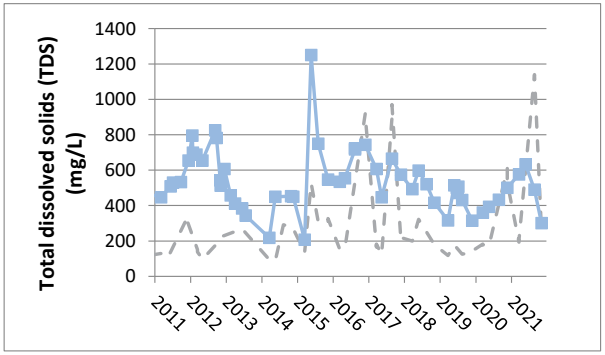












Dashed lines represent background concentrations (SW1)
Hollow icons represent non-detects at the given concentration.

APPENDIX I-2.D - Figure 10
SURFACE WATER - CONCENTRATION VERSUS TIME PLOTS - SWMS-POND
2021 OPERATIONS AND MONITORING REPORT - BROOKS ROAD LANDFILL
HALDIMAND COUNTRY, ONTARIO

Appendix H

2021 Annual Report, prepared by CWI (ECA No.1122-BKUPSM)

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2270386 Ontario Limited

BROOKS ROAD LANDFILL SITE LEACHATE TREATMENT WORKS

2021 ANNUAL REPORT

January 1 to December 31, 2021

Environmental Compliance Approval Number 1122-BKUPSM

Date:

March 23, 2022

Prepared by:

Clearford Waterworks
212-704 Mara Street,
Point Edward, ON,
Canada N7V 1X4

Tel: 519 542 7900
or 1 800 704 4188
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TABLE OF CONTENTS

APPENDICES

1.0 OVERVIEW

The Brooks Road leachate treatment works provide wastewater treatment for the Brooks Road Landfill Site in Cayuga, Haldimand County, Ontario. The Works consist of a leachate collection sump, one (1) primary settling tank, an aeration system, a membrane bioreactor (MBR) treatment system, two (2) ultraviolet disinfection units, an effluent transfer tank, three (3) effluent discharge holding tanks, one (1) sludge storage tank, and a chemical addition system, all described in detail in amended Environmental Compliance Approval (ECA) Number 1122-BKUPSM issued February 3, 2021 (previously ECA No. 4142-ASEKJ2).

This report presents a summary of the annual monitoring results for the leachate treatment system (facility) only from January to December 2021. This excludes discussion of the dissolved air flotation (DAF) system and discharge from the effluent holding tanks, which were operated and controlled by others. It is noted that there was no Effluent Discharge to the Brooks Road ditch during the reporting period; all treated effluent was hauled offsite for disposal. In accordance with Condition 12(4) of the ECA, this report includes influent concentrations to the treatment facility, flow analysis, and a summary of facility maintenance and performance issues.

2.0 FACILITY MONITORING DATA

2.1 MONITORING PROGRAM

The monitoring program for the facility is described in detail in the ECA, including: Influent Leachate monthly and quarterly grab samples. There was no Effluent Discharge to the Brooks Road ditch during the reporting period, and therefore no Effluent sampling and flow measurements recorded. Continuous flow measurements were recorded by a magnetic flowmeter on the outlet (post-UV) from the treatment facility.

Samples were collected by the plant Operator, Clearford Waterworks, who is licensed in accordance with the conditions of O.Reg. 129/04. Samples were tested for the following parameters:

- Influent Leachate – (Monthly) $CBOD_5$, TSS, TAN, TP, pH, Zinc, Phenols, Ethylbenzene; (Quarterly) Chlorides, Nitrate (N), Arsenic, Barium, Boron, Chromium, Copper, Iron, Lead, Benzo(a)pyrene, Naphtalene, Benzene, Toluene.

Temperature and pH testing were performed at site by the Operator. All other parameter testing was conducted by Bureau Veritas and E3 Laboratories Inc., independent accredited laboratories. Samples were retained in laboratory-supplied coolers containing ice and transported to the laboratory for analysis. Chain of custody documents were provided for all samples.

2.2 SUMMARY & INTERPRETATION

The facility monitoring results for influent parameters and average flows are presented in the Tables below. There was no effluent discharge to the Brooks Road ditch, and therefore no effluent sampling results for the reporting period.

Influent Monitoring

In accordance with the ECA, influent leachate samples are collected from the sampling port on the effluent line from the primary settling tank flowing to the aeration tanks. Table 1 and Table 2 present the sampling results.

TABLE 1. SUMMARY OF MONTHLY INFLUENT PARAMETERS

PERIOD	INFLUENT LEACHATE								
Parameter (mg/L)	**$CBOD_5$**	**TSS**	**TP**	**TAN**	**Zinc**	**Phenols**	**EB[1]**	**pH**	**Temp (ºC)**
08-Jan-21	84	9	1.4	190	<0.01	0.008	0.009	7.01	15.5
02-Feb-21	180	8	1.3	180	<0.01	0.007	0.012	6.86	12.7
05-Mar-21	54	9	1.2	190	0.01	0.010	0.009	7.27	13.7
12-Apr-21	39	6	1.3	230	0.02	0.009	0.010	7.23	16.5
04-May-21	71	21	1.4	230	0.01	0.010	0.009	7.00	14.3
11-Jun-21	71	2	1.3	240	<0.01	0.012	0.010	6.9	22.2
05-Jul-21	67	7	1.4	260	<0.01	0.011	0.009	8.0	23.9
11-Aug-21	66	9	1.1	210	<0.01	0.010	0.012	7.3	19.7
07-Sep-21	36	<1	1.4	210	<0.01	0.010	0.010	6.80	23.2
04-Oct-21	67	3	1.2	180	<0.01	0.009[2]	0.001	8.50	25.3
01-Nov-21	45	3	1.2	190	<0.01	0.014	0.010	7.47	16.3
06-Dec-21	47	3	1.3	160	0.02	0.008	0.009	6.65	18.1
Annual	**69**	**7**	**1.3**	**206**	**0.01**	**0.010**	**0.009**	**7.25**	**18.5**

Notes:
1. Ethylbenzene
2. Sample collected 12-Oct-21
3. "<" denotes result below the analytical detection limit

TABLE 2. SUMMARY OF QUARTERLY INFLUENT PARAMETERS

PERIOD	INFLUENT LEACHATE												
Parameter (mg/L)	**Cl**	**NO_3**	**As**	**Ba**	**B**	**Cr**	**Cu**	**Fe**	**Pb**	**Benzo(a)-pyrene[1]**	**Naphta-lene[1]**	**Ben-zene[1]**	**Tolu-ene[1]**
08-Jan-21	870	<0.50	<0.2	0.35	9.8	0.03	<0.02	0.10	<0.05	<0.009	8.1	<5.0	<10
12-Apr-21	850	<0.10	<0.2	0.36	9.9	0.03	<0.02	0.11	<0.05	<0.009	8.3	<5.0	<10
12-Jul-21	930	<0.10	<0.2	0.37	11	0.04	<0.02	0.07	<0.05	<0.009	7.8	3.4	<2.0
04-Oct-21	740	<0.50	<0.2	0.32	9.1	0.03	<0.02	0.03	<0.05	<0.009	6.3	<50	<10

Notes:
1. Unit in µg/L
2. "<" denotes result below the analytical detection limit

Facility Flows

The facility has a design daily flow capacity of 200 m^3/day. Outlet flow from the treatment facility (not Effluent Discharge to the ditch) was measured by a continuous flowmeter, with daily flows summarized in Table 3 below and detailed data included in Appendix A.

The annual average flow was 41 m^3/day, and the maximum day flow was 88 m^3/day occurring in June 2021. The recorded daily flows did not exceed the rated capacity during the reporting period. There were 24 days with zero flow as a result of plant maintenance, repairs and replacements, and quality assurance activities.

TABLE 3. MONTHLY AVERAGE AND MAXIMUM DAILY TREATMENT FACILITY FLOWS

PERIOD	MONTHLY AVG. FLOW (m^3/d)	MAX. DAY FLOW (m^3/d)
January	35.44	62.34
February	34.62	60.69
March	16.19	23.41
April	14.93	28.75
May	30.63	73.84
June	48.22	87.67
July	47.89	70.95
August	49.91	72.13
September	46.42	68.96
October	49.19	77.90
November	57.40	72.23
December	57.65	70.17
Annual	**40.75**	**87.67**

3.0 OPERATING PROBLEMS & CORRECTIVE ACTIONS

Table 4 lists the operational challenges along with their remediation steps. All equipment issues were dealt with in a timely manner and did not affect the long-term performance of the plant.

TABLE 4. OPERATIONAL PROBLEMS AND CORRECTIVE ACTIONS

DATE	OPERATIONAL CHALLENGE	CORRECTIVE ACTION
Jan-2021	MBR #3 constant auto-priming, all MBRs in high trans-membrane pressure, not addressed by clean-in-place	Inspection of MBR cassettes, membrane recovery clean, removed damaged sheets and ordered replacement sheets (installed Apr-2021)
Feb-2021	Plant effluent elevated Ammonia and Orthophosphate (field measurement)	Stopped effluent production and recirculated through AT1 & AT2 – improved results observed
Mar-2021	HMI failure	PLC card replaced

DATE	OPERATIONAL CHALLENGE	CORRECTIVE ACTION
Mar-2021	MBR tank levels constantly high	Cleared solids build-up from overflow line at MBR #1, outside line to AT2 and main line into plant – level returned to normal
Apr-2021	MBR #1 feed flowmeter not recording (zero) causing issues with automated valve and permeate pump	Tightened flowmeter piping, PLC programming adjusted
Apr-2021	Plant effluent and AT2 elevated Ammonia and Orthophosphate (field measurement)	Recirculated flow and reseeded biomass in AT1 – improved results observed
May-2021	Plant shutting down because of MBR #2 feed flow control valve position error alarm	New PLC card required – running valve in manual mode
May-2021	AT1 and AT2 elevated Ammonia and Orthophosphate (field measurement)	Wasted effluent to sludge tank, DAF offline until Ammonia lowered, recirculated flow in AT1 and AT2 – improved results observed
May-2021	MBR #1 permeate pump constantly auto-priming/air-locking	Inspected piping inside tank
May-2021	DAF potable water pressure tank failed, DAF and MBRs offline	Owner replaced PSI tank
Jun-2021	Plant effluent, AT1 and AT2 elevated Ammonia and Orthophosphate (field measurement)	Drained MBR tank to sludge tank and refilled, aerated and recirculated flow in AT1 and AT2 – improved results observed
Jun-2021	MBR #2 blower fault, MBR #1 permeate pump air-locking	Motor wiring fixed, reconnected pipe to manifold inside tank
Jul-2021	Heavy sludge in MBR tank and AT2	Ran overflow valve to AT1 and drained MBR tanks to sludge tank
Jul-2021	MBR #1 permeate pump VFD and motor thermal fault	Adjust pump speed, reset alarm and monitor if recurring
Jul-2021	MBR #2 permeate valve not working, PLC card issue, plant shutdown	Technician resolved air compressor problem, recommended replacement
Sep-2021	Plant effluent and AT2 elevated Ammonia (field measurement)	Stop MBR production, recirculate effluent in AT2 until resolved.
Sep-2021	AT2 effluent elevated solids to MBRs	Pump out sludge from AT1 and refilled with AT2 effluent with elevated solids

DATE	OPERATIONAL CHALLENGE	CORRECTIVE ACTION
Nov-2021	Plant effluent, AT1 and AT2 elevated Ammonia (field measurement)	Stop DAF and MBR production, Recirculate AT2 effluent, and continued aeration of AT1 until resolved.
Dec-2021	AT1 and AT2 elevated Ammonia (field measurement)	Stop DAF and MBR production, recirculate AT2 effluent, continue aeration of AT1 until resolved

4.0 FACILITY & EQUIPMENT MAINTENANCE

Regular and preventative maintenance performed during the reporting period included:

- Checks and maintenance on blowers, air filters and oil levels;
- Checks and maintenance on chemical pumps, tubes, injector valves;
- Checks and maintenance on instrumentation and controls;
- Cleaning and calibrating pH probes;
- Cleaning effluent booster pump and pump strainer;
- Replacement of UV disinfection unit lamps; (no UV lamp replacement in 2021. 2 new ballast are needed with new lamps for both units)
- Inspection of membrane modules;
- Cleaning and reconditioning of membranes.

Repairs, replacements and special maintenance undertaken during the reporting period included:

- January – Membrane recovery clean, inspection, and removal of some damaged membrane cassettes;
- January – Replaced MBR #3 permeate pump;
- February – Membrane recovery clean, calibration of gas monitor;
- March – New UPS installed in control panel;
- April – Installed replacement membrane cassettes in frames;
- May – Replaced MBR #1 and #2 permeate pumps, identified need for repair feed flowmeter MBR #1 (not approved while considering future changes), biomass seeding in AT1 tank, installed new fuses for MBR #1 and #2 recirculation pumps, Owner replaced DAF water PSI tank;
- June – Replaced PLC card in control panel, membrane inspection and recovery clean;
- July – Owner replaced DAF water pump, membrane recovery clean, installed new overflow line from MBR tanks to AT2, ordered replacement propeller for chemical tank mixer;
- August – Replaced air compressor for automated valves;
- September – Replaced air compressor with a higher capacity unit;
- October – Membrane inspection and recovery clean, replaced four (4) membrane sheets, removed MBR #1 feed flowmeter for repairs;
- December – Ordered replacement MBR feed pump, replaced chlorine pump #3 tubing.

5.0 EFFLUENT QUALITY ASSURANCE

The facility Operator undertook regular quality assurance activities during the reporting period to ensure adequate treatment plant operation and effluent quality, including field measurements for phosphates, ammonia, pH, dissolved oxygen, and temperature of the process stream, sludge settleability testing, and monitoring of chemical dosages and sludge wasting volumes. Non-regulatory operational sampling was also conducted with weekly grab samples from the treatment facility outlet (post-UV) analyzed by independent accredited laboratories.

The necessary instrumentation required to perform the in-house analysis of various parameters was available to the facility Operators. All sampling and analyses were performed in accordance with the "*Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works*", "*Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater*", "*Standard Methods for Examination of Water and Wastewater*", and Environment Canada publications for biological test methods for acute lethality.

The Operator followed the recommendations and procedures outlined in the facility Operations & Maintenance Manual. Data was recorded in the facility logbook and monitored for changes. When appropriate, the Operator made adjustments to the treatment processes and took corrective actions towards ensuring that the effluent quality met the objectives for the facility.

When elevated operational parameters were observed from the treatment system, the Operator took corrective action to cease plant production and recirculate flows through the MBR, AT1 and AT2 tanks for additional aeration and treatment until improved water quality was observed.

6.0 MONITORING EQUIPMENT CALIBRATION & MAINTENANCE

No calibration or maintenance was performed on the facility discharge flowmeter, which is factory-calibrated and does not require annual re-calibration.

7.0 RESULTS FOR EFFLUENT OBJECTIVES

The operational efforts made during the reporting period as described in the Sections above generally achieved the operational objectives for the facility. The results for the complete DAF system and effluent holding tanks are discussed by others. There was no effluent discharged to the Brooks Road ditch; all treated effluent was hauled off-site for disposal.

8.0 SLUDGE MANAGEMENT

There was no sludge hauled off-site for disposal during the reporting period. Waste sludge is sent to the sludge tank which pumps back to the landfill cells.

9.0 COMPLAINTS

There were no complaints received by the Operator from the public during the reporting period.

10.0 BY-PASSES, SPILLS & ABNORMAL DISCHARGES

There were no by-passes or abnormal discharge events during the reporting period. Treated effluent was hauled off-site for disposal at the Haldimand Wastewater Treatment Plant.

11.0 NOTICES OF MODIFICATION

No Notices of Modification were submitted to the District Manager during the reporting period related to Limited Operational Flexibility of the sewage works.

12.0 OTHER REQUESTED INFORMATION

No additional information was requested by the District Manager during the reporting period. It is noted that an investigation was initiated by MECP in 2021. The Operating Authority (Clearford Waterworks) is voluntarily cooperating to provide additional requested information regarding the operation of the leachate treatment facility. Additionally, facility inspection by the District MECP was conducted on November 24, 2021.

13.0 SUMMARY

Performance of the complete leachate DAF system and effluent holding tanks was controlled by others and is discussed separately. During the reporting period, there was no effluent discharged to the Brooks Road ditch; all treated effluent was hauled off-site for disposal. The facility generally achieved good operational effluent quality as a result of regular effluent quality assurance activities. The average daily sewage flow was consistently below the rated capacity for the facility, and the treatment performance was not negatively affected when higher daily flows occurred. Regular and preventative maintenance activities were undertaken, and operational challenges were dealt with in a timely manner with special maintenance, repairs and replacement of facility components as required.

It is anticipated that the facility will continue to achieve adequate treatment and operational performance during the next reporting period.

APPENDIX A.
DAILY FLOW DATA

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	SEWAGE TREATMENT FLOW DATA (m^3)												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Date													
1	43.24	60.69	13.31	28.75	0.00	64.88	21.46	0.00	49.84	58.68	45.99	70.17	
2	41.95	44.72	13.31	18.35	0.00	46.84	7.12	0.00	49.72	52.99	56.05	66.81	
3	31.45	56.54	14.13	16.33	19.71	49.83	15.73	0.00	64.73	62.13	72.23	65.53	
4	36.57	41.20	14.13	17.44	49.84	41.52	68.34	27.17	53.37	57.54	62.17	65.89	
5	36.57	50.02	16.60	18.02	65.09	40.58	59.09	27.88	42.53	69.07	69.94	64.60	
6	26.88	42.73	22.49	18.27	48.85	47.94	46.71	71.69	54.80	64.35	56.15	67.95	
7	28.79	47.08	16.57	24.41	48.85	48.46	35.63	46.11	55.17	57.07	34.81	55.83	
8	38.73	45.69	16.50	19.11	58.36	15.23	52.04	44.72	52.15	58.00	60.43	56.23	
9	42.96	55.64	17.69	16.72	38.39	19.15	70.95	43.10	68.96	33.67	55.43	59.23	
10	40.86	47.05	17.49	22.34	38.39	86.97	51.60	52.04	42.78	69.17	62.18	40.36	
11	37.79	38.95	19.73	19.94	0.30	63.87	59.20	63.30	16.97	62.14	54.86	58.81	
12	37.57	39.65	14.73	24.20	0.30	80.09	56.18	46.16	22.55	64.14	68.26	56.29	
13	27.00	51.92	22.26	19.68	0.00	61.86	54.62	58.47	58.11	13.22	55.69	67.54	
14	33.46	43.12	21.77	16.91	0.00	64.29	60.19	66.52	36.75	0.00	63.43	59.35	
15	19.11	31.74	12.40	19.28	43.17	33.77	60.91	63.38	57.32	0.00	36.96	67.64	
16	26.94	43.83	23.41	21.53	71.98	22.40	68.72	63.01	62.17	19.69	67.06	63.44	
17	25.94	19.41	15.45	17.12	54.96	22.27	47.03	57.82	39.51	44.69	37.62	56.23	
18	43.87	29.62	17.48	11.67	26.70	56.67	68.38	64.95	34.30	43.08	25.33	69.22	
19	50.27	27.95	13.56	10.73	73.23	68.91	50.29	63.74	46.89	49.99	61.02	63.99	
20	47.79	17.01	18.48	12.52	55.75	47.67	64.08	50.74	51.64	65.16	57.06	65.07	
21	44.50	32.88	14.71	14.88	34.28	50.54	58.50	53.37	52.63	75.53	68.63	49.83	
22	43.62	32.76	14.22	2.81	0.00	35.97	40.10	63.23	60.84	55.46	71.30	42.24	
23	36.29	25.26	16.37	5.61	0.00	47.73	27.37	61.73	34.54	77.90	69.06	66.56	
24	39.95	15.86	14.22	21.50	0.00	9.19	55.51	64.89	28.81	57.63	71.39	65.70	
25	28.89	6.97	13.87	19.39	0.00	0.02	59.77	59.75	58.00	54.51	67.10	54.80	
26	12.62	0.00	14.39	10.28	0.00	41.33	70.28	46.11	36.38	0.03	31.14	36.57	
27	15.76	7.79	7.73	0.00	24.56	74.45	43.80	42.34	42.65	22.02	45.90	22.01	
28	18.72	13.31	9.37	0.00	39.94	61.96	27.03	61.63	29.35	56.79	68.27	44.47	
29	28.88		18.65	0.00	73.84	87.67	37.39	72.13	31.41	66.19	65.56	42.26	
30	62.34		17.32	0.00	52.09	54.63	45.93	55.54	57.59	59.07	60.81	58.28	**ANNUAL**
31	49.40		19.59		30.81		0.74	55.71		55.12		64.24	
Min Day	**12.62**	**0.00**	**7.73**	**0.00**	**0.00**	**0.02**	**0.74**	**0.00**	**16.97**	**0.00**	**25.33**	**22.01**	**0.00**
Max Day	**62.34**	**60.69**	**23.41**	**28.75**	**73.84**	**87.67**	**70.95**	**72.13**	**68.96**	**77.90**	**72.23**	**70.17**	**87.67**
Avg Day	**35.44**	**34.62**	**16.19**	**14.93**	**30.63**	**48.22**	**47.89**	**49.91**	**46.42**	**49.19**	**57.40**	**57.65**	**40.75**
Total	**1,099**	**969**	**502**	**448**	**949**	**1,447**	**1,485**	**1,547**	**1,392**	**1,525**	**1,722**	**1,787**	**14,872**

Notes:

1. Plant offline/reduced production for maintenance and quality assurance: Feb 25-27, Mar 27-28, Apr 27-May 2, May 11-14, May 22-26, Jun 24-25, Jul 2, Jul 31-Aug 3, Oct 14-15, Oct 26.

Appendix I

Trigger Level Program

Table of Contents

1. Introduction

GHD has prepared this recommended groundwater Trigger Level Program (TLP) and Contingency Response Plan (CRP) for the Brooks Road Landfill (Site). The TLP and CRP were developed to meet the requirements of Condition 56 of Environmental Compliance Approval (Number A110302) (ECA) which states that the owner "shall develop a comprehensive Compliance and Trigger Level Monitoring Program, based on the surface water, groundwater and leachate database established for the Site". The TLP has been developed in consideration of the Site regulatory setting, hydrologic and hydrogeologic conditions, surrounding land uses, potential groundwater uses, and background groundwater and surface water quality.

The purpose of the TLP is to provide timely identification of potential Site-related water quality impairment and in turn permit implementation of appropriate contingency measures to mitigate the potential for non-compliance. The following Sections outline the recommended Site-specific TLP and CRP. The groundwater TLP presented herein was developed in a manner such that sustained concentrations in excess of the Reasonable Use Concept (Guideline B-7, MOEE, April 1994) (RUC) criteria are not reached at the downgradient Site boundaries, prior to implementation of the appropriate contingency measure(s). The surface water TLP presented herein was developed in a manner such that surface water runoff from the Site does not impair background surface water quality.

2. Groundwater Trigger Level Program

The following Site-specific tiered TLP and CRP have been developed in order to define appropriate action levels and trigger mechanisms for identifying potential and /or actual off-Site environmental degradation of groundwater due to landfilling activities. A multi-tiered TLP with defined groundwater trigger wells, trigger parameters, and trigger concentrations has been developed consistent with the three-tiered system outlined in the MOE's Interim Guidance Document entitled "Surface Water Monitoring Trigger Mechanism For Waste Disposal Sites" (MOE, March 1998). Although this mechanism was originally developed for surface water evaluations, the three-tiered system described in this document provides an appropriate approach for identifying, confirming and responding to groundwater quality compliance issues at landfill sites.

The following section describes the three tiers of monitoring included in the TLP. Trigger parameters and levels are discussed in Section 2.2. The recommended trigger locations are summarized in Section 2.3.

2.1 Trigger Level Program - Tiers

The following paragraphs describe the three Tiers of the TLP.

Tier I – Routine Monitoring and Trigger Locations

The first tier of the TLP monitoring consists of the routine monitoring included in the regular groundwater monitoring program for the Site. Groundwater monitoring at the Site is conducted two

times per year for the comprehensive list of analytical parameters included in the regular monitoring program. Samples are collected from groundwater monitoring wells and analyzed for the complete list of monitoring analytes, including the proposed trigger parameters (discussed in Section 2.2).

Analytical results for each trigger well are compared to the established trigger levels as part of the Tier I monitoring activities. The comparison of sample analytical results to the trigger levels determines if each individual well will continue with Tier I monitoring or move to Tier II monitoring during the subsequent monitoring event.

There are no additional monitoring requirements or contingency actions necessary while monitoring wells are being sampled under Tier I monitoring.

Tier II – Confirmation Monitoring

If a trigger parameter concentration exceeds an established trigger level at a trigger location in two consecutive sampling events, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting a confirmatory water quality sample from the location exhibiting the Tier I exceedance during a follow-up monitoring event in order to confirm the Tier I exceedance of the trigger parameter. If the sample collected during the follow-up monitoring event indicates that Tier I trigger concentrations are not being exceeded then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to evaluate the degree, nature, and potential source(s) of water quality impact(s) resulting in Tier I exceedance. The implications of the Tier 1 exceedances in terms of compliance with the RUC (MOE Guideline B-7), as well as the potential for downgradient off-Site impacts should be given consideration in the evaluation.

The Tier II evaluation will include comparison of the observed water quality to the generic criteria and the applicable regulatory compliance framework. The comparison will be utilized in determining the appropriate timing and urgency of response. The comparison will also include parameter trend analyses over time and the potential for contributions of sources of impact other than the landfill. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Site derived water quality impacts are or will result in an off-Site water quality compliance issue then Tier III - contingency measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves implementation and subsequent performance assessment of the necessary contingency measures. Tier III is implemented in the event that Tier II monitoring confirms a groundwater non-conformance.

Tier III includes ongoing monitoring to assess the effectiveness of any contingency measures that have been implemented until such time that the contingency measures are deemed no longer necessary. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures. Exact contingency measures should be evaluated after Tier I exceedances are confirmed through the Tier II Confirmatory Monitoring program and after a

Tier II evaluation confirms that contingency measures are warranted. As the nature of potential future water quality impairment and associated non-compliance issues cannot be predicted in advance, it is not practical to identify specific remedial or contingency plans for implementation that will necessarily best suit the particular situation in the event of a potential or actual non-compliance. Potential alternative contingency plans that are practical and implementable are provided in Section 4 for consideration in the event of a potential or actual non-compliance.

2.2 Trigger Parameters and Levels

Groundwater compliance at the Site is determined through a comparison of Site boundary groundwater quality to Site-specific RUC criteria, which are calculated from generic ODWS and background concentrations. For the purposes of the trigger level program, 85 percent of Site-specific RUC criteria will be calculated for each trigger parameter and the calculated concentration will be utilized as the Tier I Trigger Level.

ODWS Operation Guidelines (OG) criteria have not been included the list of Trigger Parameters as these criteria apply to the operation of water treatment facilities and do not relate to groundwater sampled from monitoring wells.

As previously mentioned concentrations of several parameters are present within the upgradient groundwater at elevated concentrations. Background groundwater quality within the shallow aquifer and basal till/bedrock aquifer units is generally poor and characterized by elevated sulphate, TDS, iron, sodium, alkalinity and hardness. As these parameters are naturally elevated in groundwater at the Site, it is not appropriate to use these parameters in the Trigger Level Program. It should be noted that the ODWS criteria for alkalinity and hardness are OGs and as such, these parameters are not included in the program as Trigger Parameters.

The following table summarizes the 2014 concentration ranges for sulphate, TDS, iron and sodium in background (upgradient) monitoring wells within the shallow overburden aquifer.

Location	ODWS (mg/L)	2014 Concentration Range (mg/L)
OW1B-13		
Sulphate	500	1370 - 1550
TDS	500	2520 – 2650
Iron	0.3	1.78
Sodium	20/200	136 – 144
OW3B-13		
Sulphate	500	263 – 359
TDS	500	677 – 837
Iron	0.3	<0.50
Sodium	20/200	29.9 – 37.6
OW9B-06		
Sulphate	500	489 – 525
TDS	500	1230 – 1280
Iron	0.3	<0.50
Sodium	20/200	133 – 153

The following table summarizes the 2014 concentration ranges for sulphate, TDS, iron and sodium in background (upgradient) monitoring wells within the basal till/bedrock aquifer.

Location	ODWS (mg/L)	2014 Concentration Range (mg/L)
OW1A-13		
Sulphate	500	3620 - 4400
TDS	500	6030 – 6680
Iron	0.3	<0.50
Sodium	20/200	615 – 826
OW3B-13		
Sulphate	500	2180 – 2580
TDS	500	3830 – 3960
Iron	0.3	<0.50
Sodium	20/200	170 - 186
OW9B-06		
Sulphate	500	489 – 525
TDS	500	1230 – 1280
Iron	0.3	<0.50
Sodium	20/200	116 – 123

Although the concentrations of iron reported during 2014 (presented above) were not detected above the reporting limit, the reporting limit (0.5 mg/L) was consistently above the ODWS for iron (0.3 mg/L). Iron has frequently been reported above the ODWS in background monitoring wells during historical monitoring.

Quantitatively comparing concentrations of analytes that are elevated upgradient of the landfill can be useful for evaluating the effects of landfilling on downgradient water quality; however it is not appropriate to calculate Site-specific trigger levels for these parameters based on RUC criteria. For this reason these parameters (sulphate, TDS, iron and sodium) have been omitted from the trigger level program.

Based on the above, and in consideration of historic landfill practices, the following list of selected analytes is considered appropriate for inclusion in the Trigger Level Program.

General Chemistry	Metals	PAHs(1)	VOCs(2)
Chloride	Boron	Naphthalene	Benzene
	Chromium	Phenanthrene	Ethylbenzene
	Lead	Pyrene	Toluene
		Benzo(a)pyrene	

Notes:
(1) Polycyclic Aromatic Hydrocarbons
(2) Volatile Organic Compounds

The above listed parameters include those included in the interim TLP developed for the Site as part of the hydrogeologic investigation completed by CRA in 2004 (CRA, 2004) as well as two additional analytes requested by the MOE (benzo(a) pyrene, chloride) in correspondence related to the monitoring program in 2007.

Tables 1 and 2 provide summaries of the background concentrations, leachate concentrations, calculated RUC criteria, and recommended trigger levels for the above listed parameters for the shallow overburden aquifer and the basal till/bedrock aquifer, respectively.

2.3 Trigger Locations

Groundwater monitoring locations located along the downgradient Site boundaries are appropriate for inclusion in the TLP as trigger wells. The following table summarizes the monitoring wells proposed for inclusion in the TLP, along with the respective unit in which each well is completed.

Location	Unit
MW1B-06	Shallow Overburden
MW2C-01**	Shallow Overburden
MW2B-07	Shallow Overburden
MW5B-06	Shallow Overburden
MW8B-06	Shallow Overburden
MW10B-18	Shallow Overburden
MW11B-19*	Shallow Overburden
MW12B-19*	Shallow Overburden
MW1A-06	Basal OB/Shallow BR
MW2A-01	Basal OB/Shallow BR
MW5A-06	Basal OB/Shallow BR
MW8A-06	Basal OB/Shallow BR
MW10A-18	Basal OB/Shallow BR
MW11A-19*	Basal OB/Shallow BR
MW12A-19*	Basal OB/Shallow BR

* - recommended additional monitoring well location.

** - monitoring well removed from the monitoring program

Monitoring well nests MW11A/B-19 and MW12A/B-19 are recommended for installation along the southern boundary at the locations illustrated on Drawing L-C-06. It is recommended that monitoring well nests are included in the long-term monitoring program and TLP following installation. These monitoring well nests will reduce the gaps between monitoring points along the downgradient Site boundary and will thus provide more comprehensive monitoring of Site compliance.

Investigations into the deeper bedrock aquifer have been undertaken at the Site for the purpose of evaluating the potential effects of gypsum mining in the vicinity of the Site. The results of these investigations have indicated that there is no evidence of landfill-related water quality impacts to the deeper bedrock aquifer. Further, in light of the existence of two flow zones and a significant overburden aquitard between the landfilled waste and the deeper bedrock aquifer, it is considered extremely unlikely that this flow zone could become impacted by leachate. For this reason deeper bedrock aquifer monitoring wells have not been included in the TLP.

3. Surface Water Trigger Level Program

The Site-specific surface water TLP is defined in the Industrial Sewage ECA No. 4142-ASEKJ2.

The trigger parameters include:

Table 7 – Trigger Parameters	
Parameter	Trigger Level (mg/L)
Un-ionized Ammonia	0.02
Arsenic	0.005
Boron	0.2
pH (unitless)	6.5 to 8.5

Samples collected from the stormwater management system(s) for routine monitoring and reporting will be compared to the trigger levels.

The following conditions have been reproduced from the Industrial Sewage ECA No. 4142-ASEKJ2 that describe the actions to be taken as a result of a trigger level exceedance:

10(12) In the event that a monitoring result for any of the parameters listed in Table 7 exceeds its corresponding trigger level concentration, the Owner shall re-sample within two weeks period to confirm the trigger level concentration exceedance for that parameter;

10(13) In the event that the trigger level concentration exceedance of any parameter of concern is not confirmed after the second round of sampling conducted under Condition 10 (12), then, normal stormwater monitoring shall be resumed;

*10(14) In the event that the trigger level concentration exceedance of any parameter of concern is confirmed after the second round of sampling conducted under Condition 10 (12), the Owner shall operate the Works in a **normally closed position** and notify the District Manager forthwith;*

*10(15) While operating the Works in a **normally closed position**, the Owner shall implement the "Stormwater Contingency and Remedial Action Plan" prepared under Condition 10 (10) and collect a grab sample and analyze for the trigger parameters listed under Condition 10 (11) at a **weekly frequency** preferably after a rainfall event;*

*10(16) The Owner shall resume operating the Works in a **normally open position** if monitoring results for all trigger parameters from three (3) consecutive sampling events conducted under Condition 10 (15) are less than their respective trigger level concentrations;*

(17) Discharge of contaminated stormwater from the Works to storm sewer/surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

If amended, the trigger level program in the Industrial Sewage ECA No. 4142-ASEKJ2 will supersede the conditions reproduced above.

4. Contingency Response Plan

As discussed in Section 2.1 and Section 3.0, an evaluation of potential contingency measures should be undertaken if Tier I exceedances are confirmed through and after a Tier II reassessment of the analytical results shows that contingency measures are warranted. As the nature of potential future non-compliance issues cannot be known in advance, it is not appropriate to identify specific remedial or contingency plans for implementation that will necessarily best suit the particular situation in the event of a potential or actual non-compliance.

Potential contingency or remedial action plans that could be implemented in the event of verified groundwater non-conformance include: acquisition of additional property downgradient, registration of downgradient property as contaminant attenuation zone, construction and operation of groundwater migration controls, or implementation of leachate mitigation measures (cap improvements, cut-off wall, etc.).

Examples of potential contingency or remedial action plans that could be implemented in the event of verified surface water non-conformance include: closure of the stormwater management pond discharge valve followed by monitoring and manual discharge of collected surface water until impacts are no longer identified, evaluation of landfill final cover to identify and repair potential leachate seeps or sediment migration, or implementation of other site controls if the surface water is determined to be impacting the water quality in the receiving downstream ditches.

Appendix J

Notice of Violation

Notice of Violation

Number

1-90395772-A1

Environmental Protection Act, R.S.O. 1990, c. E.19 (EPA)

Nutrient Management Act, 2002, S.O. 2002, c. 4 (NMA)
Ontario Water Resources Act, R.S.O. 1990, c. O.40 (OWRA)
Pesticides Act, R.S.O. 1990, c. P.11 (PA)
Safe Drinking Water Act, 2002, S.O. 2002, c. 32 (SDWA)

Name of Person or Company:	2270386 ONTARIO LIMITED		
Address:	162 CUMBERLAND ST , TORONTO, ON, M5R 1A8		
Telephone No.:	(188) 840-2736	**Fax No:**	(289) 206-1550

Name of Person or Company:	TIM DANYLIW		
Address:			
Telephone No.:	(226) 979-2468	**Fax No:**	

Name of Person or Company:	BILL SUTTON		
Address:			
Telephone No.:		**Fax No:**	

Location:	Brooks Road Landfill 160 BROOKS RD, CAYUGA, HALDIMAND COUNTY, ON, N0A 1E0
Observation Date: (yyyy/mm/dd)	2021/12/16

VIOLATION & COMPLIANCE ACTION ITEM(S):

Legislation	**Violation Description**
EPA | 27 | (1)	(1) No person shall use, operate, establish, alter, enlarge or extend a waste management system or a waste disposal site except under and in accordance with an environmental compliance approval.

Compliance Action Item(s):	**Complete by: (yyyy/mm/dd)**
On or before January 5, 2022, 2270386 Ontario Limited, shall submit a written compliance plan detailing steps to be taken to meet the leachate elevations listed in Schedule "D" of ECA# A110302.	2021/12/23

Provincial Officer:	Taylor Buck	**Ministry Office:**	Hamilton District Office
Telephone No:	(365) 336-7491	**Fax Number:**	(905) 521-7806
E-mail:	taylor.buck@ontario.ca		
Address:	119 KING ST W 9TH FLR, HAMILTON, ON, L8P 4Y7		

Signature:		**Badge No:**	1681
Notice served upon:	TIM DANYLIW	**Date: (yyyy/mm/dd)**	2021/12/17

Please note that this notice is a formal notification that the issuing Provincial Officer believes that you have violated provincial environmental law. This notice will remain on your ministry's file in respect to the inspection location(s) noted above and is available to the public subject to the provisions of the *Freedom of Information and Protection of Privacy Act*.

Details of the violation(s) including the applicable section(s) of the legislation are included in this Notice along with the required compliance action item(s) and the required action completion date(s).

Issuance of this Notice in no way precludes the issuance of any orders or prosecution of any person for an offence.

Inquiries regarding this Notice should be directed to the issuing Provincial Officer or the Manager of the Ministry office as shown on the Notice.

The statutes listed above, and corresponding regulations are available on the Ontario statutes and regulations website at https://www.ontario.ca/laws

Appendix K

Public Complaints Procedure

PUBLIC COMPLAINT PROCEDURE
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga Ontario
Approved December 2004

Certificate of Approval No. A110302

As required by Condition 90 of Certificate of Approval No. A110302 the following complaint procedure has been drafted to establish a process for complaints from the public regarding the operation and maintenance of the Brooks Road Landfill (Site). The purpose of this procedure is to establish a clear process for residents to voice any concerns they may have with respect to operating issues at the Site. The following steps outline the various avenues the public may follow to lodge any complaint resulting from operations at the Site.

1) During regular hours of operation, **6:00am to 6:00pm (Monday to Friday) and 6:00am to 2:00pm (Saturdays)** any complaints should be made directly to the Site by calling 905-772-3040. The Site Supervisor on duty at the time will ensure the issue is dealt with immediately. Alternatively, complainants may choose to visit the Site in person and speak directly to the Site supervisor during the above noted regular hours of operation.

2) Outside regular hours of operation, a voice message system will be available to receive complaints. In cases of emergency, residents should call 911 so that appropriate action(s) can be taken.

3) When making a complaint, residents should be prepared to provide the following information:

    - Date and time;
    - Resident's name;
    - Resident's Address;
    - Location relative to the Site;
    - Contact information (e.g. telephone number);
    - Nature of the complaint; and
    - Weather conditions at the time of the complaint.

    (Weather conditions will be documented to determine if weather was a contributing factor to the complaint, e.g. litter impacts can be associated with periods of high winds, or odour impacts can be associated with overcast periods with little wind).

Complaint forms will be completed and logged by Brooks Road Environmental (BRE) when a complaint has been received. This will be undertaken for all complaints, whether written or verbal. These forms will provide a record to be kept on file, along with copies of any correspondence to, or discussion with, the complainant. Members of the Public Liaison Committee (PLC) will receive a copy of each complaint made.

A response will be made to the complainant by the end of the next business day confirming the receipt of the complaint, the nature of the complaint, and results of any follow-up. If the complaint cannot be resolved within a reasonable time period, the complainant will be notified of the action to be taken and timing.

As per C of A No. A110302, Condition 74(g), appropriate signage will be placed at the Site entrance/exit indicating the overview of the Public Complaint Procedure, including a phone number for registering any complaint. Phone numbers for the Ministry of the Environment (MOE) Hamilton District office and Haldimand County By-law enforcement will also be included on the signs.

MOE District Office:
Brad Farnand, Senior Environmental Officer
905-521-7765

Haldimand County By-law Enforcement:
Caledonia Office
905-318-5932

Brooks Road Environmental

160 Brooks Road, Cayuga N0A 1E0
Tel: 416-389-8876

COMMUNITY REPORT # ____2018-024_____

EXTERNAL:	
Date / Time of Complaint Received: **Date / Time of Complaint Occurred:**	
Resident Name:	
Address:	
Phone Number:	
Nature of Complaint:	

INTERNAL:	
Investigation:	
Corrective Measures:	
Agencies Notified:	
Completed by: **Name:** **Title:** **Date:**	

Appendix L

Environmental Protection Act Bond Surety Rider

Bay Adelaide Centre
333 Bay Street, Suite 1610, Box 22
Toronto, Ontario, M5H 2R2
Phone: (416) 214-2555
Fax: (416) 214-9597

TRISURA GUARANTEE INSURANCE COMPANY

Endorsement NUMBER: 2

To be attached to and form part of **Bond No. TMS0122500**

executed by: **2270386 Ontario Ltd.**
as Principal

and by: **Trisura Guarantee Insurance Company**
as Surety,

in favour of: **Her Majesty the Queen in Right of Ontario as Represented by the Minister of the Environment, Conservation and Parks (the "Crown")**
as Obligee.

In consideration of the mutual agreements herein contained, the Principal and the Surety hereby consent to amending the **Bond Amount**

from: **$8,371,282.00**
to: **$9,956,333.00**

Nothing herein contained shall vary, alter or extend any condition of the bonds except as herein expressly stated. This rider is effective on the **1st day of October, 2021.**

Signed and sealed this 4th day of October, 2021.

TRISURA GUARANTEE INSURANCE COMPANY CORPORATE SEAL 2006 ONTARIO

2270386 Ontario Ltd.

(Principal)
Richard Weldon

Trisura Guarantee Insurance Company

(Surety)
Hashi Hashi, ATTORNEY IN FACT

Appendix M

Landfill Monitoring and Screening Checklist

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site (WDS) Name	Brooks Road Landfill Site
Location (e.g. street address, lot, concession)	160 Brooks Road
GPS Location (taken within the property boundary at front gate/ front entry)	UTM easting 595435.5, UTM northing 4757794.7
Municipality	Haldimand County
Client and/or Site Owner	2270386 Ontario Limited
Monitoring Period (Year)	2021
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval (ECA) Number (formerly "Certificate of Approval" (C of A)) :	A110302
Director's Order No.:	none
Provincial Officer's Order No.:	none

Other:	Industrial Sewage ECA No. 4142-ASEKJ2		
Report Submission Frequency	(•) **Annual** ( ) **Other**	annual	
The site is: **(Operation Status)**	(•) **Open** ( ) **Inactive** ( ) **Closed**		
Is there an active waste transfer station at the site?	( ) **Yes** (•) **No**		
Does this WDS have a Closure Plan?	(•) **Not yet submitted** ( ) **Submitted and under review** ( ) **Submitted and approved**		
Total Approved Capacity	1,045,065	*Units*	Cubic Metres
Maximum Approved Fill Rate	1,000	*Units*	Tonnes per Day
Total Waste Received within Monitoring Period (Year)	183,977	*Units*	Tonnes
Total Waste Received within Monitoring Period (Year) *Describe the methodology used to determine this quantity*	weighed		
Estimated Remaining Capacity	180,553	*Units*	Cubic Metres
Estimated Remaining Capacity *Describe the methodology used to determine this quantity*	Survey		
Estimated Remaining Capacity *Date Last Determined*	Dec 17, 2021		
Non-Hazardous Approved Waste Types	☐ Domestic ☒ Industrial, Commercial & Institutional (IC&I) ☐ Source Separated Organics (Green Bin) ☐ Tires	☒ Contaminated Soil ☐ Wood Waste ☐ Blue Box Material ☒ Processed Organics ☐ Leaf and Yard Waste	☐ Food Processing/Preparation Operations Waste ☐ Hauled Sewage Other:
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial *(separate waste classes by comma)*	none		

Year Site Opened *(enter the Calendar Year only)*	1980	**Current ECA Issue Date**	27-Mar-20
Is your Site required to submit Financial Assurance?		◉ **Yes** ○ **No**	
Describe how your WDS is designed.		○ Natural Attenuation only ◉ Fully engineered Facility ○ Partially engineered Facility	
Does your Site have an approved Contaminant Attenuation Zone?		○ **Yes** ◉ **No**	
If closed, specify ECA, control or authorizing document closure date:		Select Date	
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**		
If yes, provide details:	Type Here		

Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i.e. exceeded the LEL for methane)	○ Yes ◉ No

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	◉ **Yes** ○ **No**	If no, list exceptions (Type Here):
2) All groundwater, leachate and landfill gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by ECA or other relevant authorizing/ control document(s):	○ **Yes** ◉ **No** ○ **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
MW1A-07 MW4A-09 MW5A-09 MW5B-09	Blocked (November 2021) Dry/Insufficent Volume (November 2021) Not monitored (November 2021) Not monitored (November 2021)	June and November 2021
Gas Probes	Several gas probes were flooded as noted in Section 5.7 of the 2021 Operations and Monitoring Report	'2020

3) a) Some or all groundwater, leachate and landfill gas sampling and monitoring requirements have been established or defined outside of a ministry ECA, authorizing, or control document.	◯ **Yes** ◉ **No** ◯ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	◯ **Yes** ◯ **No** ◉ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for groundwater investigations was done in accordance with Standard Operating Procedures (SOP) as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	(●) **Yes** ( ) **No**	If no, specify (Type Here):
Sampling and Monitoring Program Results/WDS Conditions and Assessment:		
5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/ or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	(●) **Yes** ( ) **No**	If no, the potential design and operational concerns/exceptions are as follows (Type Here):
6) The site meets compliance and assessment criteria.	( ) **Yes** (●) **No**	As per Section 9.0 of the 2021 Operations & Monitoring Report.
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	( ) **Yes** (●) **No**	The Site performs as anticipated, however the following parameter concentrations were elevated above the RUC in the shallow overburden groundwater unit: chloride, boron and benzo(a)pyrene at OW8B-06.

1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/ treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/ concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	◉ **Yes** ○ **No**	**Note which practice(s):**	☒ **(a)** ☒ **(b)** ☐ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	◉ **Yes** ○ **No** ○ **Not Applicable**	Trigger values have been exceeded for chloride, boron, and benzo(a)pyrene at OW8B-06 as outlined in Section 6.1.2 of the 021 Operations & Monitoring Report.	

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Environmental Compliance Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/ are recommended:**	
◉ **No Changes to site design and operation are recommended** ○ **The following change(s) to the site design and operation is/are recommended:**	Type Here
Name:	Type Here
Seal:	Add Image

Signature:		**Date:**	Select Date
CEP Contact Information:	Type Here		
Company:	Type Here		
Address:	Type Here		
Telephone No.:	Type Here	Fax No. :	Type Here
E-mail Address:	Type Here		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):	
Name (s)	Grand River

Distance(s)	Grand River is approximately 7 km southwest

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	(●) **Yes** ( ) **No**	If no, identify issues (Type Here):
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the ECA or relevant authorizing/control document(s) (if applicable):	( ) **Yes** (●) **No** ( ) **Not applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
SW1 SW2 SW4 SW5	Dry/insufficient volume	June 2021
SW3	Dry/insufficient volume	August and November 2021
SW8	Dry/insufficient volume	June, August and November 2021

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry ECA or authorizing/control document.	( ) **Yes** (●) **No** ( ) **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	( ) **Yes** ( ) **No** (●) **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for surface water investigations was done in accordance with SOP, including internal/external QA/QC requirements, as established/outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):	○ **Yes** ◉ **No**

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table on the following page or provide details in an attachment:

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. ECA limit, PWQO, background	e.g. X% above PWQO
See Sections 5.5, 6.2 and Tables 5.8 and 5.10 of the 2021 Operations & Monitoring Report	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	(●) **Yes** ( ) **No**	Elevated PAHs at SW6 may be related to historic slag stockpiles in the vicinity of the Site and the use of road ballast along the Site entrance. The exact source of the detected parameters is not known.

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	○ **Yes** ◉ **No**	See Section 5.5. Background and downstream surface water quality fluctuates and shows concentrations above assessment criteria.
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	○ Yes ○ No ○ Not Known ◉ Not Applicable	
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	◉ **Yes** ○ **No** ○ **Not Applicable**	Laboratory analysed pH (8.87) did not meet the trigger level on June 1, 2021, and the field measured pH (6.32) did not meet the trigger level on November 12, 2021 for the Stormwater management system pond as outlined in Section 6.2 of the 2021 Operations & Monitoring Report.

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Environmental Compliance Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No Changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No changes to the site design and operation are recommended** ○ **The following change(s) to the site design and operation is/ are recommended:**	

CEP Signature	
Relevant Discipline	Type Here
Date:	Select Date
CEP Contact Information:	Type Here
Company:	Type Here
Address:	Type Here
Telephone No.:	Type Here
Fax No. :	Type Here
E-mail Address:	Type Here

Save As		**Print Form**

ghd.com

→ The Power of Commitment

Appendix B

Geology and Hydrogeology Assessment Report

Geology and Hydrogeology Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

2270386 Ontario Limited

April 2, 2024

→ **The Power of Commitment**

Project name		Brooks Road Landfill Expansion					
Document title		Geology and Hydrogeology Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524					
File name		Brooks Road Landfill Capacity Expansion Environmental Screening Assessment Geology & Hydrogeology Report V2.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4		Ben Kempel	Allan Molenhuis		Blair Shoniker		4/2/2024

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Contents

Table index

Figure index

Appendices

1. Introduction

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent). The location of the Site is shown in Figure 1.1.

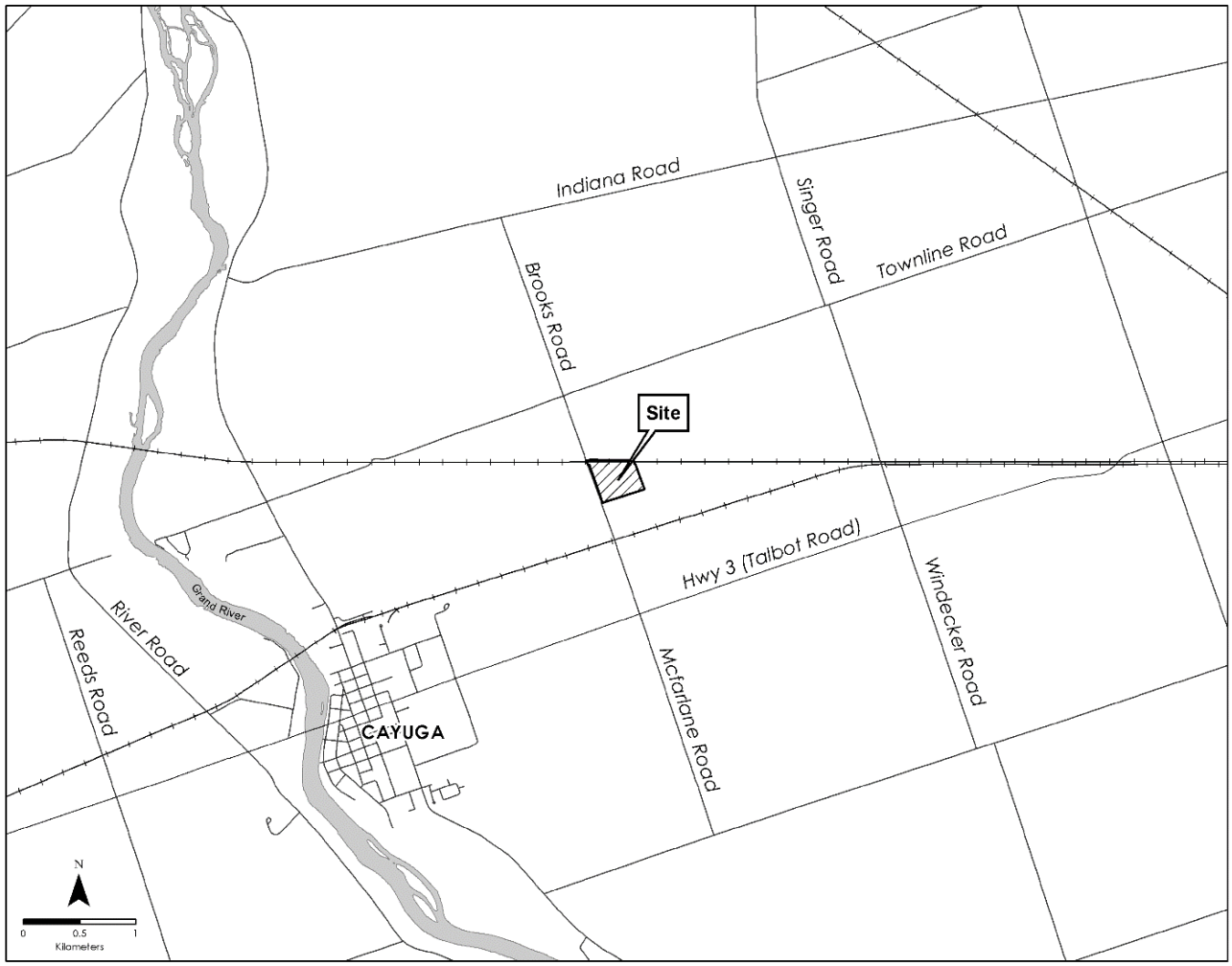

Figure 1.1 Location of the Proposed Undertaking

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302 (Landfill ECA), has an approved annual fill rate of 250,000 tonnes per year and a total capacity of 1,045,065 cubic metres (m^3) (including waste and cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA) and industrial sewage works ECA No. 1122-BKUPSM (Industrial Sewage ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (CofA, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021. Under the current ECA, the Site is licenced to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3-hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the Site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road

Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

In order to meet the growing demand from waste generators and customers for a safe and reliable waste management facility for their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils), Brooks Road Environmental is proposing to expand the capacity of the Brooks Road Landfill by approximately 219,400 m^3, adding capacity equal to approximately two additional years. This expansion would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally, as shown in **Figure 1.2.**

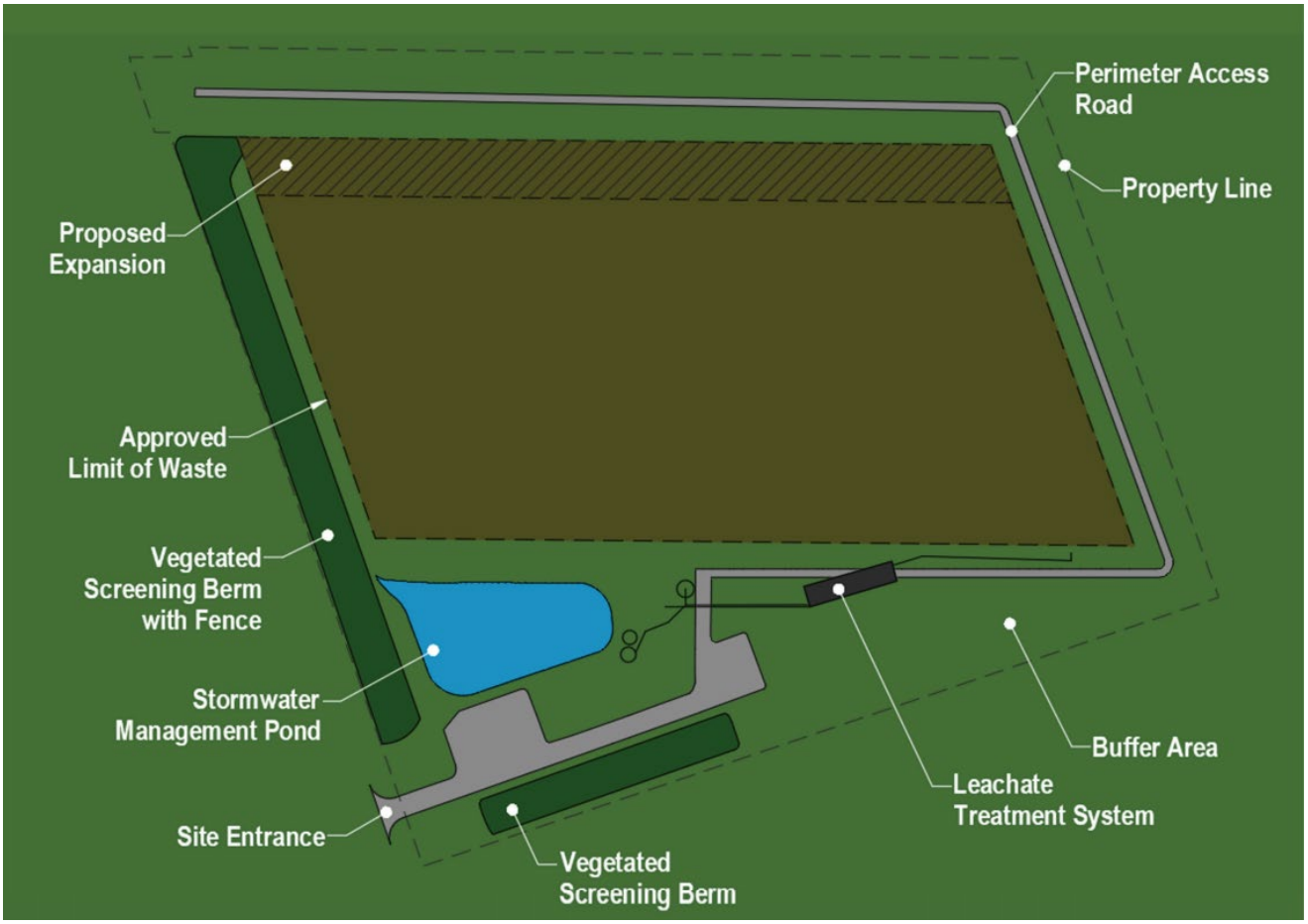

Figure 1.2 Proposed Capacity Expansion Concept

The proposed expansion would amend the approved ECA to allow for landfill volume expansion by approximately 219,400 m^3, allowing for receipt of an approved maximum daily quantity (1,000 tonnes per day) throughout the year, maintaining the approved rate of 250,000 tonnes per year. The proposed change to the total landfill capacity requires additional landfill infrastructure and changes to the currently approved landfill volume, footprint, and final contours.

The proposed Brooks Road Landfill Site capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *EA Act*, as follows:

A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:

1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process an application will be made to amend the existing ECA No. A110302.

GHD has prepared a Geology and Hydrogeology Assessment on behalf of BRE to support the proposed undertaking. This report documents the following as it relates to the geologic and hydrogeologic environment:

– Baseline/existing conditions (i.e., what exists in the absence of the proposed project)
– Potential effects on the environment, mitigation measures, and net effects
– Future monitoring requirements to be implemented

The Study Areas reviewed for the geology and hydrogeology assessment were as follows (see **Figure 1.3**):

– **On-Site** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
– **Site-Vicinity** – the area within the vicinity of the Site extending approximately 1 km in all directions

Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
GEOLOGY AND HYDROGEOLOGY ASSESSMENT REPORT

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 21, 2022**

FIGURE 1.3

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Print date: 21 Oct 2022 - 13:33

Data source: Google Earth Imagery, Date: 07/08/2018

2. Screening Criteria Checklist

At the beginning of the Environmental Screening, the Screening Criteria Checklist (provided as Schedule I, pp 67 – 69, to the "Guide to Environmental Assessment Requirements for Waste Management Projects") is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of "environment" contained in the *Ontario Environmental Assessment Act*

As noted in the Guide:

*The Screening Criteria are presented in the form of a checklist with the option of a "Yes" or "No" response. Mitigation measures **are not** to be considered in concluding whether there is "No" potential environmental effect. That is, the proponent is required to answer "Yes" even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a "Yes" is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required.*

Where a "Yes" has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that no environmental effects are anticipated, it is recommended that additional information is provided in the Environmental Screening Report in order to support the "no effects" conclusion".

Each criterion is based on a question which is prefaced with the phrase, "*Might the Project*…" Table 2.1 was completed as the first step of the Environmental Screening Process and is a summary of the criteria for the Geology and Hydrogeology discipline. Further descriptions of the criteria for which a "Yes" response was indicated in the Screening table are discussed in Section 4 of this report.

Table 2.1 Screening Criteria Checklist – Geology and Hydrogeology

	Criterion	YES	NO	Additional Information
	Might the project…			
1. Surface and Groundwater				
1.2	Cause negative effects on groundwater quality, quantity, or movement?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on groundwater quality, quantity, or movement.
1.4	Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment.

3. Existing Conditions

The following subsections describe the existing conditions that are found within the On-Site and Site-Vicinity Study Areas of the proposed project.

3.1 Methodology

3.1.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Geology and Hydrogeology Study Team to determine existing geology and hydrogeology conditions within the Study Areas. The following sources of secondary information were collected and reviewed:

Site-Specific Reports

- GHD Limited. (April 2022). 2021 Annual Operations and Monitoring Report, Brooks Road Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (October 2002, Amended November 2003). Design and Operations Report, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (October 2002). Hydrogeologic Performance Assessment - Updated Design, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (July 2010). Updated Site Decommissioning Plan, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (July 2004). Well Survey and Limited Hydrogeological Assessment, Edwards Landfill Site, Haldimand County, Ontario.
- Conestoga-Rovers and Associates. (January 2014). Site Decommissioning Report, Brooks Road Landfill Site, Haldimand County, Ontario.
- GHD Ltd. (May 2016). Gypsum Mine Investigation Report, Haldimand County, Ontario.

Government Information Available in the Public Domain

- Physiography mapping (classified as the Haldimand Clay Plain)
  - Chapman, L.S. and Putnam, D.F, 1984: The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2, Ontario Ministry of Natural Resources., Third addition.
- Topography Mapping (regional topography and slope, and approximate site topography of 200 m above mean sea level (AMSL)).
  - National Topographic System, 1983: Dunnville, Ontario; Canada Centre for Mapping, Department of Energy, Mines & Resources, Information Current as of 1980, Map Sheet 30 L/13, Edition 6, scale 1:50,000.
- Soils mapping (classified as lacustrine silty clay)
  - Ontario Institute of Pedology, 1983: Soils of Haldimand-Norfolk Regional Municipality; Cartography Section, Land Resource Research Institute, Research Branch, Agriculture Canada, Soil Survey Report No. 57, Sheet 6, scale 1:25,000.
- Quaternary geology mapping (classified as glaciolacustrine clay and silt)
  - Feenstra, B.H., 1974: Quaternary Geology of the Dunnville Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.981, Geological Series, scale 1:50,000. Geology 1973.

– Bedrock topography mapping (bedrock topography approx. 182.5 m AMSL)
  - Feenstra, B.H., 1981: Bedrock Topography of the Dunnvile Area, Southern Ontario; Ontario Geological Survey, Preliminary Map P.2412, scale 1:50,000.
– Bedrock geology mapping (bedrock geology is comprised of argillaceous dolostone and evaporites of the Salina Formation)
  - Telford, P.G., and Tarrant, G.A., 1975: Paleozoic Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.988, Geological Series, scale 1:50,000. Geology 1974.
– Karst geology report/mapping
  - Brunton, F.R. and Dodge, J.E.P. 2008: Karst of Southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5. ISBN 978-1-4249-8376-6 (ZIP FILE).
– Active and abandoned gas wells in proximity to the Site were also reviewed (source: Oil, Gas & Salt Resources Library, London, ON.

3.2 Description of Existing Conditions

The Site is situated on the Haldimand Clay Plain[1] approximately 2 km northeast of the Town of Cayuga. The Site is relatively flat. The regional topography is generally flat with a gentle slope to the south towards Lake Erie. The elevation of the Site is approximately 200 m AMSL[2]. A Site location map, which includes regional elevations, is included as Figure 3.1.

A review of soil surveys indicates that the surficial soils in the vicinity of the Site are classified as mainly lacustrine silty clay[3]. A review of the quaternary geology in the Site-Vicinity indicates that the area is generally underlain by glaciolacustrine clay and silt[4]. Published bedrock topography mapping indicates a bedrock elevation of approximately 182.5 m AMSL in the vicinity of the Site[5]. The bedrock geology in the vicinity and underlying the Site is comprised of argillaceous dolostone, shale, and evaporites of the Salina Formation[6].

[1] Chapman, L.S. and Putnam, D.F, 1984: The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2, Ontario Ministry of Natural Resources., Third addition.

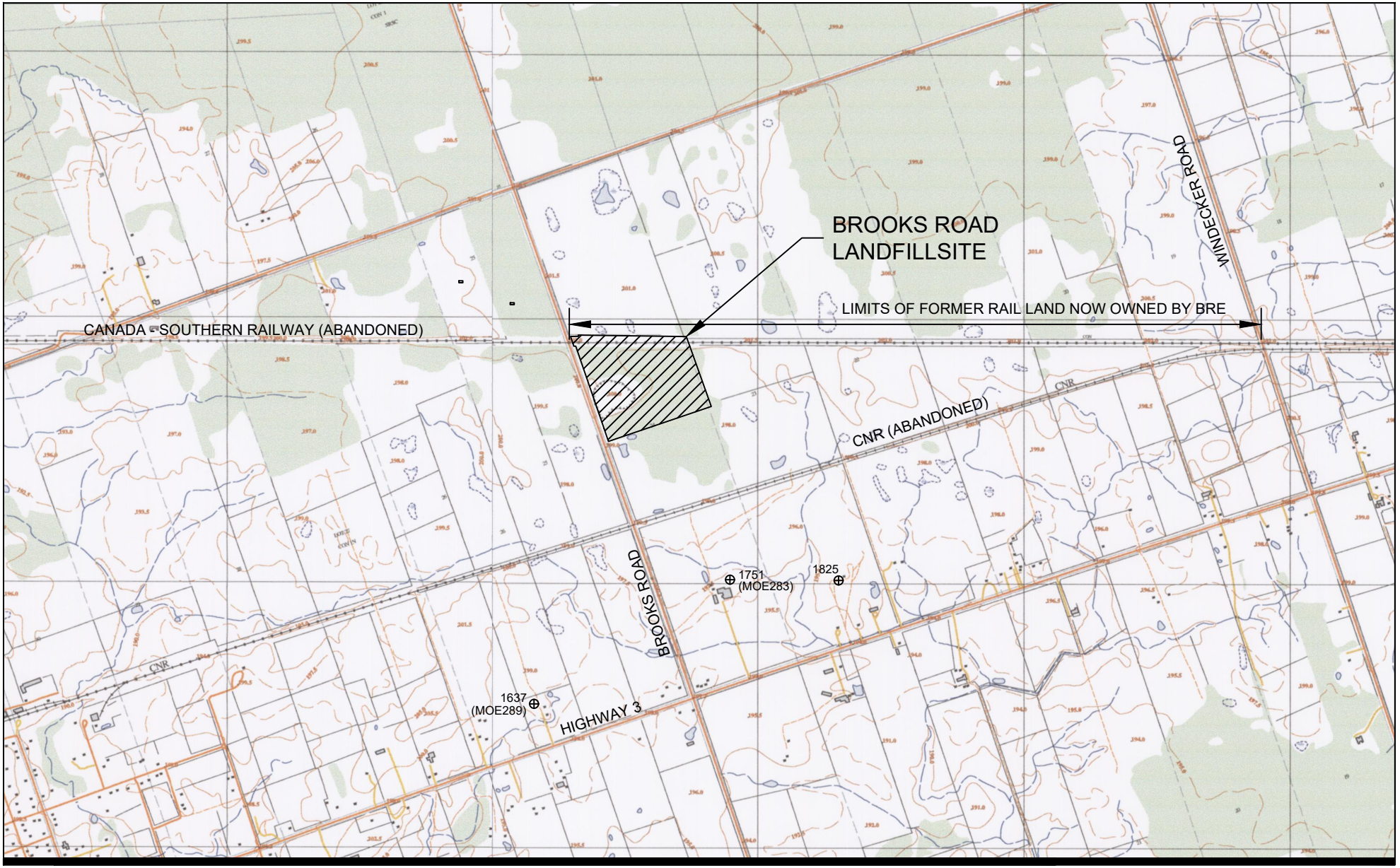
[2] National Topographic System, 1983: Dunnville, Ontario; Canada Centre for Mapping, Department of Energy, Mines & Resources, Information Current as of 1980, Map Sheet 30 L/13, Edition 6, scale 1:50,000.

[3] Ontario Institute of Pedology, 1983: Soils of Haldimand-Norfolk Regional Municipality; Cartography Section, Land Resource Research Institute, Research Branch, Agriculture Canada, Soil Survey Report No. 57, Sheet 6, scale 1:25,000.

[4] Feenstra, B.H., 1974: Quaternary Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.981, Geological Series, scale 1:50,000. Geology 1973.

[5] Feenstra, B.H., 1981: Bedrock Topography of the Dunnvile Area, Southern Ontario; Ontario Geological Survey, Preliminary Map P.2412, scale 1:50,000.

[6] Telford, P.G., and Tarrant, G.A., 1975: Paleozoic Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.988, Geological Series, scale 1:50,000. Geology 1974.



LEGEND

1637 (MOE289) RESIDENTIAL WELL LOCATION

0 200 400 600m

1:20000

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BROOKS ROAD LANDFILL SITE HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

SITE LOCATION MAP REGIONAL ELEVATION

Project No. **12561524**
Date **June 2022**

FIGURE 3.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Figures\RPT001\12561524-GHD-00-00-RPT-EN-D102_WA-001.dwg
Plot Date: 09 June 2022 8:21 AM

Data Source: MINISTRY OF NATURAL RESOURCES SHEETS: 10 17 5900 47550 & 10 17 5950 47550

Site Geology

The overburden geology is relatively uniform beneath the Site. In general, the Site is characterized by a thick (14 to 18 m) glaciolacustrine layer of stratified silty clay, silty clay till and varved clays, underlain by a thin (1 to 3 m) discontinuous layer of silty sand till with varying proportions of gravel and clay. The bedrock has been encountered at depths varying from 15.2 to 20.2 m below ground surface (BGS). A thin surficial deposit of topsoil is generally observed at the surface of the Site, with the exception of the southwestern portion.

The silty clay deposits are described as being locally fractured (weathered) from the surface down to depths varying from 3 to 5 m BGS and are characterized as a very stiff to hard with low plasticity. At depths more than 5 m, the silty clay deposits have little to no fracturing and the consistency of the units increase from stiff to very stiff.

Underlying the silty clay deposits, a thin discontinuous silty sand till with varying proportions of clay and gravel is encountered across the Site. The silty sand till ranges in thickness from 1 to 3 m and often contains cobbles and/or broken angular bedrock fragments. This deposit is usually well graded with fine to medium grained sand, minor silt and trace clay, and is described as dense to compact, grey, and saturated. The silty sand till rests directly over the bedrock.

Bedrock underlying the Site has been described as a fractured shale, dolostone and gypsum of the Salina Formation. The top of bedrock elevation ranges from 180.8 to 187.0 m AMSL and forms a small bedrock valley from northwest to southeast across the Site. The valley is characterized by a thicker silty sand till deposit. Regionally, the bedrock topography dips to the south.

Site Hydrogeology

In general, the geologic units identified at the Site may be grouped into two main hydrogeologic units separated by the thick silty clay aquitard unit, as follows:

i) An unconfined water table (shallow overburden) unit within shallow fractured silty clay (weathered) unit

ii) Silty clay aquitard

iii) A confined basal till overburden/shallow bedrock aquifer

These two hydrogeological units are separated by a thick (between 9 and 12 m) layer of stratified silty clay, silty clay till, and varved clays which form a continuous aquitard of very low hydraulic conductivity. Groundwater level data historically gathered from the shallow overburden unit and basal overburden/shallow bedrock aquifer indicate that the clay aquitard provides hydraulic separation between the two units. Differences in hydraulic head between the two units have varied between 9.5 to 15 m as historically measured at the location of nested wells. The vertical hydraulic gradient between the two hydrogeologic units is downward.

Based on historical groundwater level data, the shallow overburden unit is generally encountered at depths varying from 0.5 to 4 m BGS across the Site. The shallow overburden unit is an unconfined water table unit, which overlies the impermeable un-weathered silty clay unit. Based on the shallow overburden monitoring wells monitored in 2021, groundwater flow in this unit is generally towards the south towards Lake Erie.

Underlying the silty clay aquitard, a confined basal overburden/shallow bedrock aquifer has been observed within the lower portion of the silty sand till unit and the shallow fractured bedrock. Groundwater quality and water level data indicate that the lower silty sand till unit and the shallow fractured portion of the bedrock are hydraulically connected and geochemically similar. Therefore, these two geological units have been considered to form one aquifer.

Based on the groundwater data obtained to date, the basal overburden/shallow bedrock aquifer is generally encountered at depths varying from 14 to 17 m BGS. The groundwater flow pattern in this aquifer is in a south to southwest direction with a relatively flat horizontal hydraulic gradient.

Natural Gas Deposits and Natural Gas Wells

A review of oil, gas and salt resource mapping in Ontario indicates that several active and plugged gas wells are located within the Site-Vicinity. No active/plugged gas wells were identified on the Site, however research indicates

that 23 current and former gas wells are located within the Site-Vicinity. A total of 16 gas wells have been identified as abandoned, of which 15 have been identified as plugged, and a total of seven gas wells that may be active, suspended, or abandoned are found within the Site-Vicinity. The gas wells all targeted the Haldimand Pool within the Clinton Group and were drilled to a total depth (true vertical depth) ranging from 207.6 to 229.5 m BGS at approximately the top of the Queenston Formation. A natural gas pipeline is also located approximately 400 m south of the Site. A list of the Ontario Oil and Gas Wells located within the Site-Vicinity is itemized in Table 3.1 and a reference Figure is attached as Figure 3.2.

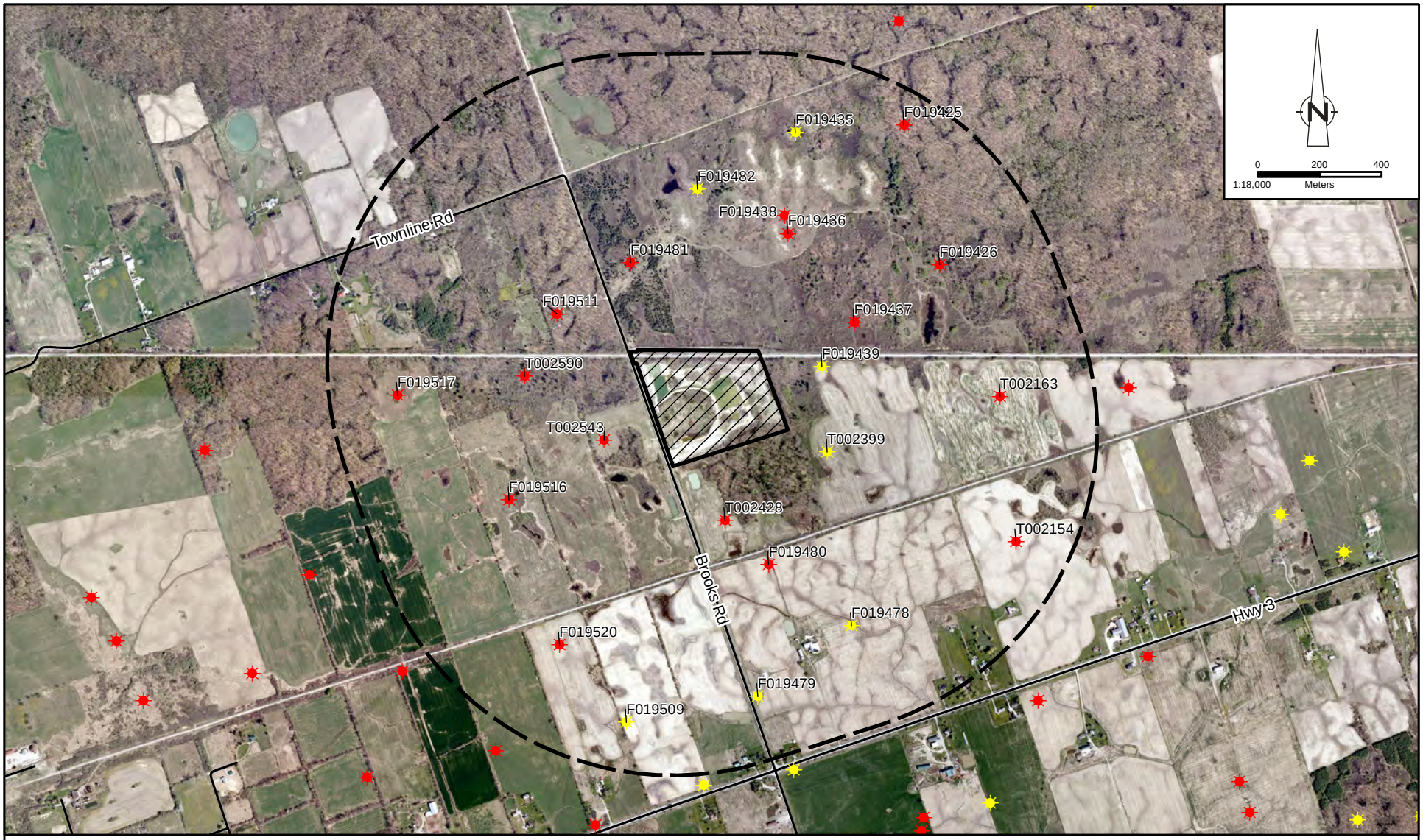
Due to the depths of the natural gas wells, it is not anticipated that there would be any influence from the landfill on the natural gas wells.

Table 3.1

List of Ontario Oil Gas Records within the Study Area
Hydrogeology Assessment
Brooks Road Landfill
Brooks Road, Cayuga, Ontario

LICENCE NUMBER	WELL NAME	OPERATOR	WELL TYPE	WELL MODE	TVD	TD DATE	PLUG DATE
F019425	Pt. Colborne-Welland Gas Co. - J. Kozak #1, North Cayuga - 22 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Gas Show	Abandoned Well	210.62	21-Nov-1947	21-Nov-1947
F019426	W.C. Patterson - Miss Doyle, North Cayuga - 22 - INTR	W. C. Patterson Gas Co. Ltd.	Dry Hole	Abandoned Well	214.58	26-Nov-1927	
F019435	P.C. Welland Gas Co - C. Bunn #1, North Cayuga - 23 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Unknown	207.57	30-Apr-1943	
F019436	Pt. Col-Welland Gas Co - C. Bunn #2, North Cayuga 1 - 23 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Abandoned Well	210.31	17-Jun-1943	3-Feb-1960
F019437	Pt. C. -Welland Gas Co - C. Bunn #3, North Cayuga - 23 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Abandoned Well	229.51	28-Aug-1943	23-Jul-1954
F019438	Dom Nat Gas Co - Wm Bunn #1, North Cayuga - 23 - INTR	Dominion Natural Gas Co., Ltd.	Dry Hole	Abandoned Well	213.97	5-Apr-1928	9-Apr-1928
F019439	Haldimand Gas Synd - W.R. Slack #2, North Cayuga - 23 - INTR	Haldimand Natural Gas Syndicate	Natural Gas Well	Unknown	211.84	21-Dec-1957	
F019478	W.C. Patterson - W.A. Oster #1, North Cayuga - 24 - INTR	W. C. Patterson Gas Co. Ltd.	Natural Gas Well	Unknown	219.76		
F019479	W.C. Patterson - W.A. Oster #2, North Cayuga - 24 - INTR	W. C. Patterson Gas Co. Ltd.	Natural Gas Well	Unknown	224.33	31-Jan-1929	
F019480	Union Gas Co of Canada - W.A. Oster #3, North Cayuga - 24 - INTR	Union Gas Limited	Gas Show	Abandoned Well	217.93	28-Nov-1938	8-Nov-1938
F019481	Pt Col.-Welland Gas Co - C. Bunn #4, North Cayuga - 24 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Abandoned Well	211.53	9-Oct-1943	30-Jun-1964
F019482	Pt. Col - Welland Gas Co Ltd. - C. Bunn #5, North Cayuga - 24 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Unknown	207.87	24-Nov-1943	
F019509	W.C. Patterson - J. Badger, North Cayuga - 25 - INTR	W. C. Patterson Gas Co. Ltd.	Natural Gas Well	Unknown	219.15	19-Mar-1929	
F019511	Pt. Col-Welland Gas & Oil Co - J. Ferguson #1, North Cayuga - 25 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Gas Show	Abandoned Well	213.66	20-Jan-1948	20-Jan-1948
F019516	Dom Nat Gas Co - A.& W. Geddes #2, North Cayuga - 26 - INTR	Dominion Natural Gas Co., Ltd.	Natural Gas Well	Abandoned Well	213.66	4-Oct-1929	25-Aug-1964
F019517	Dom Nat Gas Co - A.&W. Geddes #3, North Cayuga - 26 - INTR	Dominion Natural Gas Co., Ltd.	Dry Hole	Abandoned Well	210.01	24-Oct-1929	25-Oct-1929
F019520	Dom Nat Gas Co - W.B. Hamilton #2, North Cayuga - 26 - INTR	Dominion Natural Gas Co., Ltd.	Natural Gas Well	Abandoned Well	215.80	20-May-1929	12-Mar-1935
T002154	Haldimand Gas No. 477, North Cayuga - 22 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	214.58	13-Dec-1965	24-Jul-1974
T002163	Haldimand Gas No. 481, North Cayuga - 22 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	214.27	1-Aug-1966	4-Aug-1971
T002399	Haldimand Gas No. 489, North Cayuga - 23 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Unknown	213.66	13-Oct-1967	
T002428	Haldimand Gas No. 491, North Cayuga - 24 - INTR	Haldimand Gas & Oil Wells Ltd.	Gas Show	Abandoned Well	215.80	7-May-1968	16-Jul-1968
T002543	Haldimand Gas No. 494, North Cayuga - 25 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	213.66	30-Aug-1968	10-Jun-1975
T002590	Haldiamnd Gas No. 496, North Cayuga - 25 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	210.62	24-Oct-1968	9-Jun-1975

Notes:
TVD Total Vertical Depth
TD Date Date total depth reached



Source: MNRF NRVIS, 2014. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016; Haldimand County Official Plan
Aerial: 2006 Grand River Conservation Authority
Coordinate System: NAD 1983 UTM Zone 17N

Legend

- Site Location
- Local Study Area (1km Radius)
- Abandoned Gas Well
- Status Unknown

Figure 3.2

OIL AND GAS WELL LOCATIONS
GEOLOGY & HYDROGEOLOGY ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

018235-20(064)GIS-WA001 Jul 08/2016

Mining Claims and Abandoned Mines

A review of the Ministry of Northern Development and Mines (MNDM) information for abandoned mines and mining claims was completed. No mining claims were identified within the On-Site area, however one abandoned mine was identified within the Site-Vicinity to the northwest of the Site (AMIS File # 04888 / MDI # MDI30L13NW00003). The mine was reviewed in a CRA report entitled Well Survey and Limited Hydrogeological Assessment, dated July 2004 (2004 Report). The 2004 Report indicates two documents were reviewed: Gypsum in Ontario, C.R.Guillet, dated 1964, and Abandoned Mines Hazard Abatement Program, London District Site Examinations, prepared by Patrick Chance & Associates Consulting Geologists, dated 1994 (1994 Inspection). The information presented below was gathered from the above-referenced reports and has been revised with the most current information available including information from the Gypsum Mine Investigation Report prepared by GHD that provides an assessment of potential influences of the former Cayuga Gypsum Mine on groundwater at the landfill Site.

The former gypsum mine was operated by the Cayuga Gypsum Company Limited between 1942 and 1949. Gypsum was mined from a 0.9 m thick bed at a depth of 25.9 m BGS.

Mining operations were accomplished via two mine shafts. The first shaft was located approximately 112 m south of Townline Road and 350 m west of Brooks Road. The former shaft can reportedly be located by a 2.4 m deep depression, with a footprint of 3 by 4.6 m. The shaft was a vertical prospect shaft of unknown support and was back-filled with unknown materials. The 1994 Inspection did not document any evidence of subsidence, however the report recommended that a 50 m radius area of caution be observed in the vicinity of this shaft.

Based on the available historical documentation, approximately 10,300 tonnes of gypsum were reportedly removed from this prospect shaft during the operation of the mine. With a density of 2.3 t/m^3 and a thickness of 1 m, this would correspond to lateral workings with an aerial footprint of approximately 4,356 square metres (m^2). In order to access the gypsum in the 1 m seam, it is likely that approximately 1-2 m of the overlying shale bedrock would also have been removed.

The second shaft was located approximately 305 m south of the first shaft. The 1994 inspection was reportedly unable to locate the second shaft. The second shaft was also a vertical prospect shaft of unknown support, and it is unknown if the shaft has been back-filled. It is not known how much gypsum was removed from this shaft.

Due to property access restrictions, an inspection of the former Cayuga Gypsum Mine could not be conducted.

During the operation of the mine from 1942 to 1949, dewatering operations would likely have been conducted to keep the mine shafts and associated galleries dry. As such, during the operation of the mine, the local groundwater flow would have been influenced by mine dewatering activities. Active removal of large quantities of groundwater from the bedrock would have resulted in inward hydraulic gradients. As such, the bedrock groundwater flow in the vicinity of the former mine would have been directed toward the active galleries during the operation of the mine.

Upon closure of the mine in 1949, the dewatering activities at the mine would have ceased and the associated mine shafts and galleries would have flooded within the first year of closure. The mine has now been abandoned for 67 years. Since the former galleries and shafts are flooded, no water deficit should be present between these former underground structures and the surrounding bedrock. Thus, essentially steady state conditions should exist, and the former underground structures will no longer have a hydraulic influence on the local bedrock aquifer.

In the unlikely event that the former mine shafts would not have been properly sealed following the closure of the mine, there could exist the potential for surface water and groundwater in the shallow overburden to enter the mine shafts and migrate to the underlying bedrock aquifer. If infiltration were occurring, the shafts would be acting as a sink to the overburden groundwater and a source of recharge to the local bedrock groundwater. This would result in a cone of depression in the overburden groundwater towards the former mine shafts and radial flow from the galleries in the bedrock groundwater. Under this scenario there could be a potential for bedrock groundwater flow being diverted away from the former galleries. However, based on the relatively small dimension of the former galleries (areal extent of approximately 4,356 m^2) it is expected that any influence of these galleries on the bedrock aquifer would be localized to the immediate vicinity of the former galleries. Bedrock aquifer influence beyond the limits of the former Cayuga Gypsum Mine property is anticipated to be negligible.

The Gypsum Mine Investigation Report reviewed information related to historical mining operations including location and extent of mining activities, review of physical site conditions for evidence of historical mining operations, and an evaluation of hydraulic gradients within the available monitoring network to identify potential evidence of a hydraulic influence on horizontal or vertical gradients in the vicinity of the Site. The report concluded that there is no evidence of an influence related to the former Cayuga Gypsum Mine on the bedrock aquifer at the Landfill Site.

Other Data Sources

A review of the Ontario Geological Survey Karst of Southern Ontario and Manitoulin Island report indicates that not potentially karst, inferred karst, or known karst bedrock has been identified within the study area[7]. Furthermore, the groundwater conditions are unfavourable for the dissolution of the bedrock and the Upper Silurian bedrock consists of generally argillaceous dolostone, shale, and evaporites (primarily gypsum), the latter of which precludes the formation of large-scale karst features. Furthermore, no sink holes or caving features have been identified in the study area.

4. Potential Effects, Mitigation Measures & Net Effects

A Project Description, which includes proposed engineering design figures, was prepared so that potential environmental effects and mitigation measures could be identified. The following subsections provide a general summary of the proposed undertaking.

4.1 Description of Project Components and Activities

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final Site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This would be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours. The former railway property would continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in Table 4.1, below.

Table 4.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91

[7] Brunton, F.R. and Dodge, J.E.P. 2008: Karst of Southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5. ISBN 978-1-4249-8376-6 (ZIP FILE).

Design Component	Existing Landfill	Proposed Capacity Expansion
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted by 30 m. East and west ditches will extend to maintain full perimeter ditch.
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Methodology and Investigations

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that are based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in Section 2 of this report.

The assessment of effects was carried out by modelling the predicted effects of the landfill on the hydrogeologic regime under the scenario of the proposed expansion. The modelling took into consideration the existing conditions at the Site, the known hydrogeologic characteristics, as documented extensively in previous reports (including the most recent annual monitoring reports), and the proposed modifications to the Site design. Modelling was undertaken to estimate the quantitative and qualitative effects on the local hydrogeologic regime resulting from the lateral expansion of the waste footprint and landfilling of additional waste. The modelling takes into consideration the proposed design, including final cover, the liner system and the leachate collection system. The modelling considered scenarios that included worst-case mass loading to the underlying hydrogeologic regime (i.e., used maximum measured concentrations in leachate between 2017-2021 and considers the period when landfilling is near final capacity and maximum leachate generation volumes were reached).

Modelling included two scenarios. The first scenario involved 6 m of leachate mounding over the composite liner for 50 years, followed by complete failure of the HDPE liner. In this scenario, the leachate collection system and the HDPE liner were modelled with a service life of 50 years in order to maintain consistency with the previously modelled failure scenario. Following the 50-year service period, the HDPE liner was removed from the liner system and the

leachate head was maintained at 6 m above the base of the collection system. The second scenario modelled the effect of 6 m of head on the liner system with the HDPE liner entirely absent for the duration of the model.

Appendix A includes a report entitled Hydrogeologic Assessment – Landfill Expansion, Brooks Road Landfill (GHD, 2022) (Hydrogeologic Assessment Report). This report provides a full description of the hydrogeologic assessment of the proposed landfill expansion design, including descriptions of the methodology, existing conditions and predicted results of the expansion modelling. The results of the modelling demonstrate that the Site design features are sufficiently protective of the local hydrogeologic regime. The results of modelling indicate that concentrations of contaminants of concern entering the basal till aquifer will be reduced by an average factor of 4 prior to off-Site migration.

Groundwater quality is forecasted to be acceptable at the downgradient boundary with respect to the Ontario Drinking Water Standards (ODWS) and Site-specific Reasonable Use Concept (RUC) criteria.

4.3 Geology and Hydrogeology Net Effects

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a "Yes" answer was given in the Screening Criteria Checklist) for those geology and hydrogeology criteria which might be affected by the project as identified in Section 2. The effects assessment describes how existing environmental conditions in the Study Areas would change as a result of the construction and operation of the proposed undertaking.

As described in Section 2, a "Yes" was applied to the following geology and hydrogeology criteria:

	Criterion	YES	NO	Additional Information
	Might the project…			
1.2	Cause negative effects on groundwater quality, quantity, or movement?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on groundwater quality, quantity, or movement.
1.4	Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment.

With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.3.1 Potential Effects on Geology and Hydrogeology

The potential effects on the geology and hydrogeology environment are related primarily to the release of waste-related contaminants into the subsurface hydrogeologic regime. This release would occur as a result of leachate generated within the waste mound exiting the landfilled waste mass through the bottom or sides of the landfill and migrating into the shallow water table aquifer or the basal till/bedrock aquifer. Leachate-related impacts could travel downward from within the waste mass until reaching the basal till/bedrock aquifer. Once entering this aquifer, the impacts would travel laterally as advective flow in the direction of the natural horizontal hydraulic gradient (to the south).

4.3.2 Mitigation Measures

The mitigation measures implemented into the design to reduce or eliminate the potential effects on the geology and hydrogeology environment include:

1. The final cover system
2. The leachate collection system
3. The liner system

In addition to these engineered controls, the Site is also situated within a fine-grained (clay-rich) stratigraphic sequence with significant vertical thickness. This natural feature provides additional protection of the underlying aquifer as well as some beneficial attenuation capacity.

Section 6 of the Hydrogeologic Assessment Report provides a fulsome description of the modelling inputs, which includes the relevant design elements of engineered controls and the natural geologic setting. These elements in combination represent the measures which mitigate the potential effects of the proposed landfill expansion.

4.3.3 Net Effects

The net effects of the proposed landfill expansion on the geology and hydrogeology environment are the effects to this environment after the mitigation measures are applied. Accordingly, the results of the predictive modelling undertaken to estimate the magnitude of groundwater alteration resulting from the Project represent the net effects.

Section 6.5.3 of the Hydrogeologic Assessment Report describes the results of the predictive modelling. The primary receptor of concern with respect to the net effects is groundwater quality within the basal till/bedrock aquifer at the downgradient Site boundary. As described in Section 6.5.3 of the Hydrogeologic Assessment Report, water quality at the downgradient Site boundary within the basal till/bedrock aquifer is predicted to meet ODWS and Site-specific RUC criteria even at peak concentrations under the scenario of leachate collection system failure. On the basis of this predictive modelling, the proposed expansion is expected to result in only negligible or insignificant alterations to the geology and hydrogeology environment.

5. Monitoring Requirements and Additional Approvals

To ensure that the mitigation measures identified in Section 4 are functioning as envisioned, a strategy and schedule was developed for monitoring environmental effects. With these mitigation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the proposed undertaking.

5.1 Monitoring Requirements

A comprehensive leachate and groundwater monitoring program (water levels and quality) is proposed. This proposed program includes a trigger level and contingency implementation plan in order to supplement the routine program and ensure appropriate responses are implemented in the event that water quality results indicate that an undesirable effect on groundwater quality is imminent.

The proposed routine monitoring program and trigger level and contingency implementation plan are outlined in detail in Section 7 of the Hydrogeologic Assessment Report.

5.2 Additional Approvals

No additional approvals are required in relation to the geology or hydrogeology environment.

6. Conclusion

On the basis of the net effects analysis performed, the proposed expansion is not anticipated to have an unacceptable impact on the geology and hydrogeology environment.

Appendices

Appendix A

Hydrogeologic Assessment – Landfill Expansion, Brooks Road Landfill

Hydrogeologic Assessment – Landfill Expansion

Brooks Road Landfill

2270386 Ontario Limited

April 2, 2024

Project name		Brooks Road Landfill Expansion					
Document title		Hydrogeologic Assessment – Landfill Expansion | Brooks Road Landfill					
Project number		12561524-RPT-7					
File name		12561524-RPT-7 - Hydrogeologic Assessment for Landfill Expansion-Final.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4		Allan Molenhuis	Ben Kempel		Blair Shoniker		4/2/2024

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Contents

Table index

Tables following Text

Figure index

Figures following Text

Appendices

1. Introduction

1.1 Purpose of this Report

GHD Ltd. (GHD) has prepared the following Hydrogeologic Performance Assessment Report on behalf of Brooks Road Environmental (BRE) c/o 2270386 Ontario Limited to support a landfill expansion project at the Brooks Road Landfill located at 160 Brooks Road, Cayuga, Ontario (herein referred to as the Site).

The objective of this Hydrogeologic Performance Assessment Report is to evaluate the anticipated environmental performance of the Site in terms of groundwater quality at the downgradient Site boundary following expansion of landfill area to the north of the existing approved waste footprint. This report is intended to satisfy the requirements of Ontario Regulation 232/98 and has been prepared in support of the Environmental Assessment and application to amend the Site's existing landfill Environmental Compliance Approval (ECA) No A110302.

The existing landfill was developed based on the Hydrogeologic Performance Assessment – Updated Design, Edwards Landfill Site prepared by GHD in 2002 and the Vertical Expansion Environmental Assessment approved in 2018. Given the proposed expansion will utilize an expanded waste footprint, an updated hydrogeologic assessment is required to satisfy the conditions in Section 8 of Ontario Regulation 232/98.

This Hydrogeologic Performance Assessment Report has been prepared to ensure that the geologic and hydrogeologic conditions are suitable for the proposed expansion. This report has been prepared utilizing the extensive hydrogeologic investigations previously conducted at the Site with a focus on ensuring that the proposed expansion design will not result in any adverse impact to off-Site groundwater and to verify existing groundwater monitoring and leachate contingency plans as amended to accommodate the expanded waste footprint continue to be effective in providing a good understanding of the geologic and hydrogeologic performance of the Site.

1.2 Background

1.2.1 Site Location

The Site is an approved waste disposal site with an approved fill rate of 1,000 tonnes per day (250,000 tonnes per year) and current approved capacity of 1,045,065 cubic metre (m^3) (including waste and daily cover).

The Site is located at 160 Brooks Road in Haldimand, Ontario, approximately 1 kilometre (km) north of Kings Highway No. 3 (Talbot Road). The Site is legally described as Part of Lot 24, Concession I-N.T.R., Haldimand County.

The total Site area is approximately 14.3 hectares (ha) (35.3 acres) of which 6 ha (15 acres) is currently approved for landfilling.

The regional Site location is presented on **Figure 1.1**. The local Site location is presented on **Figure 1.2**. Copies of the legal surveys for the Site are provided in **Appendix A**.

1.2.2 Regulatory Approvals

The following lists the Site's operating ECAs:

– Landfill - ECA No. A110302 was issued on October 7, 1980 and was most recently amended on October 1, 2021.
– Industrial Sewage Works – ECA No. 1122-BKUPSM was issued on February 3, 2020
– Air - ECA No. 7323-C6EJUM was issued on September 24, 2021

Copies of the ECAs, and associated amendments, are included in **Appendix B**.

The following provides a description of the most recent ECAs issued for the Site.

An Environmental Assessment (EA) for a 400,000 m^3 vertical expansion was submitted on February 10, 2017. The EA was subject to a seven-week public and agency comment period, followed by a Ministry review and a public inspection of the Ministry Review, which concluded in August 2017. The Notice of Approval to Proceed with the Undertaking - EA Reference Number 13004 and EA File Number 03-08-02 (Notice of Approval) was signed by the Minister of the Environment, Conservation and Parks on January 15, 2019, was approved by cabinet on February 14, 2019, and received by BRE on March 13, 2019.

In April 2019, an ECA amendment application was submitted to the Ministry of the Environment, Conservation, and Parks (MECP) for Landfill ECA No. A110302 to implement the vertical expansion. On March 27, 2020, the Landfill ECA was amended. The environmental monitoring program for landfill gas (LFG), groundwater, surface water, and leachate were also updated in the amended Landfill ECA.

In September 2019, an ECA amendment application was submitted to the MECP to amend the Industrial Sewage Works ECA to increase the on-Site treatment rate, increase the treated effluent discharge rate and to operate the treatment system on a continual discharge basis. On February 3, 2020, the Industrial Sewage Works ECA was amended, resulting in Industrial Sewage ECA No. 1122-BKUPSM.

In June 2021, an ECA amendment application was submitted to the MECP to amend the Landfill ECA to increase the annual waste fill rate to 250,000 tonnes per year. On October 1, 2021, the Landfill ECA was amended. The Air ECA was also amended based on this submission.

1.2.3 Site History

Based on the information provided in the original 1971 application, the Site was approved under a Provisional Certificate of Approval (now called ECA) as a 15-acre (6.07 ha) landfill site with a daily fill rate of 10 tons (9.07 tonnes). The approved waste composition was 95 percent domestic (solid); 2 percent industrial (solid); 2.75 percent agricultural (solid); and 0.25 percent sewage sludge from the Caledonia Sewage Treatment Plant. The service area for the Site included the Province of Ontario.

Waste from various municipalities in the vicinity of the Site continued to be disposed at the Site on an ongoing basis from 1959 until 1977. After 1977, waste disposal activities were carried out on an intermittent basis. During the above period, waste disposed at the Site was placed in unlined trenches excavated into the native silty clay soils within the Site. After filling the trenches, waste was disposed directly on the ground surface and covered with a layer of the native soil. The waste stream included metal drums containing resin which had also been disposed at the Site.

Redevelopment of the landfill commenced with the construction of the Stage 1 engineered landfill cell and decommissioning and clean-up of the original landfill. Decommissioning of the original landfill commenced on September 4, 2012, and was completed on August 21, 2013 and satisfied Condition 30 of the Landfill ECA No. A110302 Notice 2. A total of 60,204 m^3 of non-hazardous solid waste and impacted soil was exhumed and transported to the newly constructed Stage 1 landfill cell for disposal. A total of 146.2 metric tons of non-hazardous solid waste, and 47.17 metric tons of suspect hazardous solid waste was exhumed and transported off Site for disposal. A total of five over-packed drums of solid non-hazardous waste were transported off Site for disposal. A total of 27,680 litres of a mixture of groundwater and leachate was pumped from the original landfill trenches and transported off Site for disposal.

The redevelopment of the Site included the construction of new lined landfill cells as follows:

– Stage 1 was completed in 2007
– Stage 2A was completed in 2013
– Stage 2B/3A was completed in 2013
– Stage 3B was completed in 2015

The vertical expansion will include Stages 5 through 8 and are being constructed on top of the Stage 1 through Stage 3B.

A stormwater management system and on-Site leachate treatment system (LTS) have been established on Site. Clean storm water and treated effluent are discharged to the Brooks Road roadside ditch and are regulated by ECA No. 1122-BKUPSM.

1.2.4 Previous Studies

Previous studies completed at the Site utilized in the preparation of this Hydrogeologic Performance Assessment Report include:

1. 2021 Operations and Monitoring Report, March 2022, prepared by GHD Ltd. for 2270386 Ontario Limited
    a. GHD has complete routine monitoring and reporting between 2004-2017 and from 2017 onwards
2. 2020 Operations and Monitoring Report, March 2021, prepared by GHD Ltd. for 2270386 Ontario Limited
3. Leachate Trigger Level Plan, Brooks Road Landfill Site, Haldimand County, November 2019, prepared by GHD Ltd. for 2270386 Ontario Limited
4. 2019 Stormwater Contingency and Remedial Action Plan, Brooks Road Landfill Site, Haldimand County, prepared by GHD Ltd. for 2270386 Ontario Limited
5. Design and Operations Report – Vertical Expansion – Brooks Road Landfill Site, April 2019, prepared by GHD Ltd. for 2270386 Ontario Limited
6. Gypsum Mine Investigation Report, Brooks Road Landfill Site, 160 Brooks Road, Haldimand County, Ontario, June 2016, prepared by GHD Ltd. for 2270386 Ontario Limited
7. Design and Operations Report - Edwards Landfill Site, October 2002, prepared by Conestoga-Rovers & Associates Limited for Haldimand-Norfolk Sanitary Landfill Inc.
8. Hydrogeologic Performance Assessment – Updated Design, Edwards Landfill Site, Haldimand County, Ontario, October 2002, prepared by Conestoga-Rovers & Associates Limited for Haldimand-Norfolk Sanitary Landfill Inc.

The following publicly available information has been considered in the preparation of this report:

1. Karst geology report/mapping: Brunton, F.R. and Dodge, J.E.P. 2008: Karst of Southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5. ISBN 978-1-4249-8376-6 (ZIP FILE).
2. Physiography mapping: Chapman, L.S. and Putnam, D.F, 1984: The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2, Ontario Ministry of Natural Resources., Third addition.
3. Topography Mapping: National Topographic System, 1983: Dunnville, Ontario; Canada Centre for Mapping, Department of Energy, Mines & Resources, Information Current as of 1980, Map Sheet 30 L/13, Edition 6, scale 1:50,000.
4. Soils mapping: Ontario Institute of Pedology, 1983: Soils of Haldimand-Norfolk Regional Municipality; Cartography Section, Land Resource Research Institute, Research Branch, Agriculture Canada, Soil Survey Report No. 57, Sheet 6, scale 1:25,000.
5. Bedrock topography mapping: Feenstra, B.H., 1981: Bedrock Topography of the Dunnvile Area, Southern Ontario; Ontario Geological Survey, Preliminary Map P.2412, scale 1:50,000.
6. Bedrock geology mapping: Telford, P.G., and Tarrant, G.A., 1975: Paleozoic Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.988, Geological Series, scale 1:50,000. Geology 1974.
7. Quaternary geology mapping: Feenstra, B.H., 1974: Quaternary Geology of the Dunnvile Area, Southern Ontario; Ontario Division of Mines, Preliminary Map P.981, Geological Series, scale 1:50,000. Geology 1973.

1.3 Report Organization

This Hydrogeologic Performance Assessment Report is organized into the following sections:

Section 1 Introduction

Section 2 Regional Physical Setting

Section 3 Site Physical Setting

Section 4 Natural gas, Mines, and Karst Consideration

Section 5 Residual Site Impact Assessment

Section 6 Hydrogeologic Assessment of the Proposed Landfill Expansion Design

Section 7 Proposed Monitoring and Reporting Programs

Section 8 Contingency Plans

Section 9 Summary and Conclusion

2. Regional Physical Setting

2.1 Description of Area

The Site is located in Part of Lot 24, Concession I-N.T.R., of the former North Cayuga Township, former Regional Municipality of Haldimand-Norfolk, and now Haldimand County.

The Site is located north-east of Cayuga on Brooks Road, approximately 1,000 metres (m) north of Kings Highway No. 3 (Talbot Road). The total Site area is approximately 14.3 hectares (ha) with a currently approved landfill area of 6 ha. The Site is located within a rural area with limited development of surrounding lands. The regional Site location is illustrated on **Figure 1.1**. The local Site location map is illustrated on **Figure 1.2**.

The Site is bounded to the north by a rural property consisting of undeveloped fields (i.e. long-term inactive agricultural crop production lands) and forested area. The Site was formerly bounded to the north by the Canada Southern Railway right-of-way locally referred to as the Michigan Central Railway and/or Conrail (Conrail) right-of-way; however, this portion of the railways was incorporated into the Site as part of the 2004 site expansion/development. It is understood that the southerly portion of the undeveloped fields north of the right-of-way was previously used for rail transfer of aggregate.

To the south, the Site is bounded by an rural property which forms part of a larger continuous agricultural land parcel which includes lands abutting the east portion of the Site and extending north to the aforementioned rail right-of-way. Agricultural lands extend further south from the Site to Highway 3 and are bisected by an abandoned Canadian National Railway (CNR) right-of-way. These lands are used primarily for passive livestock pasture purposes and consist of a combination of old fields and forested areas.

The Site is bounded to the west by Brooks Road. Brooks Road was previously used as a heavy load access route for rail transport of aggregate and by a former 1940s gypsum mine located in the area. On the west side of Brooks Road is an undeveloped rural property characterized primarily by dormant fields with occasional bush lots.

There are no buildings located on any of the adjacent properties to the Site. No municipal services (i.e., water, sanitary and storm sewers) are provided to the Site nor have any municipal services been extended to any of the adjacent properties.

2.2 Regional Setting

The following subsections provide a summary of the regional physical setting within which the Site is situated.

2.2.1 Physiography

The Site is located within the Haldimand Clay Plain which lies between the Niagara Escarpment and Lake Erie in this Region as mapped in “The Physiography of Southern Ontario”, (Chapman and Putman, 1985). This physiographic setting is characterized by stratified clay deposited mainly during the deep-water stages of glacial lakes Whittlesey and Warren and clay till deposits from advances and retreats of the Ontario-Erie glacial lobe towards the end of the Wisconsinan age.

2.2.2 Regional Topography and Drainage

As shown on **Figure 1.2**, the Site sits in the south-west corner of a localized topographic high at 200 m above mean sea level (AMSL). This boundary skirts a poorly drained area which runs to the north and appears to be the source of a number of shallow streams. To the north and west, surface drainage is to the Grand River down the terraces of an ancient spillway; many of these small streams are tributaries of Pike Creek which flows through Cayuga before emptying into the Grand River. To the south, drainage is by a roadside ditch that drains to a creek which traverses the farm property immediately south of the Site. This creek is known as Norton Creek which flows 7 km to the Grand River south of Cayuga.

The boundary of the Grand River Watershed is found along the north and northeast boundary of the Site. The Site falls entirely within the Grand River Watershed; however, drainage just beyond the north and northeast of the Site, is by small streams to Oswego Creek which empties into the Welland River south of Port Davidson approximately 23 km east of the Site.

The area is also characterized by sloughs, which are wet throughout the year, indicating water table discharge zones or areas of surface water collection. The sloughs in this region are believed to be attributable to relatively flat terrain and poor drainage.

2.3 Regional Geology

2.3.1 Overburden Geology

The regional Quaternary geology is presented on **Figure 2.1**.

As shown on **Figure 2.1**, glaciolacustrine clay and silt extensively covers the region (unit 24 – darker purple on **Figure 2.1**). These deposits are quiet water deposits lain down towards the end of the Wisconsinan period when the area was covered by glacial lakes Whittlesey and Warren.

Other younger Wisconsinan deposits located east of the Site include coarser beach sand and gravel (unit 25) overlying the till that derived from nearshore or beach deposits.

The oldest unconsolidated Quaternary deposit in the region is the Late Wisconsinan Wentworth Till (unit 14 on **Figure 2.1**). This is a gravelly silt till that is exposed as drumlins through the overlying glaciolacustrine clay and silt. This deposit extends, beneath the glaciolacustrine deposits, from 9 km southeast of Cayuga towards the northwest across the region, while the southern limit is at the north face of the Onondaga escarpment. This till formation was deposited by the Ontario-Erie glacial lobe, which advanced locally over bedrock in a western and south-western direction across the region.

Figure 2.1 also shows modern fluvial deposits of sand and gravel (unit 31) which has been deposited as a delta at the mouth of the river at the town of Dunnville.

2.3.2 Bedrock Geology

Bedrock geology in the region is illustrated on **Figure 2.2**.

As shown on **Figure 2.2**, the region is underlain by Paleozoic sedimentary rock formations: Dundee, Onondaga, Bois Blanc, Bertie, Salina, and Guelph (listed from southwest to northeast). Rock in these formations are Silurian to Devonian in age (~450 – 350 Mya) and consist of limestone and dolostone with shale and gypsum (evaporite) zones. **Figure 2.1** shows that bedrock outcrops occur west of the Site consisting mostly of Bois Blanc Formation and Onandaga Formation.

According to water well records in the region approximately 12 to 22 m of overburden overlies the bedrock. The bedrock in the water well records is often described as a grey, gravel fractured limestone or a limestone/shale. According to HPE Inc. (1992), the bedrock geology in the immediate area of the Site is dolostone, shale and gypsum of the Salina Formation.

The bedrock surface in the region appears regular in vicinity of the Site with elevations of the bedrock surface ranging between 174 and 186 mAMSL. Bedrock surface elevations appear to decrease on both sides as the Grand River is approached.

2.4 Regional Hydrogeology

Two principal groundwater systems are present in the vicinity of the Site: an upper water table unit and a basal till overburden/shallow bedrock aquifer. Regional groundwater flow within the shallow bedrock aquifer appears to be in a south-westerly direction towards the Grand River. South of the Grand River, groundwater flow appears to be in a north eastward direction indicating a strong river influence.

2.4.1 Groundwater Resource Usage

A domestic water well inventory was carried out in 1992 by HPE Inc. by conducting a house-to-house water well survey for all wells within a 1.5 km radius of the Site. The survey found that 69 percent of the surveyed wells were completed in the bedrock, 18 percent were completed in the gravel underlying clay deposits and 13 percent of the wells were completed in the thin sand and gravel deposit overlying the bedrock. Review of private well inventory and

completion of a ‘road side’ inspection of private properties surrounding the landfill by BRE staff, indicates that there has been only one additional residential home constructed in the area since the 1992 survey. A single home was constructed to the south of the Site off Talbot Road (Highway #3) between 2018 and 2020.

Figure 2.3 illustrates the locations of water wells noted in the MECP’s water well database (accessed June 2022). As shown in the figure three water supply wells are present within 500 m of the Site. Both water supply wells located north of the Site are completed within shallow bedrock (limestone, shale and gypsum) while the on-Site water supply well is completed in the basal till overburden. Details from MECP water wells within 500 m of the Site are summarized in **Table 2.1.**

Figure 2.3 shows a number of water supply wells south of the Site (beyond 500 m). A review of the water well database shows that these wells are completed within the shallow bedrock aquifer (most wells are noted to be completed in limestone).

For reference, **Appendix C** includes copies of the water well records from the MECP database.

It should be noted that the home constructed off Talbot Road is not included in the MECP Water Well Database (as of February 29, 2024).

Well records indicate that the bedrock aquifer provides sufficient yield for private and commercial supply, however water in this aquifer is of poor quality.

Based on the data reviewed, no residential wells in the vicinity of the Site are located within the surficial deposit of native silty clay that form the water table unit. As such, the only aquifer in use in the vicinity of the Site is the basal till overburden/shallow bedrock aquifer, which is located at the base of the thick native silty clay and till deposits.

2.5 Climate

The Site is situated within a continental-type climatic zone. The closest Environment Canada weather station to the Site is the Hamilton A Station located approximately 50 km from Cayuga. According to Environment Canada meteorological data for the period 1959 to 1990, as recorded at the Hamilton A Station, mean daily temperatures typical of the Site range from -6.2°C in January to 17.9°C in July, with a yearly average of 7.6°C. For the 1981 to 2010 period, mean daily temperatures ranged from -5.5°C in January to 20.9°C in July.

Between 1959 and 1990, precipitation recorded as rainfall ranged from a minimum of 22.2 mm in January to a maximum of 84.7 mm in August with a yearly average of 743.3 mm total rainfall. Precipitation recorded as snow ranges from a minimum of 0.0 cm between June and September to a maximum of 41.8 cm in January with a yearly average of 152.4 cm total snowfall. The total average annual precipitation at the Hamilton A Station was reported at 890.4 mm.

Between 1981 and 2010 precipitation recorded as rainfall ranged between 28.2 mm in February and 100.7 mm in July. The average annual rainfall was reported as 791.7 mm. Precipitation recorded as snow ranged from a minimum of 0.0 mm between June and September and a maximum of 40.8 mm in January. The annual average snowfall between 1981 and 2010 is reported to be 156.5 mm.

The total annual average precipitation between 1981 and 2010 was reported to be 929.8 mm/year.

Between 2010 and 2021 precipitation recorded as rainfall ranged between 24.0 mm in February and 106.4. mm in October. The average annual rainfall was reported as 779.17 mm. Average precipitation recorded as snow ranged from a minimum of 0.0 mm between June and September and a maximum of 40.0 mm in January. Between 2010 and 2021 the total average annual precipitation was reported to be 902.4 mm.

A review of weather data records for other nearby weather stations (Dunville, Hagersville, and Simcoe) indicates a similar average annual precipitation and temperature ranges. As such, it is anticipated that the climate data presented at the Hamilton A Station accurately represents Site conditions.

3. Site Physical Setting

The geologic and hydrogeologic setting of the Site has been extensively studied through a number of field investigations completed to support previous landfill expansions and ongoing environmental monitoring. This data has been compiled to describe the physical setting of the Site and immediately surround lands.

3.1 Site Topography and Drainage

The Site is located within the Haldimand Clay Plain, which is characterized by level topography and relatively poor drainage. The stormwater management facility currently consists of perimeter ditching and a surface water management system pond (SWMS Pond). The function of the stormwater management system is to capture stormwater runoff from capped portions of the landfill and surrounding on-Site buffer zones and direct that stormwater to the SWMS Pond by way of perimeter ditching. Stormwater that has contact with waste (i.e., non-capped areas of the landfill) is directed to the leachate collection system within the landfill cell. The SWMS Pond operates as a continuously open pond with an outlet control structure. The location of the SWMS Pond is presented on **Figure 3.1**.

The roadside ditch along the east side of Brooks Road adjacent to the Site drains south through a culvert under the abandoned railway corridor and empties into a small, natural stream channel which is part of the head waters of Norton Creek. Other drainage from adjacent lands to the west of Brooks Road also flows in culverts under Brooks Road to provide surface runoff to Norton Creek. Other surface runoff contributions include ephemeral streams on lands south of the Site that enter Norton Creek via culverts under the abandoned railway corridor.

3.2 Site Geology

Examination of the stratigraphic logs generated from the extensive Site investigations completed by M&B Ltd., 1985; HPE Inc., 1992, and GHD 2001 to 2022 indicate that the overburden geology is relatively uniform beneath the Site. Soil and groundwater investigative locations completed at the Site are illustrated on **Figure 3.1**.

In general, the Site is characterized by a thick (14 to 18 m) glaciolacustrine layer of stratified silty clay and clay, silty clay till, and varved clays (referred to collectively as the native silty clay), underlain by a thin (1 to 3 m) discontinuous layer of silty sand till with varying concentrations of gravel and clay. Bedrock is encountered at depths varying from 15 to 20 mBGS. A thin surficial deposit of topsoil is generally observed at the surface of the Site, except for the southwestern portion, where refuse associated with historical waste disposal activities was observed prior to the redevelopment of the Site in 2012.

The native silty clay deposits are described as being locally fractured (weathered) from the surface down to depths varying from 3 to 5 mBGS and are characterized as a very stiff to hard unit with low plasticity. At depths more than 5 m, the native silty clay deposits have little to no fracturing with a hardness described as stiff to very stiff.

Underlying the native silty clay deposits, a thin discontinuous silty sand till with varying concentration of clay and gravel is encountered across the Site. The silty sand till ranges in thickness from 1 to 3 m and often contains cobbles and/or broken angular bedrock fragments. This deposit is usually well graded/poorly sorted with fine to medium grained sand, minor silt and trace clay, and is described as dense to compact, grey, and saturated. The silty sand till is referred to as a basal till and exists directly over the bedrock.

Bedrock underlying the Site has been identified as a fractured shale, dolostone and gypsum of the Salina Formation. As illustrated on **Figure 3.2**, the top of bedrock elevation ranges from 180.8 to approximately 187.0 m above mean sea level (mAMSL). A small bedrock valley has been interpreted from northwest to southeast across the Site. The small depression is characterized by the thicker silty sand basal till deposit. A bedrock ridge is located on the northern bounds of the small valley with bedrock highs located in the northern portion of the Site.

To illustrate the main geological features of the Site, two cross-sections have been prepared. The locations of the cross-sections are shown on **Figure 3.3** and the cross-sections are presented on **Figures 3.4** and **Figure 3.5**. These cross-sections illustrate the general relationship of overburden thickness/stratigraphy and top of bedrock position.

Detailed descriptions of the geology encountered in boreholes advanced at the Site are presented in the Stratigraphic and Instrumentation logs presented in **Appendix D** (2013-onwards). For reference, the monitoring well and borehole completion details for all investigation locations are summarized on **Table 3.1**. **Table 3.2** provides a summary of the bedrock surface elevations across the Site.

3.2.1 Native Silty Clay Overburden Characteristics

Previous investigations have included laboratory analyses to characterize the overburden soil at the Site. As described above, overburden in the Region generally consists of silty clay glaciolacustrine deposits, silty clay till, or varved clay. Results of the extensive subsurface investigations at the Site concur with this. Thus, overburden soil characteristics are generally comparable across the Site and historic soil characterization analyses is inferred to be representative of the proposed expansion area to the north. Previous analyses have included grain size analyses, estimates of hydraulic conductivity based on Hazen's analysis, analyses for cation exchange capacity (CEC), fraction of organic carbon (FOC), and mineralogical assessments. In addition, geotechnical analyses have been completed on selected soil samples, including moisture content, bulk density and Atterburg limits (Design and Operations Report, CRA, October 2002). For references the geotechnical analyses have been included as **Appendix E**.

Given the consistency of overburden soils, the following characterizes the overburden at the Site and provides an overview of the analysis described in the 2002 Hydrogeologic Performance Assessment (CRA, 2002). Refer to the 2002 report for a more detailed discussion.

Grain Size

Select grain size analyses results identified a stratified silty clay unit extending from the shallow overburden down to at least 10 metres below ground surface (mBGS), and silty sand till with trace gravel and clay in the deeper overburden (at depths in excess of 13 mBGS).

The grain size distribution obtained for the silty clay unit is consistent with prior results and indicated that the deposit is generally composed of 60 percent clay size particles. Based on the results of the grain size analyses carried out to date, the grain size distribution of the silty clay material encountered down to depth of 13 mBGS is very consistent. The material is therefore characterized as being relatively homogeneous.

Cation Exchange Capacity

The cation exchange capacity (CEC) of a soil is a measure of the ability of the soil to remove cations (positively charged ions) from groundwater which migrates or travels through the soil. The CEC is dependent on the type and amount of clay present in the soil as clay minerals typically have a deficiency of cations and therefore, an ability to absorb (adsorb) cations from the groundwater. Leachate generated at landfill sites is typically elevated in cations. Thus, the CEC values are used to estimate the capability of soils, situated beneath or in the vicinity of landfill sites, to retard the vertical and lateral migration of leachate derived cations.

The results of the CEC analyses indicate that the CEC of the silty clay ranges from 287.1 to 288.4 meq/100 grams, while the CEC of the silty sand till in the deeper overburden was reported at 85.4 meq/100 grams. The CEC values for the Site indicate that the native silty clay observed in the shallow overburden has a high ability to retard cation migration, while the silty sand till located in the deep overburden has a moderate to high ability to retard cation migration.

Fraction of Organic Carbon

The capability of soils to attenuate the migration of organic compounds is in part a function of the organic content of the soils. The results of past FOC analyses show that the FOC of the silty clay ranged from <0.03 to 0.615 percent, with an average value of about 0.3 percent. The FOC of the silty sand till was measured to 0.26 percent.

The FOC values of the samples analyzed indicate that the overburden material (native silty clay and the silty sand till) has a relatively low capability to attenuate the migration of organic compounds.

3.3 Site Hydrogeology

In general, the geologic units identified at the Site may be grouped into two main hydrogeologic units separated by the thick silty clay aquitard unit, as follows:

i) An unconfined water table (shallow overburden) unit within shallow fractured portion of the native silty clay (weathered) unit

ii) Native silty clay aquitard

iii) A confined basal till overburden/shallow bedrock aquifer

The two hydrogeologic units (unconfined water table within the fractured native silty clay and the confined basal till overburden/shallow bedrock aquifer) are separated by a thick (between 9 and 15 m) layer of stratified silty clay, silty clay till, and varved clays which form an aquitard of very low hydraulic conductivity (native silty clay aquitard). Groundwater level data historically gathered from the shallow overburden unit and basal till overburden/shallow bedrock aquifer indicate that the presence of the silty clay aquitard results in hydraulic separation of the two units. A hydraulic head difference varying from 9.5 to 15 m has been historically measured at the location of nested wells.

3.3.1 Shallow Water Table Unit

The water table unit is contained within the fractured (weathered) silty clay unit. The hydraulic conductivity of the weathered portion of the silty clay unit has been estimated at approximately $2.3x10^{-6}$ cm/s. Based on the groundwater data, the water table unit is generally encountered at depths varying from 0.5 to 4 mBGS. Horizontal hydraulic gradients within the water table are relatively flat, making determination of a precise or consistent flow direction difficult. Notwithstanding, groundwater flow within the water table unit has generally been interpreted to be to the south toward Lake Erie.

Based on the hydrogeologic characteristics of the water table unit, and assuming an overall effective porosity of 30 percent, horizontal linear groundwater velocities of between 0.02 to 0.24 m/year have been estimated.

For reference, the attached **Table 3.3**, includes a summary of the hydraulic conductivity testing results completed at the Site. **Table 3.3** is inclusive of the testing completed in the shallow water table unit, silty clay aquitard, and basal till overburden/shallow bedrock aquifer units (described below).

3.3.2 Native Silty Clay Aquitard

The native silty clay aquitard encountered beneath the water table unit consists of a stratified unweathered silty clay, silty clay till, and varved clay deposits, which are generally characterized as being stiff to hard with little to no fracturing. The fractured portion of the native silty clay aquitard extends to between 3 to 5 mBGS. Thus, the competent, unfractured, native silty clay aquitard varies in thickness from 9 to 15 m and is further defined by a low to medium plasticity as well as a very low hydraulic conductivity. In-situ field testing and laboratory analyses performed on the various units forming the silty clay aquitard have provided a hydraulic conductivity range of $1x10^{-6}$ to $1.4x10^{-8}$ cm/s. The vertical hydraulic conductivity was determined to be approximately $1.4x10^{-8}$ cm/s through laboratory testing of an undisturbed silty clay sample collected at a depth of 12.2 mBGS (HPE Inc., 1992).

Groundwater level data from the water table unit and basal till overburden/shallow bedrock aquifer indicate that the presence of the native silty clay aquitard results in hydraulic separation of the two units. Differences in piezometric head of greater than 10 m are frequently observed between the water table unit and deep basal till overburden/shallow bedrock aquifer as measured at various on-Site nested monitoring wells.

3.3.3 Basal Till Overburden/Shallow Bedrock Aquifer

Underlying the native silty clay aquitard, a confined basal till overburden/shallow bedrock aquifer exists within the lower portion of the silty sand till unit and the shallow fractured bedrock. Groundwater quality and water level data historically gathered from monitoring wells screened within the lower silty sand till unit exhibited similar hydrostatic levels and hydrochemical characteristics which are not substantially different from samples obtained from well nests screened solely with the shallow bedrock. Therefore, these two geological units have been generally considered to form one aquifer. The average hydraulic conductivity of the basal till overburden/shallow bedrock aquifer has been calculated to be approximately $1.4x10^{-4}$ cm/s, based on in-situ field-testing.

The deep basal till overburden/shallow bedrock aquifer is encountered at depths varying from 14 to 18 mBGS. The groundwater flow pattern of this aquifer is overall towards the south or southwest. Horizontal hydraulic gradients within this unit are generally very flat, typically ranging between 0.0002 and 0.004 m/m.

Based on the hydrogeologic data, the horizontal linear groundwater velocity within the deep basal till overburden/shallow bedrock is estimated to be approximately 0.3 m/year toward the southwest.

The following figure provides a conceptual schematic illustration of the geologic and hydrogeologic setting of the Site.

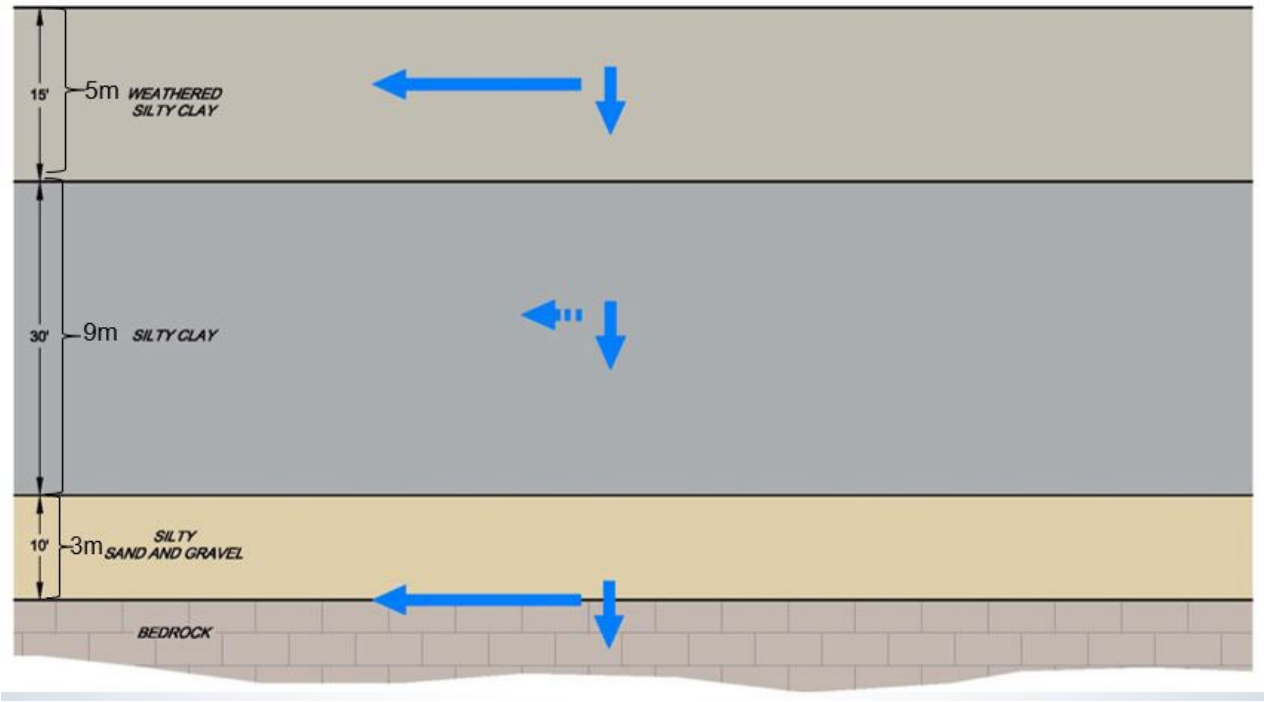

Figure 3.6 Conceptual Site Geology and Hydrogeology

4. Natural Gas, Mines, and Karst Considerations

4.1 Natural Gas Deposits and Natural Gas Wells

A review of oil, gas and salt resource mapping in Ontario indicates that active and plugged gas wells are located within the vicinity of the Site. No active/plugged gas wells were identified on the Site, however research indicates that 23 current and former gas wells are located within the vicinity of the Site. A total of 16 gas wells have been identified

as abandoned, of which 15 have been identified as plugged, and a total of seven gas wells that may be active, suspended, or abandoned are found within the vicinity of the Site. The gas wells all targeted the Haldimand Pool within the Clinton Group and were drilled to a total depth (true vertical depth) ranging from 207.6 to 229.5 mBGS at approximately the top of the Queenston Formation. An east west trending natural gas pipeline is also located approximately 400 m south of the Site. A list of the Ontario Oil and Gas Wells located within the vicinity of the Site is itemized in **Table 4.1**. The locations of the oil and gas wells are illustrated on **Figure 3.7.**

Due to the depths of the natural gas wells, it is not anticipated that there would be any influence from the landfill on the natural gas wells.

4.2 Mining Claims and Abandoned Mines

A review of the Ministry of Northern Development and Mines (MNDM) information for abandoned mines and mining claims was completed. No mining claims were identified within the vicinity of the Site, however one abandoned mine was identified to the northwest of the Site (AMIS File # 04888 / MDI # MDI30L13NW00003). The mine was reviewed in a CRA report entitled Well Survey and Limited Hydrogeological Assessment, dated July 2004 (2004 Report). The 2004 Report indicates two documents were reviewed: Gypsum in Ontario, C.R. Guillet, dated 1964, and Abandoned Mines Hazard Abatement Program, London District Site Examinations, prepared by Patrick Chance & Associates Consulting Geologists, dated 1994 (1994 Inspection). The information presented below was gathered from the above-referenced reports and has been revised with the most current information available including information from the Gypsum Mine Investigation Report prepared by GHD in 2016 that provides an assessment of potential influences of the former Cayuga Gypsum Mine on groundwater at the landfill Site.

The former gypsum mine was operated by the Cayuga Gypsum Company Limited between 1942 and 1949. Gypsum was mined from a 0.9 m thick bed at a depth of 25.9 mBGS.

Mining operations were accomplished via two mine shafts. The first shaft was located approximately 112 m south of Townline Road and 350 m west of Brooks Road. The former shaft can reportedly be located by a 2.4 m deep depression, with a footprint of 3.0 by 4.6 m. The shaft was a vertical prospect shaft of unknown support and was back-filled with unknown materials. The 1994 Inspection did not document any evidence of subsidence; however, the report recommended that a 50 m radius area of caution be observed in the vicinity of this shaft.

Based on the available historical documentation, approximately 10,300 tonnes of gypsum was reportedly removed from this prospect shaft during the operation of the mine. With a density of 2.3 tonnes/m^3 and a thickness of 1 m, this would correspond to lateral workings with an aerial footprint of approximately 4,356 square metres (m^2). In order to access the gypsum in the ~1 m seam, it is likely that approximately 1-2 m of the overlying shale bedrock would also have been removed.

The second shaft was located approximately 305 m south of the first shaft. The 1994 inspection was reportedly unable to locate the second shaft. The second shaft was also a vertical prospect shaft of unknown support and it is unknown if the shaft has been back-filled. It is not known how much gypsum was removed from this shaft.

Due to property access restrictions, an inspection of the former Cayuga Gypsum Mine could not be conducted.

During the operation of the mine from 1942 to 1949, dewatering operations would likely have been conducted to keep the mine shafts and associated galleries dry. As such, during the operation of the mine the local groundwater flow would have been influenced by mine dewatering activities. Active removal of large quantities of groundwater from the bedrock would have resulted in inward hydraulic gradients. As such, the bedrock groundwater flow in the vicinity of the former mine would have been directed towards the active galleries during operation of the mine.

Upon closure of the mine in 1949, the dewatering activities at the mine would have ceased and the associated mine shafts and galleries would have flooded within a short period of time after closure. The mine has now been abandoned for over 70 years. Since the former galleries and shafts are flooded, no water deficit should be present between these former underground structures and the surrounding bedrock. Thus, essentially steady state conditions should exist, and the former underground structures will no longer have a hydraulic influence on the local bedrock aquifer.

In the unlikely event that the former mine shafts would not have been properly sealed following closure of the mine, there could exist the potential for surface water and groundwater in the shallow overburden to enter the mine shafts and migrate to the underlying bedrock aquifer. If infiltration were occurring, the shafts would be acting as a sink to the overburden groundwater and a source of recharge to the local bedrock groundwater. This would result in a cone of depression in the overburden groundwater towards the former mine shafts and radial flow from the galleries in the bedrock groundwater. Under this scenario there could be a potential for bedrock groundwater flow being diverted away from the former galleries. However, based on the relatively small dimension of the former galleries (areal extent of approximately 4,356 m2) it is expected that any influence of these galleries on the bedrock aquifer would be localized to the immediate vicinity of the former galleries. Bedrock aquifer influence beyond the limits of the former Cayuga Gypsum Mine property is anticipated to be negligible.

The Gypsum Mine Investigation Report reviewed information related to historical mining operations including location and extent of mining activities, review of physical site conditions for evidence of historical mining operations, and an evaluation of hydraulic gradients within the available monitoring network to identify potential evidence of a hydraulic influence on horizontal or vertical gradients in the vicinity of the Site. The report concluded that there is no evidence of an influence related to the former Cayuga Gypsum Mine on the bedrock aquifer at the Site.

4.3 Karst

A review of the Ontario Geological Survey Karst of Southern Ontario and Manitoulin Island report indicates that no potentially karst, inferred karst, or known karst bedrock has been identified within the 1KM of the Site. Furthermore, the groundwater conditions are unfavourable for the dissolution of the bedrock and bedrock consists of generally argillaceous dolostone, shale, and evaporites (primarily gypsum), the latter of which precludes the formation of large-scale karst features. Furthermore, no sink holes or caving features have been identified with 1 km of the Site.

5. Residual Site Impact Assessment

The following sections have been updated from previous assessment of residual site impacts to focus on current leachate quality within the engineered landfill and current groundwater and surface water quality surrounding the lined landfill footprint.

5.1 Leachate and Groundwater Quality

Since the Site was redeveloped, leachate generated from within the lined waste cells is conveyed into the Leachate Collection System (LCS) and flows by gravity to a sump located in the southeast corner of the landfill base. The leachate is pumped from the sump to a storage tank for on-Site treatment and/or off-Site disposal.

Leachate quality has been monitored on an annual basis since 2011 to characterize leachate source contaminants and concentrations. Understanding the characteristics of leachate is important for identifying potential leachate impacts to groundwater and surface water outside the waste footprint,. Leachate samples are analyzed for general chemistry, metals, PAH, and VOCs. The following **Table 5.1** summarizes recent (2021) leachate concentrations in comparison to historical concentration ranges and the corresponding Ontario Drinking Water Standards (ODWS) where available:

Table 5.1 Leachate Character

Parameters	Units	2021 Results	Historical (2011-2021) Concentration Range	Comparative ODWS
Alkalinity	mg/L	820	820 – 3,700	30 – 500 (OG)
Chloride	mg/L	1,130	555 – 1,440	250 (AO)

Parameters	Units	2021 Results	Historical (2011-2021) Concentration Range	Comparative ODWS
DOC	mg/L	188	15.6 – 767	5 (AO)
Hardness	mg/L	1,640	1,560 – 2,310	80 – 100 (OG)
Sulphate	mg/L	287	26 – 1,490	500 (AO)
TDS	mg/L	4,120	2,980 – 5,800	500 (AO)
Aluminum	mg/L	<0.50	0.063 – 1.69	0.1 (OG)
Arsenic	mg/L	0.030	0.030 – 69	0.010 (MAC)
Boron	mg/L	10.0	4.97 – 16.1	5.0 (IMAC)
Chromium	mg/L	<0.050	0.016 – 0.058	0.050 (MAC)
Iron	mg/L	<1.0	<0.10 – 7.51	0.30 (AO)
Lead	mg/L	<0.0050	<0.00050 – 0.0088	0.01 (MAC)
Manganese	mg/L	--	0.249 – 3.04	0.05 (AO)
Sodium	mg/L	716	255 – 843	200 (AO)
Benzene	µg/L	3.40	<0.8 – 4.3	1 (MAC)
Ethylbenzene	µg/L	8.31	<1.00 – 11.5	2.4 (AO) / 140 (MAC)
Toluene	µg/L	1.06	1.06 – 41	60 (AO)
Benzo(a)pyrene	µg/L	<0.010	<0.010 – 0.085	0.01 (MAC)
Naphthalene	µg/L	8.12	2.1 – 11	--
Phenanthrene	µg/L	0.411	0.217 – 4	--
Notes: '—' indicates that no information available				

In general, the current landfill leachate is characterized by elevated conductivity, alkalinity, chloride, DOC, hardness, phenolics, phosphorus, TDS, arsenic, boron, and iron.

Benzene, cis-1,2-dichloroethene (cis-1,2-DCE), ethylbenzene, xylenes (m&p, o), toluene, 1-Methylnaphthalene / 2-Methylnaphthalene, acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene are also commonly detected in leachate at the Site.

5.2 Contaminants of Concern

Site-specific leachate contaminants of concern are listed below. Individual general chemistry and metals parameters have been identified based on elevated concentrations in leachate at the Site. The presence of organic parameters in leachate may be used in identifying potential leachate impacts to groundwater in general. Specific VOC and PAH parameters have been identified based on elevated concentrations in leachate and low drinking water standards in groundwater.

– General Chemistry: alkalinity, boron, chloride, DOC, hardness, sodium, TDS
– Metals: arsenic, boron, cadmium, iron;
– VOCs: particularly BTEX and vinyl chloride; and
– PAHs: Particularly benzo(a)pyrene, fluorene, naphthalene, phenanthrene

5.3 Groundwater Quality

Groundwater quality has been monitored in each of the hydrogeologic units on a semi-annual basis following the early 2000's modernization of the Site as described in the Design and Operations Report (CRA, October 2002) and the Hydrogeologic Performance Assessment (CRA, October 2002). Samples are typically analyzed for general chemistry, metals, PAH, and VOCs.

In 2015, GHD undertook a review of the available database of groundwater and leachate quality data for the Site in order to develop a Site-specific Trigger Level Program (TLP) and Contingency Response Plan (CRP). An updated Design and Operation report was submitted and approved in December 2018 which included the TLP and CRP. The purpose of the TLP is to provide timely identification of potential Site-related water quality impairment and in turn permit implementation of appropriate contingency measures to mitigate the potential for water quality non-compliance.

Groundwater at the Site is generally assessed by comparing spatial and temporal trends between leachate and upgradient and downgradient groundwater monitoring locations. Groundwater compliance at the Site is assessed by comparing Site boundary groundwater quality to Site-specific Reasonable Use Concept (RUC) criteria. The RUC criteria are calculated from generic ODWS and background concentrations. For the purposes of the TLP, 85 percent of the Site-specific RUC criteria have been used as trigger levels. Accordingly, the TLP is intended to provide advance warning of potential Site groundwater compliance issues.

Shallow overburden water quality is currently assessed using groundwater quality data collected from ten on-Site shallow overburden wells (MW1B-13, MW2B-07, OW1B-06, OW3B-13, OW5B-06, OW8B-06, OW9B-06, MW10B-18, MW11B-19, MW12B-19) and two off-Site shallow overburden wells (MW5B-09, MW6B-07). Basal till overburden/shallow bedrock water quality is also monitored semi-annually and water quality is assessed based on groundwater monitoring data collected from ten basal till overburden/shallow bedrock monitoring wells. Of these monitoring wells, ten are located throughout the Site (MW1A-13, MW2A-01, OW1A-06, OW3A-13, OW5A-06, OW8A-06, OW9A-06, MW10A-18, MW11A-19, MW12A-19), and two off-Site basal till overburden/shallow bedrock monitoring wells (MW5A-09, MW6A-07) which are located approximately 150 m south of the Site.

The locations of the Site's groundwater monitors are illustrated on **Figure 3.1**.

Natural background water quality within the on-Site shallow overburden unit is generally characterized by elevated levels of alkalinity, hardness, DOC, TDS, sulphate, and iron. The basal till overburden/shallow bedrock unit is characterized by naturally elevated levels of sulphate, hardness, TDS, iron, and manganese.

With the exception of OW8B-06, shallow groundwater monitors at and surrounding the Site have demonstrated water quality in compliance with the Site's TLP which is generally consistent with background water quality.

Elevated sodium, chloride and TDS (with chloride above the Site's RUC) are noted in the shallow overburden unit at on-Site monitoring well OW8B-06. Water quality impacts are interpreted to be due to the road-salt impacts as this well is located in close proximity to Brooks Road. Concentrations of benzo(a)pyrene (often above RUC limits) have also been noted in the groundwater sampled from the shallow overburden unit at on-Site monitoring well OW8B-06. Detectable PAHs, including benzo(a)pyrene at OW8B-06 are interpreted to be related to historic slag stockpiles in the vicinity of the Site and the use of road ballast along the Site entrance. The landfilled waste is not interpreted to be the source of detectable PAHs in groundwater at OW8B-06.

Similar to the shallow overburden, water quality results from the basal till overburden/shallow bedrock have shown no evidence of landfill related impacts as all monitoring results have been below trigger levels and have shown water quality comparable to background.

6. Hydrogeologic Assessment of Proposed Landfill Design

The following sections present a hydrogeologic assessment of the proposed landfill expansion design. The assessment has been undertaken to evaluate the expansion design with respect to its potential effect on downgradient receptors in terms of groundwater quality. Considerations included as part of this assessment include:

– Characteristics of the proposed landfill expansion design;
– Evaluation of the quality of the native silty clay deposits for use as a natural attenuation layer (thickness, homogeneity, and hydraulic conductivity);
– Assessment of existing leachate character;
– Receptors of concern;
– Vertical and horizontal contaminant migration; and
– Predictive modelling of future Site performance.

6.1 Landfill Design

The Brooks Road Landfill, including the proposed expansion, has been designed to ensure appropriate protection of the surrounding environmental. The landfill expansion will include an additional stage of landfilling, Stage 9, to the north of the existing approved landfill footprint. This expansion will provide an additional 219,400 m^3 of landfill capacity that will be filled following the Stage 5 through 8 of the vertical expansion.

The existing approved landfill footprint area is approximately 60,705 m^2 (6.07 ha). The Stage 9 expansion area includes an additional 10,230 m^2 (1.02 ha). If approved, the final landfill footprint will be 71,461 m^2 (7.15 ha).

Based on the final contours (refer to the accompanying Design and Operations Report, GHD, 2024), the expanded landfill footprint will include a minimum buffer width of 30 m between the east and west Site boundaries and the landfill footprint, 42 m between the north boundary, and a minimum 37 m between the south-eastern corner of the landfill footprint and the Site boundary.

The base design for the existing landfill stages has been maintained for the Stage 9 expansion area and includes: a woven geotextile overlying a drainage layer (for leachate collection), which will overlie a non-woven geotextile and a 60-mil thick, textured, high density polyethylene (HDPE) liner, which will, in turn, overlie a 750 mm thick engineered clay layer. The engineered clay will be placed and compacted using on-Site soil excavated from the silty clay aquitard during the construction of the landfill and will have a hydraulic conductivity equal to or lower than the native on-Site silty clay aquitard (i.e. $2x10^{-8}$ cm/sec).

The base of the Stage 9 expansion will be consistent with the existing landfill base and will extend to a maximum depth of approximately 10 mBGS with a base bottom that will be excavated into the silty clay aquitard unit.

The landfill base is designed with a leachate collection system that overlays the composite HDPE/clay liner. The leachate collection system will consist of a stone layer placed over the base of the landfill at a minimum thickness of 0.3 m on the base side slopes and a minimum thickness of 0.5 m elsewhere. A non-woven geotextile will be installed between the stone layer and the underlying liner and the overlying waste. Leachate collection pipes will be made of HDPE and will be 200 mm in diameter with perforations 12 mm in diameter located along the length and around the circumference of the pipe.

The leachate collected by the leachate collection system will be removed from the sump being the low point in the collection system on a continuous basis through pumping. Leachate will be directed, via buried forcemain, to a storage tank for on-Site treatment and/or off-Site disposal.

6.2 Use of the Native Silty Clay Aquitard as a Landfill Base

The design of the landfill cells is based on the availability of low permeability material to ensure that the base of the landfill as well as the composite liner can conform to the design requirements.

The native silty clay aquitard, into which the landfill base has been installed, consists of a stratified unweathered silty clay, silty clay till, and varved clay deposits as described in Section 3.3.2. As described in Section 3.3.2, the native silty clay aquitard is of sufficient thickness, low hydraulic conductivity, and geotechnical character to provide a natural barrier that is protective of the basal till overburden/shallow bedrock aquifer.

The natural soil characteristics of the native silty clay aquitard; low to medium plasticity, low sensitivity and low activity indicate that the natural silty clay is not sensitive to disturbance and can be placed and compacted by equipment commonly used in earthworks projects. No significant difficulties were encountered during previous landfill cell construction operations at the Site and none are expected with the Stage 9 expansion.

Based on the hydrogeologic and geotechnical data, the natural silty clay to be excavated can be used to construct the clay liner and achieve the design hydraulic conductivity value of 2×10^{-8} cm/s, provided a good bond is achieved between successive compacted layers. The silty clay used in the construction of the liner will be at moisture contents at or just above (plus 1 to plus 3 percent) the optimum moisture content as determined in the standard proctor test. The silty clay will be placed in lifts consistent with the size of sheepsfoot roller (not exceeding 200 mm in thickness) and uniformly compacted to a minimum of 98 percent of the standard proctor maximum density.

6.3 Leachate Characteristics

As defined in the ECA (Waste), the landfill has accepted solid non-hazardous Industrial, Commercial and Institutional waste (IC&I waste). The waste stream will not change for the expansion area and so the leachate character described in Section 5.1 is expected to be representative of future leachate generated across the landfill.

The leachate is characteristic of land clearing and construction and demolition waste landfills (C&D or IC&I landfills). Based on the nature of waste normally found in ICI landfills (wood, small amounts of steel, asphalt shingles, and construction debris) the quality of ICI leachate is generally much weaker in comparison to leachate from municipal landfill and also tends to have a lower organic content. As a general rule of thumb, ICI leachate is often established at less than half the strength of municipal waste landfill. Non-hazardous contaminated soil may contain a variety of contaminants depending on the source of the waste material. Common soil contaminants include metals, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and petroleum hydrocarbons (PHCs). The leachability of the contaminants in non-hazardous contaminated soil is low compared to hazardous waste that may contain elevated concentrations and potentially include free-product. Asbestos-Containing Material (ACM) does not affect the quality of the leachate in terms of impacts from the asbestos material, as asbestos does not have the leachability characteristic that distinguish hazardous chemicals. Once landfilled, ACM is an inert material.

6.4 Predictive Flow and Transport Modelling

To assess the potential degradation of on-Site and off-Site groundwater quality via leakage through the base of the landfill liner and the underlying native silty clay aquitard, a mathematical evaluation of the vertical and horizontal migration potential of various landfill indicator contaminants using standard groundwater modelling procedures adapted to the hydrogeological setting and the landfill design has been undertaken.

The objective of the models is to simulate the quality of the groundwater leaching into and then migrating within the deep basal till overburden/shallow bedrock aquifer underlying the base of the landfill. To simplify the model and to provide a security factor to the simulation results, no attenuation factors (such as chemical, and biological processes including, adsorption, biodegradation, cation and anion exchange, filtration, and precipitation) that commonly occur

between the clayey soils and the leachate constituents were incorporated into the simulation. As such the model is considered to be conservative, as it will overestimate the rate of contaminant movement.

The model used for the purposes of the vertical migration simulation is similar to the model used to test the hydrogeological feasibility of the design as part of the hydrogeologic performance assessment undertaken in support of the original Design and Operation (D&O) Plan (CRA, 2004) and the Leachate Trigger Level Plan (GHD, 2019) which have previously been approved for the Site.

The vertical migration of contaminants from the base of the landfill through the composite liner (composed of the HDPE liner and compacted clay) and the underlying native silty clay was simulated with a one-dimension advection-dispersion model. An adaptation of the 1DTRANSEN model, developed by Dr. N.R. Thomson, was selected as the vertical migration model for the Site for the following reasons:

– The model includes the dominant contaminant transport processes (advection and dispersion)
– The model is a flexible and allows for variation in source characterization and failure scenarios
– the model has been verified and validated
– the model was used as the basis for the original hydrogeologic assessment of liner performance and thus formed one of the bases for approval of the Site design

In order to provide a conservative assessment of the mobility of leachate derived contaminants at the Site, the landfill was modelled under 2 different scenarios. The first scenario involved 6 m of leachate mounding over the composite liner for 50 years, followed by complete failure of the HDPE liner. In this scenario, the leachate collection system and the HDPE liner were modelled with a service life of 50 years in order to maintain consistency with the previously modelled failure scenario. Following the 50-year service period, the HDPE liner was removed from the liner system and the leachate head was maintained at 6 m above the base of the collection system.

The second scenario modelled the effect of 6 m of head on the liner system with the HDPE liner entirely absent for the duration of the model.

GHD has completed the predictive modelling using leachate quality consistent with measured leachate concentrations from 2017-2021. Peak concentrations have been used to be conservative. Previous predictive modelling employed expected leachate characteristics using leachate quality from nearby landfills with similar waste streams (2002 Hydrogeologic Assessment (CRA, 2002) and the Leachate Trigger Level Plan (GHD, 2019). The following predictive model uses leachate quality reported at the Site since 2011. Indicator parameters were chosen based on comparing leachate quality to background groundwater quality in order to identify leachate constituents that are elevated in leachate but not in groundwater. Further, indicator parameters have been chosen to represent the major analyte categories (general chemistry, metals, VOCs, and PAHs). To conservatively assess the hydrogeologic performance of the landfill expansion and potential leakage through the landfill liner, peak or maximum concentrations reported in leachate have been used to represent leachate generated at the Site.

Table 6.1 below, presents a summary of input parameters for the vertical migration simulation scenarios.

Table 6.1 Vertical Migration Model Input Parameters

Source Concentration					
Indicator Parameters	Initial Source Concentration	Decay Function[(1)]			Diffusion Coefficient (m^2/year)
		T1	T2	x	
Chloride	1,130 (mg/L)	1.5	6	-0.065	0.06402
Boron	10.1 (mg/L)	1.5	6	-0.125	0.07030
Cadmium	0.0005 (mg/L)	1.5	6	-0.125	0.06402
Benzene	4.27 (µg/L)	1.5	6	-0.139	0.03237
Vinyl Chloride	0.76 (µg/L)	1.5	6	-0.069	0.03786

Source Concentration					
Fluorene	0.544 (µg/L)	1.5	6	-0.069	0.02488
Phenanthrene	0.492 (µg/L)	1.5	6	-0.069	0.01395
Underlying the Leachate Mound					
Material	Hydraulic Conductivity		Average Thickness		Porosity
HDPE Liner	1 x 10^{-11} cm/s		1.5 mm		0.3
Compacted Clay liner	2 x 10^{-8} cm/s		0.75 m		0.3
Native Silty Clay	2 x 10^{-8} cm/s		5.6 m		0.3
Modeling Scenario					
Scenario	Time Frame		HDPE Liner Condition		Leachate Head
1	From 0 to 50 years		HDPE Liner is good		6 m
	After 50 years		HDPE Liner has failed		6 m
2	From 0 to 50 years		No HDPE Liner		6 m
	After 50 years		No HDPE Liner		6 m
Notes: Decay function were obtained from Lu et al. (1981) and Rowe (1994) – described below.					

The general decay function provided by Lu et al. (1981) and Rowe (1974) is presented below:

$$\frac{C(t)}{C(0)} = e^{-x(T1-T2)}$$

C(t)	Contaminant concentrations at time t (mg/L or µg/L)
C(0)	Initial source contaminant concentration (mg/L or µg/L)
X	Diffusion coefficient
T1 and T2	Temporal boundary conditions: T1 is set to a 0-1.5 years to represent initial conditions; T2 is set to 1.5-6 years an assumed period of increasing concentrations as contaminants leach from the source material; after T2, concentrations exponentially decay

The results of the vertical model are presented in **Table 6.2** below:

Table 6.2 1Dtransen Model Results

Scenario 1	**6 m Leachate Head (before and after HDPE Liner fails (50 years before present)**				
Indicator Parameters	***Predicted Peak Concentration through base of Native Clay (1)***	***Predicted Time to Reach Peak Concentration (years) (1)***	***Predicted Vertical Groundwater Flux through base of Native Clay (m/year per unit area – m/year/m²)***	***Background Concentration in Aquifer***	***RUC (Trigger Level)***
Chloride (mg/L)	**192.472**	42.6	0.021024	15.7	133.0
Boron (mg/L)	1.324	33.0	0.021024	0.527	1.65
Benzene (µg/L)	**0.397**	52.4	0.021024	ND (0.5)	0.25
Vinyl Chloride (µg/L)	0.107	56.2	0.021024	ND (0.5)	0.25

Scenario 1	6 m Leachate Head (before and after HDPE Liner fails (50 years before present)				
Fluorene (µg/L)	0.071	70.6	0.021024	ND (0.020)	30
Phenanthrene (µg/L)	0.063	93.0	0.021024	ND (0.020)	0.5
Scenario 2	6 m Leachate Head (No HDPE Liner)				
Chloride (mg/L)	**192.472**	42.5	0.021024	15.7	133.0
Boron (mg/L)	1.324	32.9	0.021024	0.527	1.65
Benzene (µg/L)	**0.397**	52.2	0.021024	ND (0.5)	0.25
Vinyl Chloride (µg/L)	0.107	55.8	0.021024	ND (0.5)	0.25
Fluorene (µg/L)	0.071	70.4	0.021024	ND (0.020)	30
Phenanthrene (µg/L)	0.063	92.8	0.021024	ND (0.020)	0.5

Notes:

BOLD – anticipated exceedance of the RUC (2017-2021)

Peak concentration and time required to reach peak concentration were obtained using 1DTRANSEN transport model

Average Median concentrations from 2017-2021 from background monitoring wells MW1A-13, OW3A-13, and OW9A-06 have been used to calculate the RUC and average background concentrations presented above.

ND - Parameter not detected above Method Detection Limit (MDL).

Half of the MDL has been used in the RUC calculations

Time series graphs presenting the variation in concentrations of the source, as well as the projected concentration at the base of the native silty clay are presented in **Figures 6.1 and 6.2** for Scenarios 1 and Scenario 2.

Based on the results of the conservative vertical migration simulation scenarios using current leachate quality from the Site, the peak concentrations of chloride and benzene are predicted to marginally exceed the calculated Site-specific RUC criteria upon entering the basal till overburden/shallow bedrock aquifer.

As previously discussed, the projected quality of the groundwater leaching from the base of the native silty clay aquitard unit was modelled using a direct adaptation of the advection-dispersion equation with no input for soil/leachate interaction/degradation, which would further reduce the peak levels reported. The following section presents the results of the horizontal migration simulation. As is discussed in this section, additional attenuation of the peak concentrations will result from the combination of the minor quantities of vertical leakage entering the basal till overburden/shallow bedrock aquifer horizontal flux.

6.5 Horizontal Migration Simulation

Following vertical migration by advection and diffusion through the composite liner and native silty clay aquitard deposit, leachate impacted groundwater will eventually reach the basal till overburden/shallow bedrock aquifer at the concentrations and vertical flux presented in **Table 6.3**. From that point the attenuated leachate contaminants will be further attenuated by mixing with horizontal bulk groundwater flow of the basal till overburden/shallow bedrock aquifer beneath the landfill footprint.

Beyond the downgradient limit of the landfill footprint, the attenuated contaminants in the basal till overburden/shallow bedrock aquifer will further mix with downgradient infiltration recharge. The infiltration recharge downgradient of the landfill footprint will further attenuate by dilution any residual leachate derived parameters present in the groundwater prior to off-Site migration.

The contaminant attenuation model utilized to assess the predicted contaminant concentration at the Site boundary within the basal till overburden/shallow bedrock aquifer consisted of a simple mass balance model. A mass balance

model was selected as the preferred modeling approach for the horizontal simulation within the basal till overburden/shallow bedrock aquifer for the following reasons:

– This method is very conservative and uses only dilution for attenuation; and
– The hydrogeological setting of the Site is well understood.

The following subsection outlines the relationship between upgradient groundwater flux flowing into the Site and combining with the vertical flux of leachate impacted groundwater into the basal till overburden/shallow bedrock aquifer. This mass balance simulation provides a conservative estimate of the projected groundwater quality at the downgradient Property boundary. As previously indicated no other chemical, and biological attenuation processes that will occur were incorporated into the simulation.

6.5.1 Upgradient Groundwater Flux

The saturated thickness of the basal till overburden/shallow bedrock aquifer immediately upgradient of the proposed design landfill footprint is approximately 5 m based on the current groundwater levels and the geological data presented in the stratigraphic and instrumentation logs. Taking into account the saturated thickness of the aquifer, an estimate of the volume of groundwater (groundwater flux) migrating across the 2-dimensional plane on the upgradient side of the landfill footprint can be made from the following equation (Darcy's equation):

$$Q = KiA$$

where:

Q: is the groundwater recharge (m^3/s);

K: is the hydraulic conductivity of the aquifer material (m/s);

i: is the horizontal hydraulic gradient (m/m); and

A: is the cross-sectional area across which groundwater flow is occurring (m^2).

As previously noted, the hydraulic conductivity of the basal till overburden/shallow bedrock aquifer is approximately 1.4×10^{-4} cm/s, while a horizontal hydraulic gradient of approximately 0.002 m/m has been calculated for the basal till overburden/shallow bedrock across the Site. Based on a unit width of 1 m, the anticipated upgradient recharge to the basal till overburden/shallow bedrock aquifer is calculated at 0.44 m^3/year (per unit width). The upgradient width of the landfill is approximately 365 m which results in 161 m^3/day of groundwater flux flowing beneath the landfill footprint. The groundwater quality (for indicator parameters) upgradient of the landfill footprint will be consistent with average groundwater quality established for the deep basal till overburden/shallow bedrock aquifer.

6.5.2 Leachate Derived Groundwater - Vertical Flux

An estimate of the projected leachate derived groundwater flux into the basal till overburden/shallow bedrock aquifer through the silty clay aquitard was presented in Section 6.4. The estimated vertical flux is based on the proposed final landfill footprint and conservative assumption that there would be 6 m of leachate head across the entire liner system. The results of the simulation indicated a vertical flux of leachate impacted groundwater entering the basal till overburden/shallow bedrock aquifer at a rate of 0.021 m/year per unit area (m/year/m^2).

The total area of the landfill, including the proposed expansion footprint, is approximately 7.15 ha which results in a total leachate derived groundwater loading to the basal till overburden/shallow bedrock aquifer of 3.9 m^3/day or approximately 3,900 L/day.

6.5.3 Projected Groundwater Quality at the Site Boundary

The simulated failure scenario groundwater quality in the basal till overburden/shallow bedrock aquifer at the downgradient boundary of the Site was evaluated through a mass balance approach, where the previously defined upgradient and leachate derived groundwater fluxes and their corresponding contaminant concentrations were inputted. The projected concentration at the property boundary was calculated as follows:

$$Concentration\ at\ Boundary = \frac{(Q_1 C_1) + (Q_2 C_2)}{Q_1 + Q_2}$$

where:

Q_1: Vertical leachate derived groundwater flux entering the basal till overburden/shallow bedrock aquifer (L/day)

C_1: Parameter concentration in leachate derived groundwater (mg/L)

Q_2 Upgradient groundwater recharge/flux into deep basil till overburden/shallow bedrock aquifer (L/day)

C_2: Parameter concentration of upgradient recharge (mg/L)

The projected groundwater quality in the basal till overburden/shallow bedrock aquifer at the downgradient boundary of the Site is presented in **Table 6.3**.

A review of the results of the vertical migration simulation and the mass balance assessment of the horizontal migration within the basal till overburden/shallow bedrock aquifer indicates that concentrations leachate derived groundwater entering the aquifer will be reduced by an average factor of 4 prior to off-Site migration.

As shown in **Table 6.3**, groundwater quality is forecasted to be acceptable at the downgradient boundary with respect to the Site-specific RUC criteria and the ODWS (with the exception of benzene and vinyl chloride which are predicted to be at or below the laboratory reporting limits).

It is important to once again stress that the model utilized assumptions are very conservative for several reasons, including the following:

– A reduced native silty clay thickness has been included in the vertical model (5.6 m versus 9 m used in previous Site models). This assumes all landfill leakage will occur from the base of the landfill that will be excavated into the silty clay aquitard. This represents the shortest vertical travel time and least attenuation prior to reaching the basal till/shallow bedrock aquifer,
– Both the vertical and horizontal models include only dilution and dispersion (vertical model only). No additional attenuation factors such as chemical, and biological processes including, adsorption, biodegradation, cation and anion exchange, filtration, and precipitation have been incorporated into the mode. It is reasonable to assume that these processes would contribute additional attenuation not accounted for in the model.
– Peak or maximum concentrations reported in leachate over the past five years have been used to represent leachate generated at the Site,
– Where reported background concentrations were below the method detection limit, half of the MDL has been used to calculate the contaminant mass from upgradient flux while a value of 0.0 has been used to calculate the RUC, and finally
– Infiltration resulting from precipitation within the water table unit between the Landfill footprint and the western boundary of the Site, will contribute to the recharge of the deep basil till overburden/shallow bedrock aquifer, thus assisting in the further dilution of the leachate impacted groundwater prior to off-Site discharge. This has not been included as an additional attenuation mechanism.

Based on the modelling results obtained as part of the modelling exercises it is concluded that the proposed design of the Site will not result in any unacceptable degradation of the groundwater prior to off-Site migration.

7. Proposed Environmental Monitoring and Reporting Programs

Regular monitoring of the environment surrounding the landfill footprint is necessary to demonstrate that a landfilling site is performing as designed and the impacts on the environment are acceptable. Regular monitoring of the groundwater and surface water regimes allows for analysis of trends over time and ensures there is early warning of potential problems.

Based on the hydrogeologic setting of the Site and the proposed design of the landfill, the groundwater monitoring program needs to address groundwater quality in both the shallow water table unit and the deep basal till overburden/shallow bedrock aquifer. The deep basal till overburden/shallow bedrock aquifer is a primary receptor of concern as it has some potential to be utilized off-Site as a source of water supply. The current groundwater monitoring program developed for the Site is based on the requirements of O. Reg. 232/98, the landfilled waste, and the known leachate characteristics. As previously discussed, the Site's current environmental monitoring program is robust and sufficient to monitor water quality.

The proposed landfill footprint will expand approximately 30 m to the north. This will cover the current monitoring well nests MW1S/D-07 (located in the northwest) and OW9A/B-06 (located in the northeast). Prior to landfill construction each well nest will be suitably abandoned, via overdrilling, to ensure that the potential for contaminant migration is eliminated. In order to supplement the understanding of upgradient groundwater quality, GHD installed an additional two monitoring well nests on the northern Site boundary (MW13S/D-22 and MW14S/D-22). The approximate locations of MW13S/D-22 and MW14S/D-22 are illustrated on **Figure 3.1**.

The proposed long-term monitoring program for the Site in the context of the expansion is outlined in **Table 7.1**. This proposed monitoring program is equivalent to the current monitoring program undertaken at the Site, with the addition of the supplementary upgradient monitoring well nests installed in 2022 (MW13S/D-22 and MW14S/D-22). This monitoring program is largely consistent with the program outlined in the Site's current ECA. MW1S/D-07 and OW9A/B-06 will be removed from the program once construction on the proposed expansion begins.

Monitoring and operation progress reports will continue to be prepared for the Site and submitted to the District Office of the MECP prior to the March 31st deadline as outlined in the current ECA. Each annual report will include but not be limited to the details outlined in the current ECA (Section 12 (6) through (7)).

7.1 Trigger Level Monitoring Program and Contingency Response Plan

In 2015, GHD undertook a detailed review of the available database of groundwater and leachate quality data for the Site. The purpose of this review was to use this information to develop a Site-specific Trigger Level Program (TLP) and Contingency Response Plan (CRP). The TLP and CRP were included in the Updated D&O report which was submitted and approved in December 2018.

The purpose of the TLP is to provide timely identification of potential Site-related water quality impairment and in turn permit implementation of appropriate contingency measures to mitigate the potential for non-compliance.

Groundwater compliance at the Site is based on Site boundary groundwater quality and how it compares to Site-specific Reasonable Use Concept (RUC) criteria. The RUC criteria are calculated from generic ODWS and background concentrations. For the purposes of the TLP, 85 percent of the Site-specific RUC criteria are used as the trigger levels. Accordingly, the TLP is intended to provide advance warning of potential Site groundwater compliance issues.

The RUC criteria are re-calculated annually as groundwater quality data is added to the database. The RUC criteria used for this assessment were established using background water quality data collected from monitoring wells

located upgradient of the landfill. The RUC established for the shallow overburden unit is derived from background groundwater quality data gathered at MW1B-01/MW1B-07/MW1B-13, OW3B-85/OW3B-07/OW3B-13, and OW9B-92/OW9B-06. The RUC established for the basal till overburden/shallow bedrock unit were derived from background groundwater quality data gathered at MW1A-01/MW1A-07/MW1A-13, OW3A-85/OW3A-07/OW3A-13, and OW9A-06.

As illustrated on **Figure 3.1**, newly installed monitoring wells MW13S/D-22 and MW14S/D-22 are located on the upgradient side of the landfill. Water quality results from these wells will be incorporated into the RUC calculations for future monitoring events.

To be consistent with the existing TLP, the following parameters have been selected as trigger parameters for groundwater quality:

– General Chemistry: chloride
– Metals: boron, chromium, lead
– PAHs: naphthalene, phenanthrene, pyrene, benzo(a)pyrene
– VOCs: benzene, ethylbenzene, toluene

The TLP will continue to focus on monitoring locations located downgradient of the landfill footprint.

Shallow overburden wells will include locations along the western boundary of the Site (MW10B-18), the eastern portion of the Site (MW2B-07), and along the southern boundary of the Site (OW1B-06, OW8B-06, MW11B-19, and MW12B-19).

The basal overburden/shallow bedrock unit beneath the OLA is overlain by a clay aquitard of very low hydraulic conductivity, and thus the potential for water quality impact in this unit is minimal. The basal overburden/shallow bedrock monitoring wells will include monitors located in the southern portion of the Site (OW1A-06, OW8A-06, MW11A-19, MW12A-19), the eastern portion of the Site (MW2A-01), and the western property boundary (MW10A-18).

As stated above an approved CRP was submitted as part of the updated Design and Operation Report (GHD, 2018). This CRP will continue to be used following the expansion of the landfill footprint.

8. Summary and Conclusions

The Site is characterized by two relevant groundwater units (a water table unit and a confined basal till overburden/shallow bedrock aquifer) which are separated by a thick layer of stratified silty clay, silty clay till and varved clays which form an aquitard of very low hydraulic conductivity. The vertical hydraulic conductivity of the lower portions of the silty clay aquitard is estimated at $2x10^{-8}$ cm/s.

The Site has previously been designed to take advantage of the very low permeability of the on-Site soils to ensure appropriate protection of the groundwater at the Site. The proposed expansion to the north will continue to take advantage of this natural Site feature. As additional protection for the environment, the proposed landfill design includes a base constructed of a single composite liner design consisting of a 1.5 mm thick high-density polyethylene (HDPE) liner overlying a 750 mm thick engineered clayey liner. The landfill base configuration will provide for a minimum of 3 m and an average of 5.6 m of native clay between the underside of the engineered clayey liner and the top of the silty sand till/sand and gravel layer overlying the bedrock. Leachate produced within the landfill will be collected in a leachate collection system installed above the HDPE liner and will be removed from the landfill mound on a continuous basis and treated on-Site prior to discharge.

Based on the existing leachate and groundwater quality at the Site and the high level of protection provided by the engineered composite liner and the natural silty clay aquitard, no groundwater quality compliance issues are predicted to occur under the scenario of the proposed expansion.

The Site has robust environmental monitoring and trigger level programs which will continue following landfill expansion. In the event that water quality results suggest future non-compliance is a possibility, the Site contingency plan will be implemented. This contingency plan provides a suitable mechanism for ensuring appropriate mitigative measures are put in place to eliminate or offset potential off-Site adverse effects.

Figures

0 300 600 900m

1:30000

N

GHD

BROOKS ROAD LANDFILL SITE
HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

Project No. **12561524**
Date **June 2022**

REGIONAL SITE LOCATION MAP

FIGURE 1.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Figures\RPT001\12561524-GHD-00-00-RPT-EN-D101_WA-001.dwg
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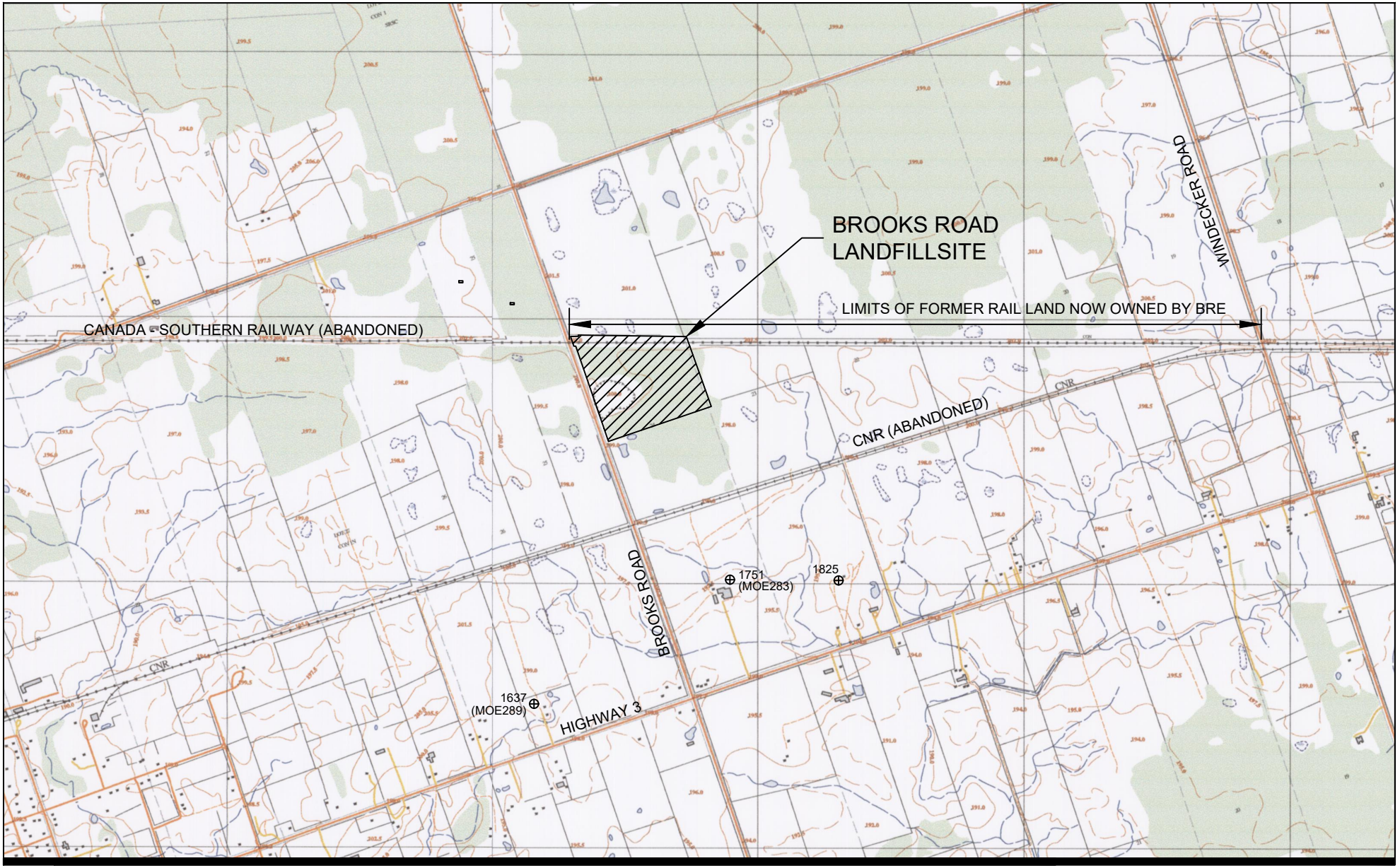

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LEGEND

1637 (MOE289) RESIDENTIAL WELL LOCATION

GHD

BROOKS ROAD LANDFILL SITE
HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

Project No. **12561524**
Date **June 2022**

LOCAL SITE LOCATION MAP

FIGURE 1.2

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Figures\RPT001\12561524-GHD-00-00-RPT-EN-D102_WA-001.dwg
Plot Date: 09 June 2022 8:21 AM

Data Source: MINISTRY OF NATURAL RESOURCES SHEETS: 10 17 5900 47550 & 10 17 5950 47550

Legend

- Site Boundary
- 2;bedrock;undifferentiated carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift
- 14;Wentworth till;sandy silt to silt matrix, becoming finer grained to silty clay near lake erie, highly calcareous, clast content moderate to low decreasing southward
- 17;Halton till;predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor
- 24;glaciolacustrine deposits;silt and clay, minor sand, basin and quiet water deposits
- 25;glaciolacustrine deposits;sand, gravelly sand and gravel, nearshore and beach deposits
- 31;fluvial deposits;gravel, sand, silt and clay, deposited on modern flood plains

Paper Size ANSI B

0 600 1,200 1,800 2,400

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD ENVIRONMENTAL HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT BROOKS ROAD LANDFILL SITE

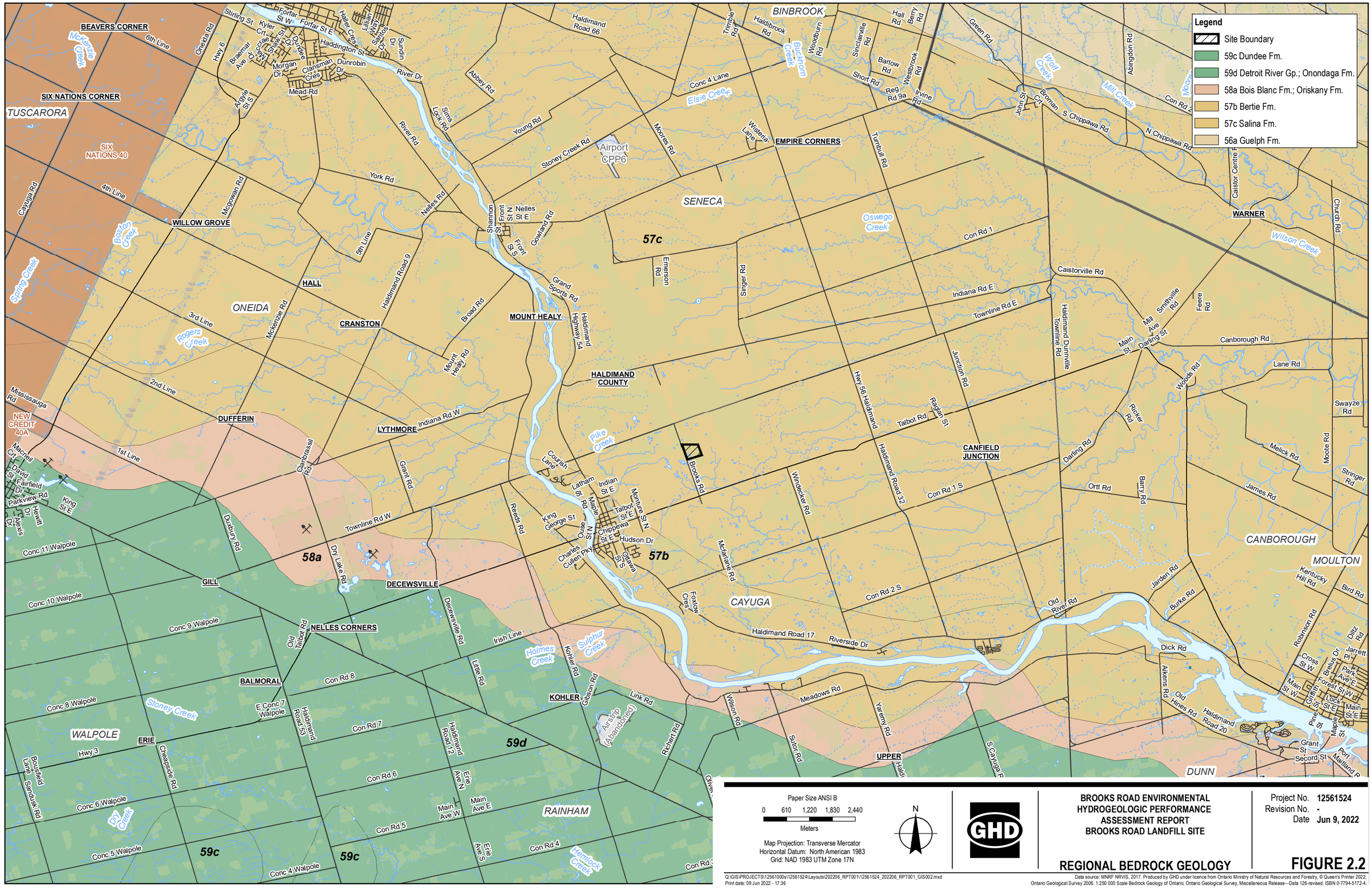
Project No. **12561524**
Revision No. **-**
Date **Jun 9, 2022**

REGIONAL QUATERNARY GEOLOGY

FIGURE 2.1

Q:\GIS\PROJECTS\12561000s\12561524\Layouts\202206_RPT001\12561524_202206_RPT001_GIS001.mxd
Print date: 09 Jun 2022 - 17:38

Data source: MNRF NRVIS, 2018. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry. © Queen's Printer 2022; Ontario Geological Survey 2003. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 128.


Legend
Site Boundary
59c Dundee Fm.
59d Detroit River Gp.; Onondaga Fm.
58a Bois Blanc Fm.; Oriskany Fm.
57b Bertie Fm.
57c Salina Fm.
56a Guelph Fm.
BEAVERS CORNER
SIX NATIONS CORNER
TUSCARORA
SIX NATIONS 40
NEW CREDIT 40A
WILLOW GROVE
HALL
ONEIDA
CRANSTON
MOUNT HEALY
DUFFERIN
LYTHMORE
HALDIMAND COUNTY
BINBROOK
SENECA
EMPIRE CORNERS
WARNER
CANFIELD JUNCTION
CANBOROUGH
MOULTON
CAYUGA
DUNN
UPPER
GIL'L
DECEWSVILLE
NELLES CORNERS
BALMORAL
KOHLER
WALPOLE
ERIE
RAINHAM
Airport CPP6
Airstrip (Abandoned)
57c
58a
57b
59d
59c
59c
Haldimand Road 66
Conc 4 Lane
Elsie Creek
Young Rd
Stoney Creek Rd
York Rd
River Rd
Nelles Rd
Gowland Rd
Grand Sports Rd
Broad Rd
Mount Healy Rd
Haldimand Road 9
Haldimand Highway 54
Indiana Rd W
Townline Rd W
Conc 11 Walpole
Conc 10 Walpole
Conc 9 Walpole
Conc 8 Walpole
Conc 6 Walpole
Conc 5 Walpole
Conc 4 Walpole
Irish Line
Con Rd 8
Con Rd 7
Con Rd 6
Con Rd 5
Con Rd 4
Con Rd 3
Con Rd 1
Con Rd 1 S
Con Rd 2 S
Indiana Rd E
Townline Rd E
Caistorville Rd
Canborough Rd
Lane Rd
Darling Rd
Ortt Rd
Meadows Rd
Haldimand Road 17
Riverside Dr
Old River Rd
Talbot Rd
Ragan St
Junction Rd
Hwy 56/Haldimand
Haldimand Road 32
Haldimand Road 12
Haldimand Road 20
Haldimand Dunnville Townline Rd
Trumbull Rd
Moores Rd
Wisteria Lane
Stoney Creek
Oswego Creek
Wilson Creek
Mill Creek
Wolf Creek
Buckhorn Creek
Pike Creek
Holmes Creek
Sulphur Creek
Boston Creek
Spring Creek
Rogers Creek
McKenzie Creek
Dry Creek
Hemlock Creek
Paper Size ANSI B
0 610 1,220 1,830 2,440
Meters
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N
N
GHD
BROOKS ROAD ENVIRONMENTAL HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT
BROOKS ROAD LANDFILL SITE
REGIONAL BEDROCK GEOLOGY
Project No. 12561524
Revision No. -
Date Jun 9, 2022
FIGURE 2.2
Q:\GIS\PROJECTS\12561000s\12561524\Layouts\202206_RPT001\12561524_202206_RPT001_GIS002.mxd
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Data source: MNRF NRVIS, 2017. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2022;
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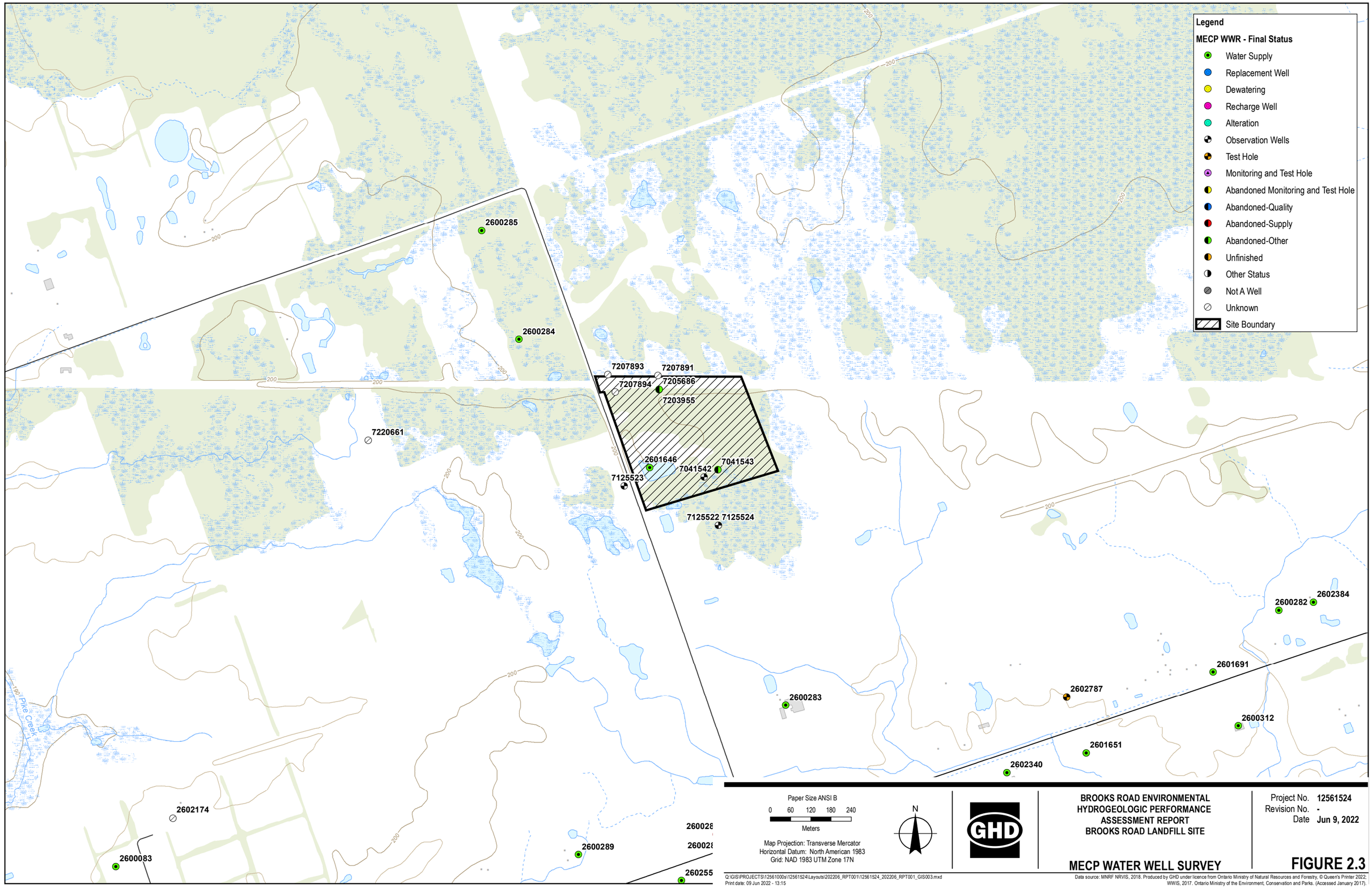

Paper Size ANSI B

0 60 120 180 240

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD ENVIRONMENTAL HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT BROOKS ROAD LANDFILL SITE

MECP WATER WELL SURVEY

Project No. **12561524**
Revision No. **-**
Date **Jun 9, 2022**

FIGURE 2.3

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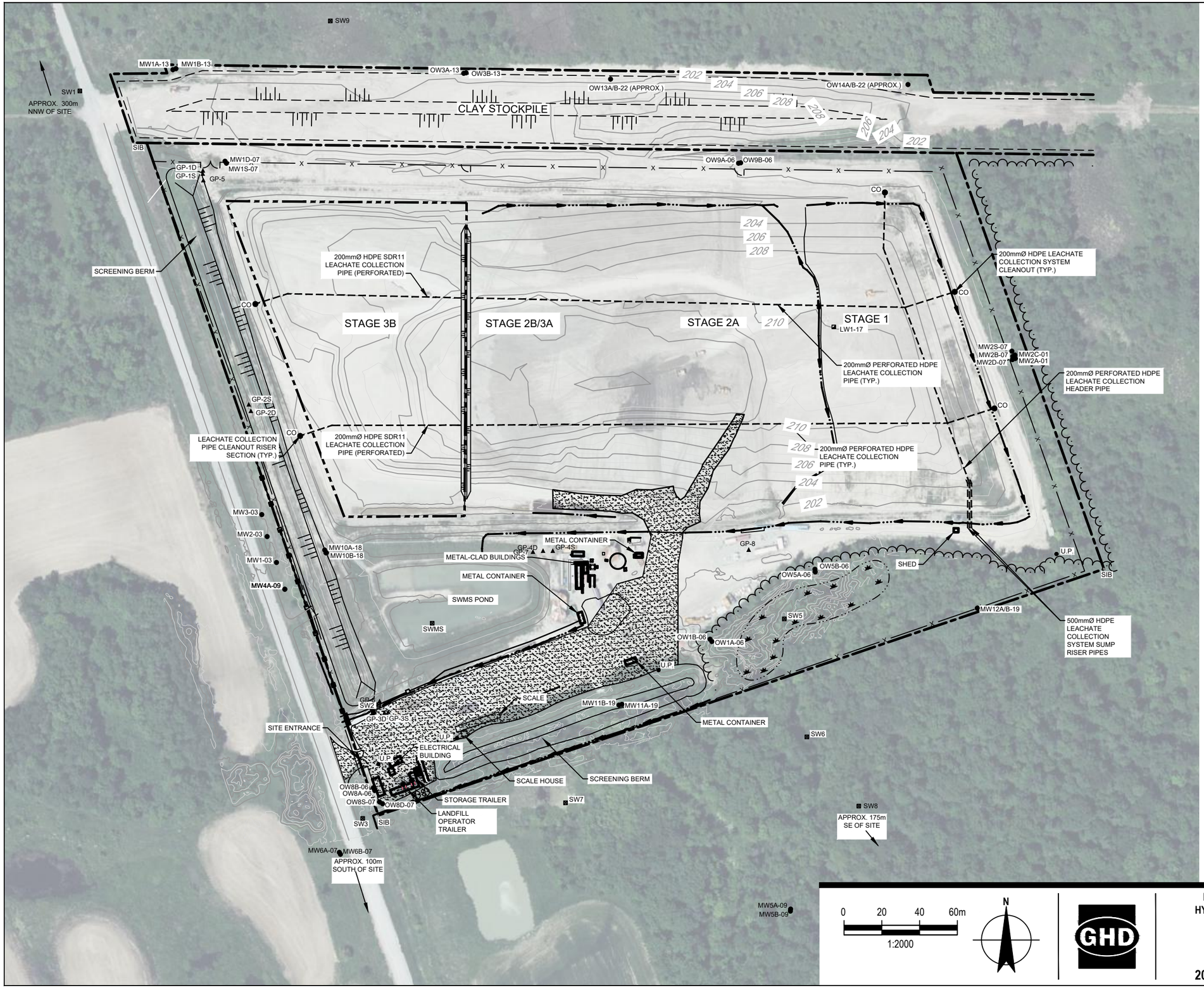

LEGEND:

- GROUND CONTOUR AT 1.0m INTERVAL
- 192.0 GROUND CONTOUR AT 2.0m INTERVAL
- PROPERTY LINE
- X FENCELINE
- CLAY STOCKPILE AREA
- SILT FENCE
- LEACHATE COLLECTION SYSTEM PIPING
- DRAINAGE DITCH
- ACTIVE CELL
- LOW AREA
- TEMPORARY DIVIDER BERM
- GRANULAR SURFACE / ACCESS ROADS
- TREELINE
- ● OW1B-06 OBSERVATION WELL
- ● MW2A-01 MONITORING WELL
- ▣ SW6 SURFACE WATER MONITORING LOCATION
- ▲ GP-3S GAS PROBE
- ●U.P. UTILITY POLE
- ◪ LW1-17 LEACHATE WELL
- CULVERT
- CHECK DAM
- DOUBLE GATE
- SINGLE GATE
- S.I.B. STANDARD IRON BAR

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED 2020.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
3. NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY-17-2013.
4. EXISTING CONDITIONS SURVEY, DRAWING NAME: 18235(SURVEY)2021-12-17 EXISTING CONDITIONS SURVEYED DECEMBER 16 2021 COMBINED WITH EXISTING CONDITIONS 2020 2019 2018

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

0 20 40 60m

1:2000

N

GHD

BROOKS ROAD LANDFILL SITE
HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

Project No. **12561524**
Date **June 2022**

2022 EXISTING CONDITIONS

FIGURE 3.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Figures\RPT001\12561524-GHD-00-00-RPT-EN-D103_WA-001.dwg
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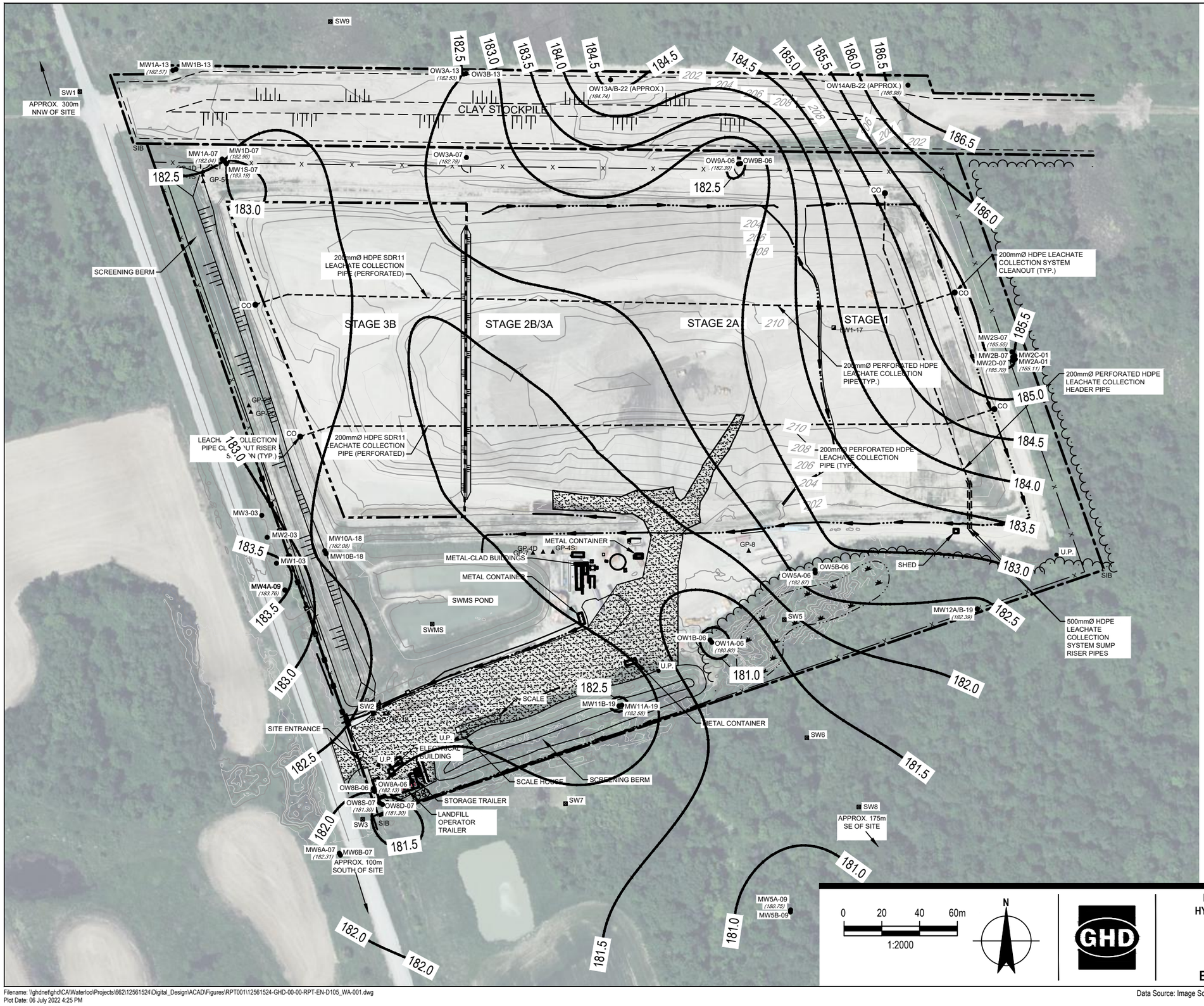

LEGEND:

- GROUND CONTOUR AT 1.0m INTERVAL
- 192.0 GROUND CONTOUR AT 2.0m INTERVAL
- PROPERTY LINE
- FENCELINE
- CLAY STOCKPILE AREA
- SILT FENCE
- LEACHATE COLLECTION SYSTEM PIPING
- DRAINAGE DITCH
- ACTIVE CELL
- LOW AREA
- TEMPORARY DIVIDER BERM
- GRANULAR SURFACE / ACCESS ROADS
- TREELINE
- OWAB-06 OBSERVATION WELL
- MW2A-01 MONITORING WELL
- SW6 SURFACE WATER MONITORING LOCATION
- GP-3S GAS PROBE
- U.P. UTILITY POLE
- LW1-17 LEACHATE WELL
- CULVERT
- CHECK DAM
- DOUBLE GATE
- SINGLE GATE
- S.I.B. STANDARD IRON BAR
- 181.0 BEDROCK ELEVATION CONTOUR (mAMSL)
- (180.75) BEDROCK ELEVATION (mAMSL)

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED 2020.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
3. NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY-17-2013.
4. EXISTING CONDITIONS SURVEY, DRAWING NAME: 18235(SURVEY)2021-12-17 EXISTING CONDITIONS SURVEYED DECEMBER 16 2021 COMBINED WITH EXISTING CONDITIONS 2020 2019 2018

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

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1:2000

N

GHD

BROOKS ROAD LANDFILL SITE
HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

Project No. **12561524**
Date **July 2022**

BEDROCK CONTOUR MAP

FIGURE 3.2

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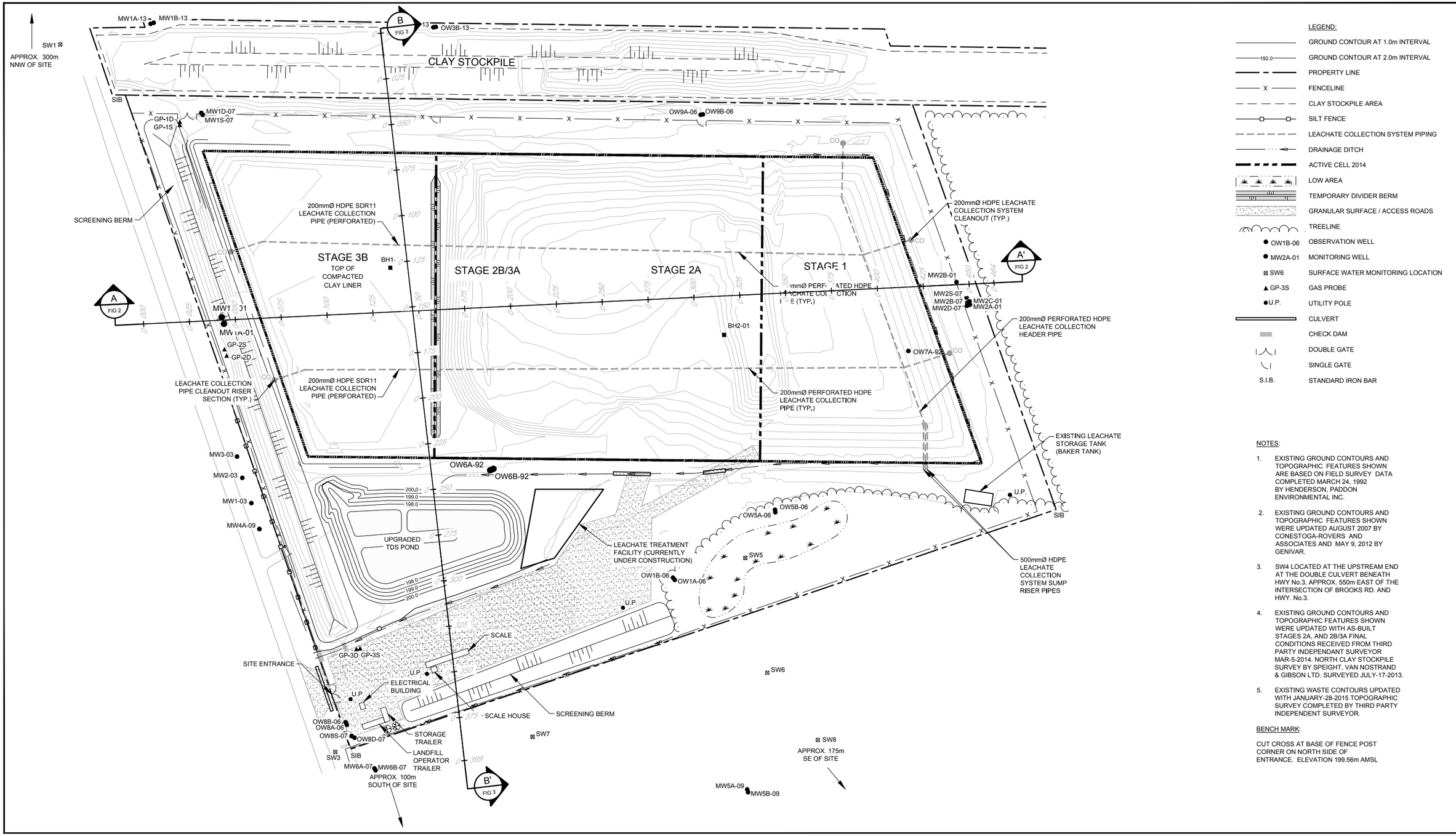


NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED MARCH 24, 1992 BY HENDERSON, PADDON ENVIRONMENTAL INC.
2. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN WERE UPDATED AUGUST 2007 BY CONESTOGA-ROVERS AND ASSOCIATES AND MAY 9, 2012 BY GENIVAR.
3. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HWY No.3, APPROX. 550m EAST OF THE INTERSECTION OF BROOKS RD. AND HWY. No.3.
4. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN WERE UPDATED WITH AS-BUILT STAGES 2A, AND 2B/3A FINAL CONDITIONS RECEIVED FROM THIRD PARTY INDEPENDANT SURVEYOR MAR-5-2014. NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY-17-2013.
5. EXISTING WASTE CONTOURS UPDATED WITH JANUARY-28-2015 TOPOGRAPHIC SURVEY COMPLETED BY THIRD PARTY INDEPENDENT SURVEYOR.

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56m AMSL

0 20 40 60m

BROOKS ROAD LANDFILL SITE
Halimand County, Ontario
HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

CROSS SECTION PLAN

18235-20
Oct 12, 2016

Figure 3.3

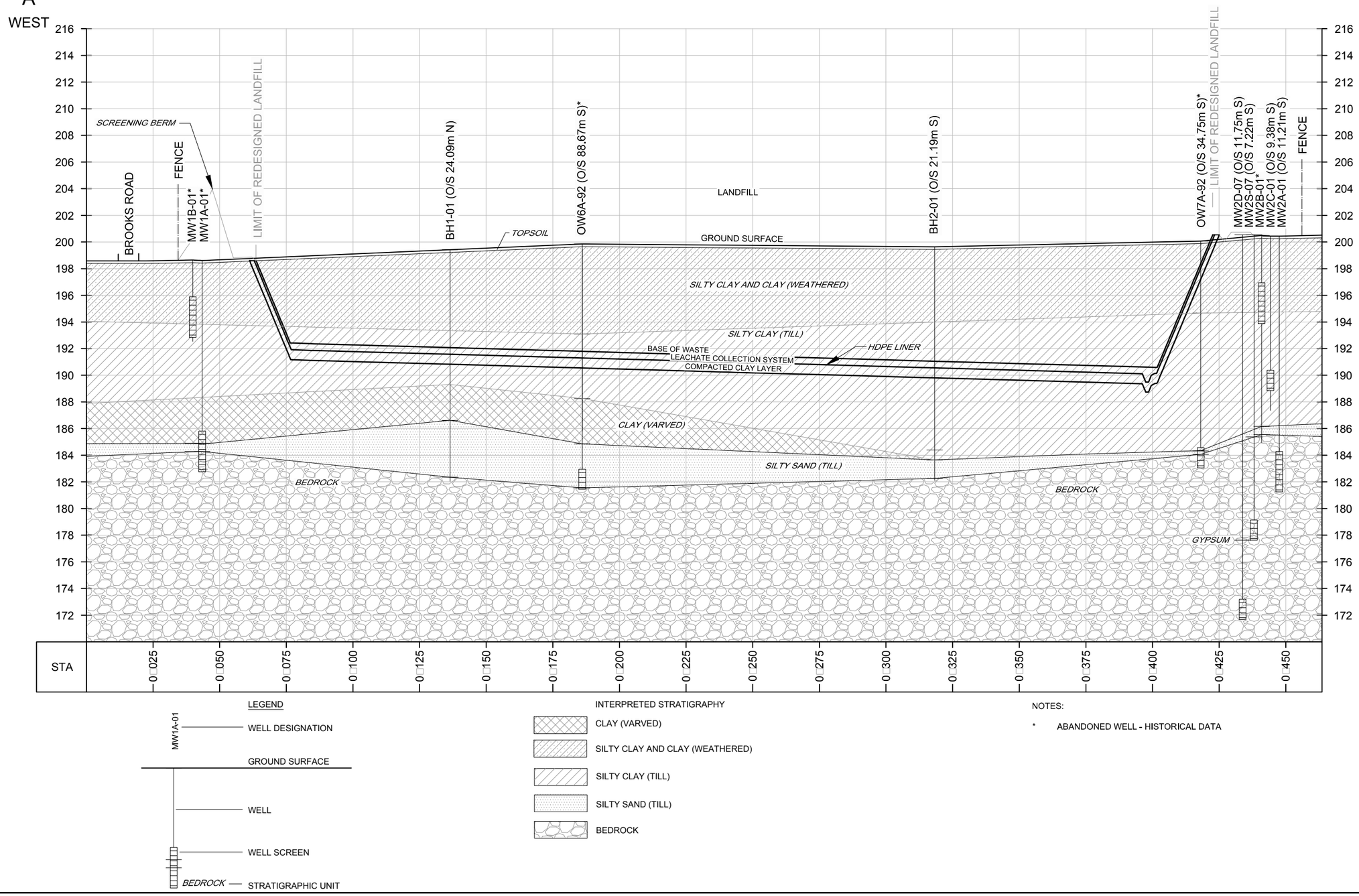
CAD File: P:\drawings\18000s\18235\18235-reports\18235-20(064)\18235-20(064)GN\18235-20(064)GN-WA001.dwg

A

WEST

A'

EAST



LEGEND

MW1A-01 — WELL DESIGNATION

GROUND SURFACE

WELL

WELL SCREEN

BEDROCK — STRATIGRAPHIC UNIT

INTERPRETED STRATIGRAPHY

- CLAY (VARVED)
- SILTY CLAY AND CLAY (WEATHERED)
- SILTY CLAY (TILL)
- SILTY SAND (TILL)
- BEDROCK

NOTES:

* ABANDONED WELL - HISTORICAL DATA

0 15 30 45m

SCALE:

HORZ.: 1:1500
VERT. : 1:300

GHD

BROOKS ROAD LANDFILL SITE
Halimand County, Ontario
HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

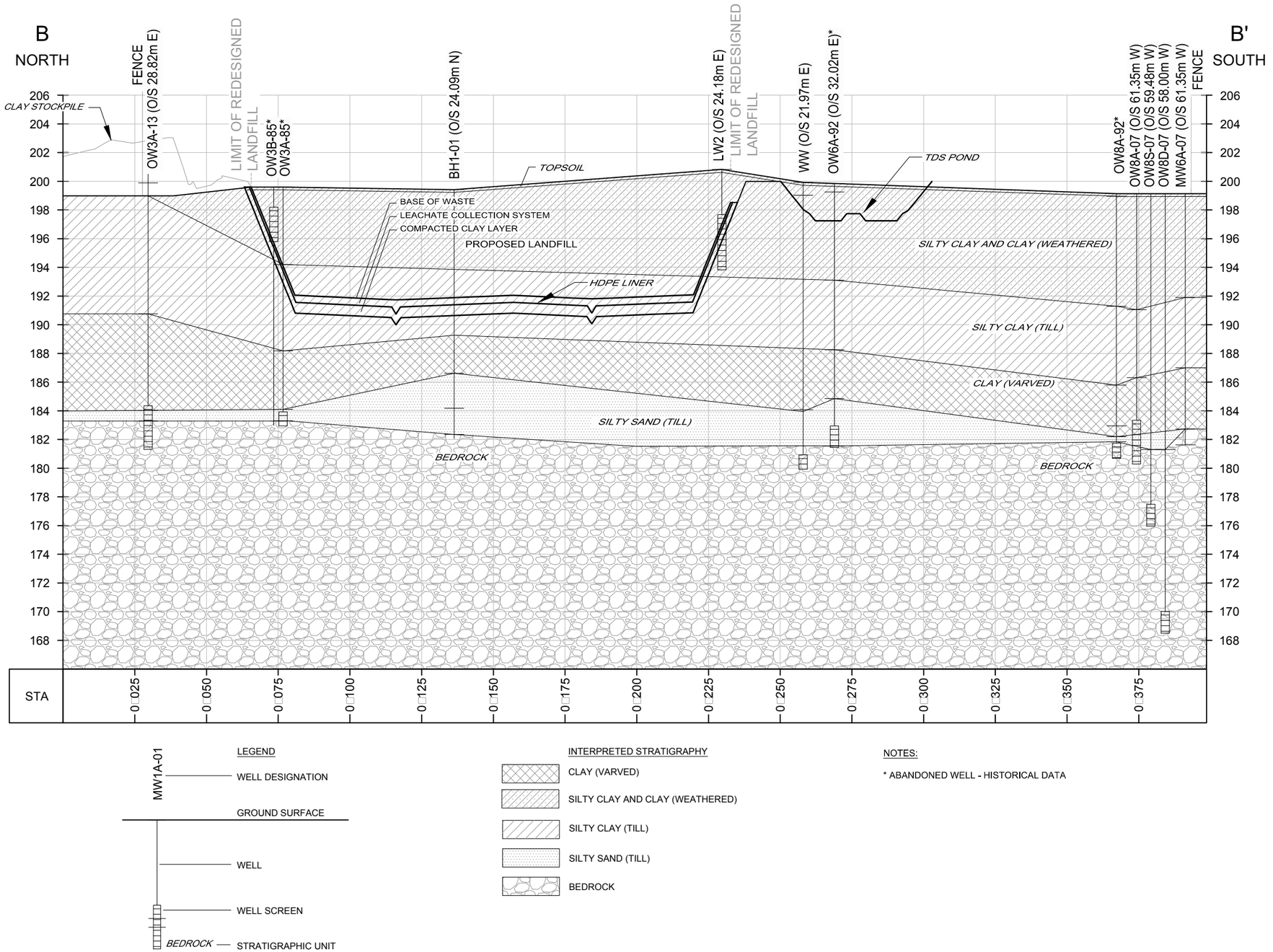
GEOLOGICAL CROSS-SECTION A-A'

18235-20

Oct 12, 2016

Figure 3.4

CAD File: P:\drawings\18000s\18235\18235-reports\18235-20(064)\18235-20(064)GN\18235-20(064)GN-WA001.dwg



LEGEND

MW1A-01 — WELL DESIGNATION

GROUND SURFACE

WELL

WELL SCREEN

BEDROCK — STRATIGRAPHIC UNIT

INTERPRETED STRATIGRAPHY

- CLAY (VARVED)
- SILTY CLAY AND CLAY (WEATHERED)
- SILTY CLAY (TILL)
- SILTY SAND (TILL)
- BEDROCK

NOTES:

* ABANDONED WELL - HISTORICAL DATA

0 15 30 45m

SCALE:

HORZ.: 1:1500
VERT. : 1:300

GHD

BROOKS ROAD LANDFILL SITE
Halimand County, Ontario
HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

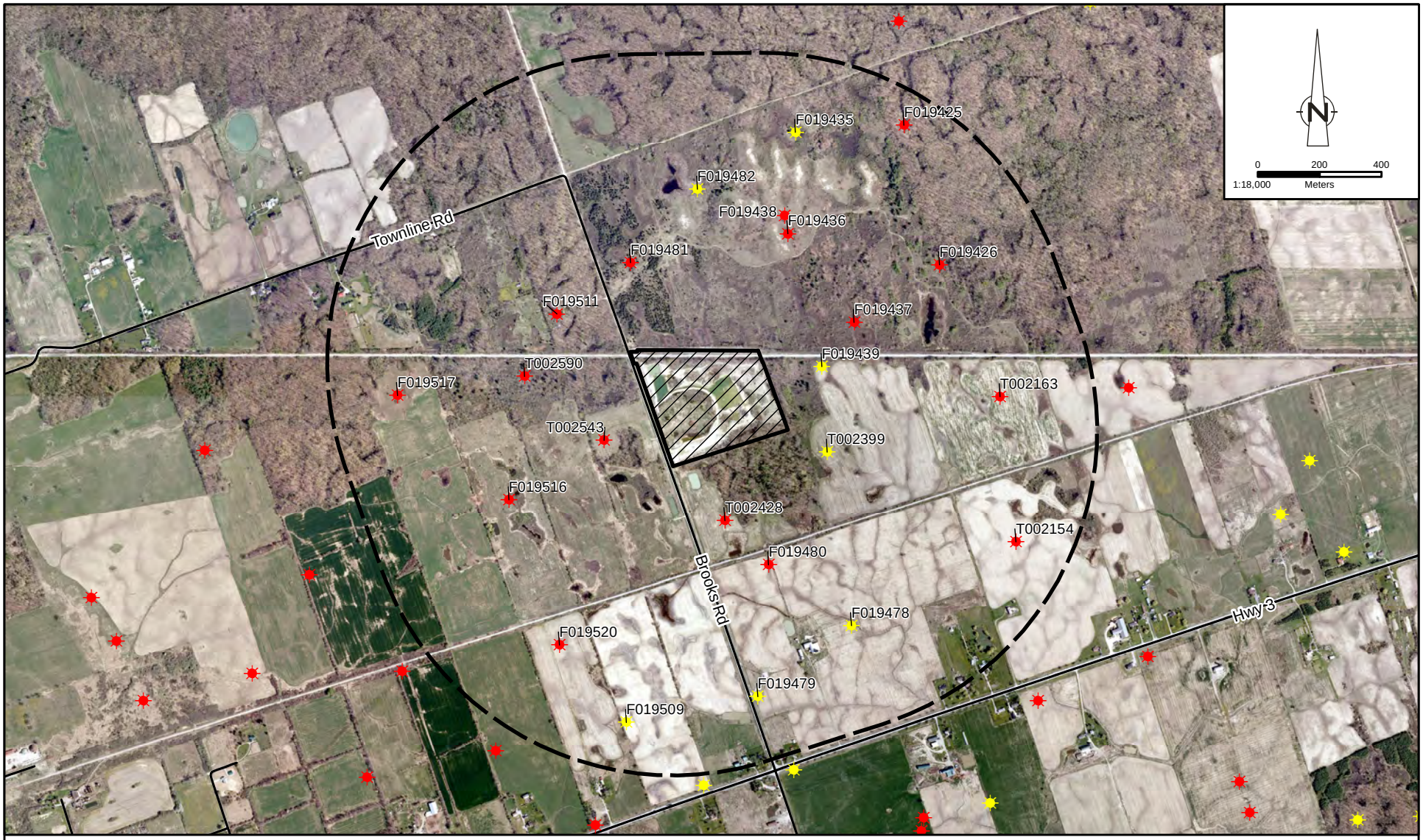
GEOLOGICAL CROSS-SECTION B-B'

18235-20

Oct 12, 2016

Figure 3.5

CAD File: P:\drawings\18000s\18235\18235-reports\18235-20(064)\18235-20(064)GN\18235-20(064)GN-WA001.dwg



Source: MNRF NRVIS, 2014. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016; Haldimand County Official Plan
Aerial: 2006 Grand River Conservation Authority
Coordinate System: NAD 1983 UTM Zone 17N

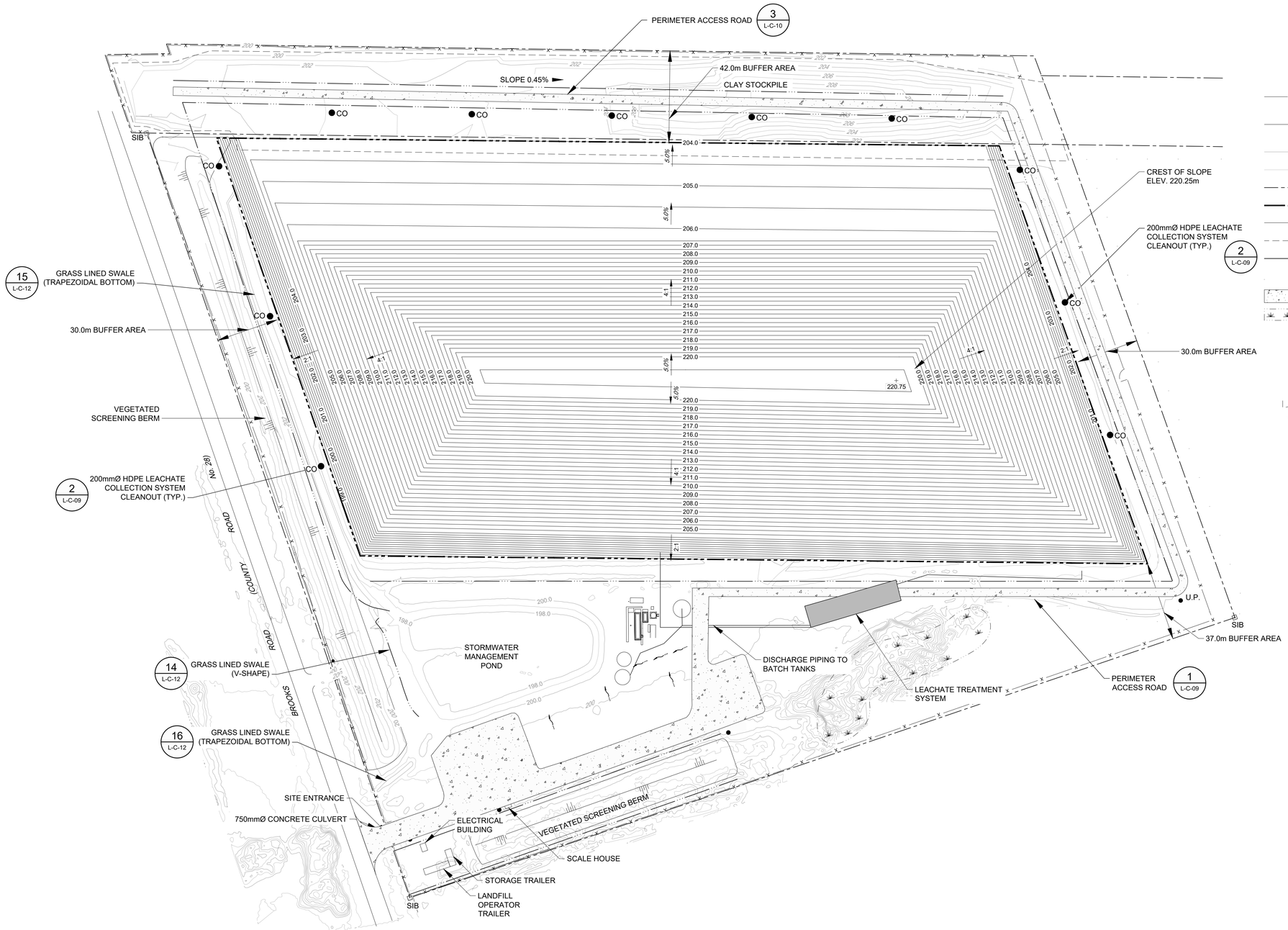
Legend

- Site Location
- Local Study Area (1km Radius)
- Abandoned Gas Well
- Status Unknown

figure 3.7

OIL AND GAS WELL LOCATIONS
GEOLOGY & HYDROGEOLOGY ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

018235-20(064)GIS-WA001 Jul 08/2016



LEGEND

- 202.0 — TOP OF WASTE CONTOUR (1.0m INTERVAL (m AMSL))
- TOP OF WASTE CONTOUR (0.5m INTERVAL (m AMSL))
- 202 — GROUND CONTOUR (2.0m INTERVAL)
- GROUND CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- APPROVED LIMIT OF WASTE
- EXISTING FENCELINE
- CLAY STOCKPILE AREA
- PERIMETER DITCH
- TREELINE
- GRANULAR SURFACE ACCESS ROAD
- SWAMPY AREA
- 201.67 — SPOT ELEVATION (m AMSL)
- CO — LEACHATE COLLECTION SYSTEM CLEAN OUT
- SIB — STANDARD IRON BAR
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SOURCE:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017 BY SVNG.

EXISTING WASTE CONTOURS SURVEYED DECEMBER 16, 2021 BY GHD

GHD Ltd.
455 Phillip Street
Waterloo, Ontario N2L 3X2 Canada
T 1 519 884 0510 **F** 1 519 884 0525

www.ghd.com

Bar is 25mm on original size sheet
0 25mm

NO.	-	-	-
NO.	-	-	-
NO.	-	-	-
NO.	-	-	-
NO.	-	-	-
-	-	-	-

No.	Issue	Checked	Approved	Date

Author	**S.HOLLAND**	Designer	**R.LOVEDAY**
Drafting Check	**K.DHALIWAL**	Design Check	**K.DHALIWAL**
Project Manager	**R.LOVEDAY**	Project Director	**R.LOVEDAY**

Client

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Project

HYDROGEOLOGIC PERFORMANCE ASSESSMENT REPORT

Date	Scale
APRIL 22, 2022	**1:1000**

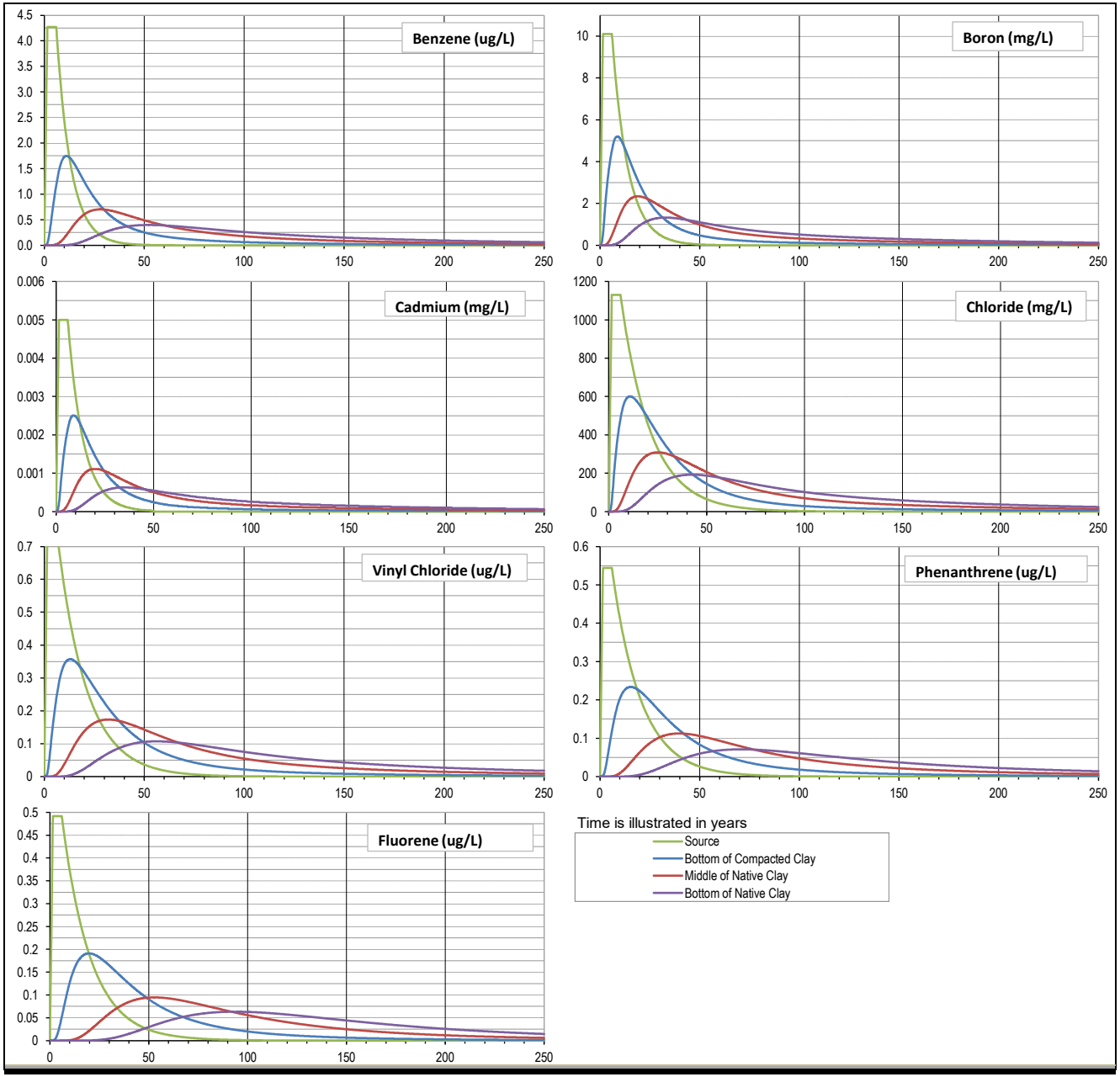
Project No.
12561524

Title
FIGURE 6.1
TOP OF WASTE CONTOURS

Size
ANSI D

Sheet No
L-C-04

Plot Date: 10 June 2022 - 5:44 PM
Plotted By: Spencer Holland
Path and Filename: N:\CA\Waterloo\Projects\66\12561524\Digital_Design\ACAD\Sheets\REPORT 2\CI\12561524-GHD-00-00-CGP-CI-004.dwg



Note: Leachate head is 6 m now and remains 6 m when HDPE Liner fails after 50 years.

BROOKS ROAD LANDFILL
2270386 ONTARIO LTD.
HALDIMAND COUNTY, ONTARIO

SIMULATED CONCENTRATION VERSUS TIME IN VERTICAL COLUMN (SCENARIO 1)

Project No. **12561524**
Date **July 2022**

FIGURE 6.2

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Worksharel\Hydrogeology Assessment\12561524-RPT\Figures\12561524-Scenario1-0to250Yr.xlsx
Plot Date: 4 Jul 2022 03:53 PM

Tables

Table 2.1

MECP Water Well Summary
Hydrogeologic Assessment - Landfill Expansion
Brooks Road Landfill
2270386 Ontario Limited

Well No.	Township	Status	Installation Date	Tested Flow Rate (gpm)	UTM Easting	UTM Northing	Elevation (mAMSL)	Depth to Bedrock (ft)	Depth to Bedrock (m)	Bedrock elevation (mAMSL)	Drilled Depth (m)	Drilled elevation (mAMSL)	Static Level (ft)	Static Level (m)	Static Elevation (mAMSL)	Water Found at (ft)	Water found at (m)	Status
2600283	North Cayuga	Water Supply	2/16/1961	5	595862.4	4757184	196.60	48	14.63	181.97	60.0	136.60	48	14.6	182.0	60.0	18.3	fresh
2600284	North Cayuga	Water Supply	11/29/1947	-	595073.4	4758266	196.60	51	15.54	181.05	70.0	126.60	48	14.6	182.0	70.0	21.3	fresh
2600285	North Cayuga	Water Supply	12/11/1947	-	594963.4	4758588	198.12	49	14.94	183.18	70.0	128.12	49	14.9	183.2	67.0	20.4	fresh
2601646	North Cayuga	Water Supply	11/20/1973	10	595460.4	4757887	199.34	-	-	-	66.0	133.34	20	6.1	193.2	64.0	19.5	fresh
7041542	North Cayuga	Observation Wells	12/6/2006	-	595621	4757859	-	-	18.97	-	19.9	-	-	-	-	-	-	-
7041543	North Cayuga	Abandoned	12/6/2006	-	595662	4757881	-	-	5.15	-	19.0	-	-	-	-	-	-	-
7125522	North Cayuga	Observation Wells	6/23/2009	-	595663	4757716	-	-	-	-	6.1	-	-	-	-	-	-	-
7125523	North Cayuga	Observation Wells	6/23/2009	-	595385	4757833	-	-	-	-	53.5	-	-	-	-	-	-	-
7125524	North Cayuga	Observation Wells	6/23/2009	-	595663	4757716	-	-	-	-	58.0	-	-	-	-	-	-	-
7203955	North Cayuga	Abandoned	6/7/2013	-	595487	4758118	-	-	-	-	16.0	-	-	-	-	-	-	-
7205686	North Cayuga	Abandoned	6/7/2013	-	595488	4758119	-	-	-	-	5.0	-	-	-	-	-	-	-
7319670	North Cayuga	Test Hole	6/29/2018	-	595419	4757904	-	-	-	-	8.2	-	-	-	-	-	-	-
7319671	North Cayuga	Observation Wells	6/29/2018	-	595419	4757906	-	-	-	-	19.1	-	-	-	-	56.0	17.1	untested

Table 3.1

Summary of Groundwater Elevations
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Well No.	Survey Dates	Northing (m)	Easting (m)	Ground Elevation (mAMSL)	Top of Riser Elevation (mAMSL)	Stickup (m)	Completion Date	Bottom of Borehole (m)	Screened Interval (mBGS) from	to	(mAMSL) from	to	Screened Media	Abandonment Date
Shallow Overburden														
OW1B-85	-	595606.953	4757870.701	199.23	199.96	0.73	9/12/1985	18	1.6	4.55	197.63	194.68	Clay	3-Nov-2006
OW2B-85	(2)	595429.391	4757892.585	199.83	200.55	0.72	9/12/1985	16.76	1.7	4.6	198.13	195.23	Silt, Clay	9-Oct-2001
OW3B-85	-	595468.553	4758080.732	199.43	200.31	0.88	9/13/1985	16.76	1.2	3.8	198.23	195.63	Clay, Shale	30-Nov-2006
OW4B-91	(3)	595402.449	4757916.627	201.33	202.00	0.67	4/17/1991	3.96	1.75	3.96	199.58	197.37	Clay	27-May-2007
OW5C-91	-			200.33	201.09	0.76	4/18/1991	4.57	1.7	5.63	198.63	194.70	Clay	27-Nov-2006
OW6B-92	(3)	595522.911	4757919.192	199.96	200.73	0.77	3/27/1992	6.1	5 4.56	6.1	195.40	193.86	Clay	26-May-2007
OW7B-92	(2) (3)	595749.031	4757985.204	200.01	200.82	0.81	3/30/1992	6.86	5.32	6.86	194.69	193.15	Clay	9-Oct-2001
OW8B-92	(3)	595502.139	4757809.561	199.29	199.79	0.50	4/1/1992	6.71	5.17	6.71	194.12	192.58	Clay	23-Apr-2007
OW9B-92	-	595643.262	4758094.778	200.27	200.92	0.65	4/2/1992	6.71	5.17	6.71	195.10	193.56	Clay	29-Nov-2006
MW2C-01	(1)	595780.913	4758013.629	200.35	201.09	0.74	10/16/2001	11.89	10.06	11.58	190.29	188.77	Silt, Clay	
MW2B-01	-	595773.743	4758023.990	200.35	201.09	0.74	10/5/2021	15.54	3.66	6.7	196.69	193.65	Silt, Clay	23-May-2007
MW1B-01	-	595378.111	4757997.375	198.68	199.40	0.72	10/18/2001	6.1	2.75	5.79	195.93	192.89	Silt, Clay	3-May-2007
MW1-03	(1)	595391.323	4757898.703	199.40	200.19	0.79	9/16/2003	5.79	1.22	5.79	198.18	193.61	Gravel, Silt, Clayey Silt	
MW2-03	(1)	595386.222	4757912.373	199.44	200.27	0.82	9/16/2003	5.79	1.22	5.79	198.22	193.65	Silt,Silt with Clay, Clayey Silt	
MW3-03	(1)	595383.216	4757923.973	199.30	200.20	0.90	9/16/2003	5.79	1.22	5.79	198.08	193.51	Silt, Clayey Silt	
OW8B-06	(3)	595444.147	4757780.062	198.29	199.33	1.04	11/21/2006	5.03	1.98	5.03	196.31	193.26	Clay, Clay with Silt	
OW1B-06	(3)	595621.421	4757861.063	199.47	200.35	0.88	11/23/2006	5.33	2.29	5.33	197.18	194.14	Clay with Silt	
OW5B-06	(3)	595676.497	4757898.797	198.72	199.67	0.94	11/27/2006	4.72	1.6	4.65	197.12	194.07	Clay with Silt, Clay	
OW9B-06	(4)	595634.398	4758113.526	199.88	201.18	1.30	11/29/2006	5.79	2.74	5.79	197.14	194.09	Clay, Clay with Gravel	
OW3B-07	(4)	595489.133	4758114.831	199.18	200.05	0.87	5/2/2007	3.96	0.91	3.6	198.27	195.58	Gravelly Silt Loam, Clay with Silt and Sand, Clay	7-Jun-2013
MW1B-07	(4)	595360.935	4758112.199	199.65	200.73	1.08	5/7/2007	4.27	1.22	4.27	198.43	195.38	Silt Loam, Silty Clay	27-Jun-2013
MW2B-07	(4)	595779.784	4758012.944	200.50	201.46	0.96	6/4/2007	3.96	0.91	3.96	199.59	196.54	Silt, Clay	
MW6B-07	(6)	595462.136	4757654.108	198.65	199.43	0.78	11/20/2007	3.96	0.91	3.96	197.74	194.69	Clayey Silt and Sand, Clayey Silt	
MW5B-09	(6)	595663.795	4757744.794	198.65	199.51	0.86	6/22/2009	6.02	1.22	6.02	197.43	192.63	Clay and Silt with Sand, Clayey Silt	
OW3B-13	(7)	595488.361	4758159.297	200.50	201.22	0.72	6/7/2013	3.96	0.91	3.96	199.59	196.54	Clay with Silt	
MW1B-13	(7)	595334.711	4758159.539	199.70	200.50	0.79	6/17/2013	3.96	0.91	3.96	198.79	195.74	Silty Clay	
MW10B-18	(13)	595417.718	4757904.401	201.09	201.99	0.90	6/27/2018	8.08	5.03	8.08	196.06	193.01	Silty Clay, Clay	
MW12B-19	(14)	595764.307	4757880.692	199.70	200.55	0.84	8/26/2019	6.1	3.05	6.1	196.65	193.60	Clay	
MW11B-19	(14)	595573.643	4757825.553	203.02	203.69	0.67	8/29/2019	11.28	8.23	11.28	194.79	191.74	Clay	
MW13B-22	ns	595564.914	4758156.950	-	-	~0.6	4/19/2022	7.62	4.57	7.62	-	-	Clay	
MW14B-22	ns	595722.455	4758156.125	-	-	~0.6	4/21/2022	7.62	4.57	7.62	-	-	Clay	
Basal Overburden / Shallow Bedrock														
OW1A-85		595606.953	4757870.701	199.23	199.92	0.69	9/12/1985	18	17.3	18	181.93	181.23	Gravel, Shale	3-Nov-2006
OW2A-85	(2)	595428.886	4757892.476	199.82	200.55	0.73	9/12/1985	16.76	15.6	16.76	184.22	183.06	Gravel, Shale	9-Oct-2001
OW3A-85	-	595468.522	4758080.781	199.43	200.24	0.81	9/13/1985	16.76	15.6	16.76	183.83	182.67	Clay, Shale	30-Nov-2006
OW5B-91	-	595680.805	4757917.933	200.33	200.93	0.60	4/17/1991	18.45	17.75	18.45	182.58	181.88	Clay, Gravel	27-Nov-2006
OW5A-91	-	595681.950	4757915.313	200.33	200.98	0.65	4/19/1991	21.03	20.2	21.03	180.13	179.30	Shale	27-Nov-2006
OW6A-92	-	595521.128	4757918.386	199.96	200.67	0.70	3/27/1992	18.44	16.9	18.44	183.06	181.52	Sand, Shale	26-May-2007
OW7A-92	(2)	595747.956	4757986.525	200.08	200.80	0.72	3/30/1992	16.99	15.45	16.99	184.63	183.09	Sand, Shale	9-Oct-2001
OW8A-92	-	595502.606	4757807.877	199.29	199.80	0.51	3/31/1992	18.49	16.95	18.49	182.34	180.80	Sand, Shale	24-Apr-2007
OW9A-92	-	595644.984	4758096.002	200.27	201.00	0.73	4/2/1992	15.82	14.1	15.82	186.17	184.45	Sand, Shale	29-Nov-2006
MW2A-01	(1)	595781.173	4758011.818	200.35	201.19	0.85	10/16/2001	19.2	16.15	19.2	184.20	181.15	Shale	
MW1A-01	-	595378.174	4757996.875	198.68	199.40	0.73	10/17/2001	15.85	12.8	15.85	185.88	182.83	Silt, Clay, Gravel, Shale	4-May-2007
OW8A-06	(3)	595444.871	4757778.658	198.29	199.33	1.05	11/21/2006	17.98	14.94	17.98	183.35	180.31	Clay, Gravelly Sand, Shale	
OW1A-06	(3)	595622.395	4757859.863	199.47	200.24	0.77	11/23/2006	19.35	16.31	19.35	183.16	180.12	Clay with Silt, Sand with Gravel with Fines, Shale	
OW5A-06	(3)	595676.669	4757897.435	198.72	199.72	1.00	11/27/2006	17.98	14.78	17.83	183.94	180.89	Clay, Sand with Gravel, Shale	
OW9A-06	(4)	595633.238	4758113.303	199.88	201.08	1.21	11/29/2006	19.05	16	19.05	183.88	180.83	Cobble with Boulder, Sand, Gravel, Shale	
MW1A-07	(4)	595359.739	4758112.291	199.72	200.72	1.00	5/7/2007	17.68	14.63	17.68	185.09	182.04	Clay, Silt, Sand and Gravel, Bedrock	27-Jun-2013
MW6A-07	(6)	595461.535	4757655.105	198.57	199.39	0.81	11/20/2007	17.37	14.33	17.37	184.24	181.20	Clay and Silt with Sand, Clayey Gravel with Sand,	
MW5A-09	(6)	595663.346	4757746.298	198.53	199.39	0.86	6/22/2009	17.78	14.73	17.78	183.80	180.75	Clay and Silt, Sand and Gravel	
MW4A-09	(6)	595395.907	4757884.615	199.25	200.15	0.90	6/23/2009	16	12.95	16	186.30	183.25	Clay and Silt, Gravel with Sand, Bedrock	
OW3A-13	(7)	595487.106	4758159.041	200.51	201.23	0.72	6/7/2013	19.2	16.15	19.2	184.36	181.31	Clay with Sand and Gravel	
OW4A-91	(2)	595404.518	4757908.903	200.85	201.91	1.06	6/7/2013	17.62	16.55	17.62	184.30	183.23	Clay	19-Oct-2001 / ~2005
MW1A-13	(7)	595333.078	4758158.933	199.64	200.42	0.78	6/27/2013	18.14	15.09	16.61	184.55	183.03	Silt with Sand	
MW10A-18	(13)	595416.842	4757905.591	201.13	202.04	0.91	6/27/2018	19.08	16.03	19.08	185.10	182.05	Clay, Silt/Sand, Bedrock	
MW12A-19	(14)	595762.712	4757879.316	199.76	200.60	0.84	8/26/2019	18.29	15.24	18.29	184.52	181.47	Silty Gravelly Sand, Dolostone	
MW11A-19	(14)	595575.180	4757825.979	203.00	203.76	0.76	8/29/2019	21.34	19.2	22.25	183.80	180.75	Clay, Silty Gravally Sand, Dolostone	
MW13A-22	ns	595564.914	4758156.950	-	-	~0.6	4/19/2022	17.98	14.94	17.98	-	-	Basal Till, Bedrock	
MW14A-22	ns	595722.455	4758156.125	-	-	~0.6	4/19/2022	16.76	13.72	16.76	-	-	Basal Till, Bedrock	

Table 3.1

Summary of Groundwater Elevations
2021 Operations and Monitoring Report
Brooks Road Landfill Site
Haldimand County, Ontario

Well No.	Survey Dates	Northing	Easting	Ground Elevation	Top of Riser Elevation	Stickup	Completion Date	Bottom of Borehole	Screened Interval (mBGS)		Screened Interval (mAMSL)		Screened Media	Abandonment Date
Residential														
OW3A-07	(4)	595488.276	4758115.859	199.23	200.14	0.91	5/1/2007	16.46	14.48	17.53	184.75	181.70	Clay with Silt, Sandy Gravel, Bedrock	7-Jun-2013
Bedrock Wells (shallow and deep)														
MW1D-07	(4)(15)	595361.315	4758110.831	199.72	201.21	1.49	5/14/2007	30.68	23.77	26.21	175.95	173.51	Dolostone-Shale Bedrock	
MW1S-07	(4)(15)	595362.099	4758109.785	199.65	201.11	1.46	5/17/2007	21.54	20.02	21.54	179.63	178.11	Dolostone-Shale Bedrock	
MW2D-07	(4)	595779.620	4758011.175	200.63	201.16	0.53	5/29/2007	28.96	27.43	28.96	173.20	171.67	Dolostone-Shale Bedrock	
MW2S-07	(4)	595779.271	4758015.691	200.49	201.13	0.64	6/1/2007	22.86	21.34	22.86	179.15	177.63	Dolostone-Shale Bedrock	
OW8D-07	(5)	595449.144	4757771.695	198.98	199.32	0.34	6/14/2007	30.48	28.96	30.48	170.02	168.50	Dolostone-Shale Bedrock	
OW8S-07	(5)	595447.532	4757772.604	198.98	199.67	0.69	6/19/2007	23.01	21.49	23.01	177.49	175.97	Dolostone-Shale Bedrock	
Leachate Well														
LW1-17	(10)	-	-	208.45	211.61	3.16	10/10/2017	14.63	3.96	14.63	204.49	193.82	Landfill Material	
LW1-92		595437.286	4757940.393	201.17	201.18	0.01	4/2/1992	10.82	7.74	10.82	193.43	190.35	Landfill Material	unknown
LW2-92		595508.886	4757951.155	200.63	201.45	0.82	4/3/1992	7.01	3.93	7.01	196.7	193.62	Landfill Material	unknown

Notes:

All units in meters above mean sea level (m AMSL)
mBTOR Metres Below Top Of Riser

(1) Surveyed on February 18, 2005
(2) Surveyed on May 1, 2001
(3) Surveyed on January 9, 2007
(4) Surveyed on June 13, 2007
(5) Surveyed on July 26, 2007
(6) Surveyed on March 31, 2010
(7) Surveyed on July 17, 2013
(8) Water level not considered reliable, monitoring well replaced
(9) Water level elevation obtained from others and considered unreliable
(10) Surveyed in February 2020
(11) Leachate well also measured by BRE on December 12, 2017
(12) Monitoring Wells MW5A-09 and MW5B-09 were accessed and measured on December 27, 2017
(13) surveyed on July 26, 2018
(14) surveyed on December 17, 2019
(15) risers adjusted in August 2019
NM Not Measured
NS Not Surveyed
- Data Note Available

Table 3.2

Bedrock Elevation Summary
Hydrogeologic Assessment - Landfill Expansion
Brooks Road Landfill
2270386 Ontario Limited

Well No.	Northing	Easting	Ground Elevation (mAMSL)	Top of Riser Elevation (mAMSL)	Bedrock Elevation (mBGS)	Bedrock Elevation (mAMSL)
Basal Overburden / Shallow Bedrock						
MW2A-01	595781.173	4758011.818	200.35	201.19	15.24	185.11
OW1A-06	595622.395	4757859.863	199.47	200.24	18.67	180.8
OW5A-06	595676.669	4757897.435	198.72	199.72	17.98	182.87
OW8A-06	595444.871	4757778.658	198.29	199.33	16.16	182.13
OW9A-06	595633.238	4758113.303	199.88	201.08	17.49	182.39
MW1A-07	595359.739	4758112.291	199.72	200.72	17.68	182.04
MW6A-07	595461.535	4757655.105	198.57	199.39	16.26	182.31
MW4A-09	595395.907	4757884.615	199.25	200.15	15.49	183.76
MW5A-09	595663.346	4757746.298	198.53	199.39	17.78	180.75
MW1A-13	595333.078	4758158.933	199.64	200.42	17.07	182.57
OW3A-13	595487.106	4758159.041	200.51	201.23	17.98	182.53
MW10A-18	595416.842	4757905.591	201.13	202.04	19.05	182.08
MW11A-19	595575.180	4757825.979	203.00	203.76	20.42	182.58
MW12A-19	595762.712	4757879.316	199.76	200.60	17.37	182.39
MW13A-22	595564.914	4758156.950	~201.5	-	16.764	184.74
MW14A-22	595722.455	4758156.125	~201	-	14.0208	186.98
Residential						
OW3A-07	595488.276	4758115.859	199.23	200.14	16.449	182.78
Bedrock Wells (shallow and deep)						
MW1S-07	595362.099	4758109.785	199.65	201.11	16.46	183.19
MW2S-07	595779.271	4758015.691	200.49	201.13	14.94	185.55
MW1D-07	595361.315	4758110.831	199.72	201.21	16.76	182.96
MW2D-07	595779.620	4758011.175	200.63	201.16	14.93	185.7
OW8S-07	595447.532	4757772.604	198.98	199.67	17.68	181.30
OW8D-07	595449.144	4757771.695	198.98	199.32	17.68	181.30

Table 3.3

Summary of Hydraulic Conductivity Estimates
Hydrogeologic Assessment - Landfill Expansion
Brooks Road Landfill
2270386 Ontario Limited

Geologic Unit	Aquifer and Approximate Depth Interval	Hydraulic Conductivity Estimates (cm/sec) Horizontal		Vertical	Method	Source
		Estimate/ Range	Geometric Mean			
Refuse	Water Table Aquifer (0 to 10 m bgs)	1.2E-03 - 1.2E-02	6.60E-03		In-situ field testing	HPE, 1992
Silty Clay (weathered)	Water Table Unit (0 to 5 m bgs)	4.00E-08 2.00E-07 - 1.70E-05 2.20E-06 4.15E-05 1.29E-07 - 2.02E-07	2.30E-06 1.75E-07	1.43E-08	Grain size analysis In-situ field testing Pressure packer tests Horslev Grain size analysis Estimation	CRA HPE, 1992 van der Kamp, 1985 van der Kamp, 1985 HPE, 1992 HPE, 1992
Silty Clay (unweathered) (unfractured)	Silty Clay Aquitard (6 to 13 m bgs)	6.30E-08 - 1.20E-07 4.50E-07 1.43E-08	2.32E-07	1.37E-08 2.00E-08	Grain size analysis Single well response Laboratory test Laboratory test Other landfills in Haldimand Clay Plain	CRA CRA HPE, 1992 HPE, 1992 Jagger Hims Ltd
Silty Sand Till/ Shallow Bedrock	Basal Overburden/ Shallow Bedrock Aquifer (13 to 20 m bgs)	1.00E-05 - 1.00E-04 3.20E-05 7.39E-06 - 2.89E-03 1.00E-04	5.50E-05 1.40E-04		Grain size analysis Grain size analysis Field testing Laboratory test	CRA CRA HPE, 1992 HPE, 1992

Note: 2.30E-06 Selected hydraulic conductivity for the corresponding geological unit

Table 4.1

List of Ontario Oil Gas Records within the Study Area
Hydrogeology Assessment
Brooks Road Landfill
Brooks Road, Cayuga, Ontario

LICENCE NUMBER	WELL NAME	OPERATOR	WELL TYPE	WELL MODE	TVD	TD DATE	PLUG DATE
F019425	Pt. Colborne-Welland Gas Co. - J. Kozak #1, North Cayuga - 22 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Gas Show	Abandoned Well	210.62	21-Nov-1947	21-Nov-1947
F019426	W.C. Patterson - Miss Doyle, North Cayuga - 22 - INTR	W. C. Patterson Gas Co. Ltd.	Dry Hole	Abandoned Well	214.58	26-Nov-1927	
F019435	P.C. Welland Gas Co - C. Bunn #1, North Cayuga - 23 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Unknown	207.57	30-Apr-1943	
F019436	Pt. Col-Welland Gas Co - C. Bunn #2, North Cayuga 1 - 23 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Abandoned Well	210.31	17-Jun-1943	3-Feb-1960
F019437	Pt. C. -Welland Gas Co - C. Bunn #3, North Cayuga - 23 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Abandoned Well	229.51	28-Aug-1943	23-Jul-1954
F019438	Dom Nat Gas Co - Wm Bunn #1, North Cayuga - 23 - INTR	Dominion Natural Gas Co., Ltd.	Dry Hole	Abandoned Well	213.97	5-Apr-1928	9-Apr-1928
F019439	Haldimand Gas Synd - W.R. Slack #2, North Cayuga - 23 - INTR	Haldimand Natural Gas Syndicate	Natural Gas Well	Unknown	211.84	21-Dec-1957	
F019478	W.C. Patterson - W.A. Oster #1, North Cayuga - 24 - INTR	W. C. Patterson Gas Co. Ltd.	Natural Gas Well	Unknown	219.76		
F019479	W.C. Patterson - W.A. Oster #2, North Cayuga - 24 - INTR	W. C. Patterson Gas Co. Ltd.	Natural Gas Well	Unknown	224.33	31-Jan-1929	
F019480	Union Gas Co of Canada - W.A. Oster #3, North Cayuga - 24 - INTR	Union Gas Limited	Gas Show	Abandoned Well	217.93	28-Nov-1938	8-Nov-1938
F019481	Pt Col.-Welland Gas Co - C. Bunn #4, North Cayuga - 24 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Abandoned Well	211.53	9-Oct-1943	30-Jun-1964
F019482	Pt. Col - Welland Gas Co Ltd. - C. Bunn #5, North Cayuga - 24 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Natural Gas Well	Unknown	207.87	24-Nov-1943	
F019509	W.C. Patterson - J. Badger, North Cayuga - 25 - INTR	W. C. Patterson Gas Co. Ltd.	Natural Gas Well	Unknown	219.15	19-Mar-1929	
F019511	Pt. Col-Welland Gas & Oil Co - J. Ferguson #1, North Cayuga - 25 - INTR	Port Colborne - Welland Natural Gas & Oil Co. Ltd.	Gas Show	Abandoned Well	213.66	20-Jan-1948	20-Jan-1948
F019516	Dom Nat Gas Co - A.& W. Geddes #2, North Cayuga - 26 - INTR	Dominion Natural Gas Co., Ltd.	Natural Gas Well	Abandoned Well	213.66	4-Oct-1929	25-Aug-1964
F019517	Dom Nat Gas Co - A.&W. Geddes #3, North Cayuga - 26 - INTR	Dominion Natural Gas Co., Ltd.	Dry Hole	Abandoned Well	210.01	24-Oct-1929	25-Oct-1929
F019520	Dom Nat Gas Co - W.B. Hamilton #2, North Cayuga - 26 - INTR	Dominion Natural Gas Co., Ltd.	Natural Gas Well	Abandoned Well	215.80	20-May-1929	12-Mar-1935
T002154	Haldimand Gas No. 477, North Cayuga - 22 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	214.58	13-Dec-1965	24-Jul-1974
T002163	Haldimand Gas No. 481, North Cayuga - 22 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	214.27	1-Aug-1966	4-Aug-1971
T002399	Haldimand Gas No. 489, North Cayuga - 23 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Unknown	213.66	13-Oct-1967	
T002428	Haldimand Gas No. 491, North Cayuga - 24 - INTR	Haldimand Gas & Oil Wells Ltd.	Gas Show	Abandoned Well	215.80	7-May-1968	16-Jul-1968
T002543	Haldimand Gas No. 494, North Cayuga - 25 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	213.66	30-Aug-1968	10-Jun-1975
T002590	Haldiamnd Gas No. 496, North Cayuga - 25 - INTR	Haldimand Gas & Oil Wells Ltd.	Natural Gas Well	Abandoned Well	210.62	24-Oct-1968	9-Jun-1975

Notes:
TVD Total Vertical Depth
TD Date Date total depth reached

Table 6.3

Horizontal Model Results
Hydrogeologic Assessment - Landfill Expansion
Brooks Road Landfill
2270386 Ontario Limited

Parameters		Average Median Basil Till Overburden/Shallow Bedrock (MW1A-13, OW3A-13, OW9A-06)[1][4]	Leachate Concentrations (2017-2021)[2]	*Predicted Peak Concentration through base of Native Clay*[3]	Contaminant Masses & Source Volumes Basal Till Overburden/Shallow Bedrock Aquifer			Final Forecasted Groundwater Concentrations at the Downgradient Property Boundary Basal Till Overburden/Shallow Bedrock Aquifer	Reduction in Concentrations (peak concentrations / final forecasted concentrations)	ODWS or Table 2 Values[5]		Basal Till Overburden/Shallow Bedrock Aquifer RUC[6]
			Maximum		Units	Horizontal Flux into Landfill Footprint (440 L/day per unit width)	Vertical Infiltration of Contaminant Mass (Landfill->Shallow Aquifer->Aquitard-> Basil Till/Shallow Bedrock Aquifer (0.02 m/day per unit area)					
					L/day	Upgradient Width = 365 m 161,000	Total Area = 71,461 m^2 3,900					
						Contaminant Masses						
Chloride	mg/L	15.7	1130	192.5	mg/day	2,527,700	750,641	19.88	9.7	250	AO	133
Boron	mg/L	0.527	10.1	1.32	mg/day	84,847	5,164	0.55	2.4	5	IMAC	1.65
Fluorene	ug/L	ND(0.02)	0.544	0.07	ug/day	1,610	277	0.01	6.2	30	Table 2	30
Phenanthrene	ug/L	ND(0.02)	0.492	0.06	ug/day	1,610	246	0.01	5.6	1.0	Table 2	0.5
Benzene	ug/L	ND(0.5)	4.27	0.40	ug/day	40,250	1,548	0.25	1.6	0.001	MAC	0.25
Vinyl chloride	ug/L	ND(0.5)	0.76	0.11	ug/day	40,250	417	0.25	0.4	0.001	MAC	0.25
									Average: 4			

Notes:
(1) Average median background concentrations are based on groundwater quality reported at wells MW1S-13, OW3A-13, and OW9A-06 between 2017 and 2021.
(2) Maximum reported concentrations in leachate from 2017 and 2021 are used.
(3) Taken from the vertical model
(4) Where a parameter was analyzed for but was not detected at or above the Method Detection Limit, a value of 1/2 of the lowest MDL was assumed.
(5) Ontario Drinking Water Standards (ODWS), June 2003; revised June 2006, as amended, prepared by the MECP. Where no ODWS criteria exists, the RUC values were developed using Table 2 of the Soil, Groundwater and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act, dated April 15, 2011.
(6) A value of zero was used to calculate the RUC for PAHs and VOCs.
RUC Reasonable Use Criteria
Bold Concentration exceeds ODWS and RUC.

Table 7.1A

Proposed Monitoring Program
Hydrogeologic Assessment - Landfill Expansion
Brooks Road Landfill
2270386 Ontario Limited

	Location	March	May	August	November
Groundwater [1]	OW1A-06		B		A
	OW1B-06		B		A
	OW3A-13		B		A
	OW3B-13		B		A
	OW5A-06		B		A
	OW5B-06		B		A
	OW8A-06		B		A
	OW8B-06		B		A
	OW8D-07 (Gypsum Mine)		B		WL-only
	OW8S-07 (Gypsum Mine)		B		WL-only
	OW9A-06		B		A
	OW9B-06		B		A
	MW1-03		WL-only		WL-only
	MW1A-13		B		A
	MW1B-13		B		A
	MW1D-07 (Gypsum Mine)		B		WL-only
	MW1S-07 (Gypsum Mine)		B		WL-only
	MW2-03		WL-only		WL-only
	MW2A-01		B		A
	MW2B-07		B		A
	MW2C-01				
	MW2D-07 (Gypsum Mine)		B		WL-only
	MW2S-07 (Gypsum Mine)		B		WL-only
	MW3-03		WL-only		WL-only
	MW4A-09		WL-only		WL-only
	MW5A-09		B		A
	MW5B-09		B		A
	MW6A-07		B		A
	MW6B-07		B		A
	MW10A-18		B		A
	MW10B-18		B		A
	MW11A-19		B		A
	MW11B-19		B		A
	MW12A-19		B		A
	MW12B-19		B		A
	MW13A-22		B		A
	MW13B-22		B		A
	MW14A-22		B		A
	MW14B-22		B		A
Surface Water [2]	SW1	C	B	C	B
	SW2	C	B	C	B
	SW3	C	B	C	B
	SW4	C	B	C	B
	SW5	C	B	C	B
	SW6	C	B	C	B
	SW7	C	B	C	B
	SW8	C	B	C	B
	SW9	C	B	C	B
	SWMS Pond [3]	D	D	D	D
LCS	Leachate Collection System	WL-only	B	WL-only	WL-only
LW	LW1-17	WL-only	WL-only	WL-only	WL-only
QA/QC	Groundwater Duplicate		B		A
	Surface Water Duplicate	C	B	C	B
	Field Blank	C	B	C	B

Notes:

[1] Groundwater levels will be measured at all monitoring wells during the May and November sampling events

[2] Surface water levels and flows will be measured during all surface water sampling events at all surface water locations

[3] List E - Trigger Parameter samples are collected and reviewed prior to discharging water from the SWMS Pond

Refer to Table 2 for the list of parameters

List A - indicator parameters (groundwater)

List B - inorganic chemistry, metals, PAHs, VOCs

List C - indicator parameters (surface water)

List D - TDS Pond Parameters

List E - Effluent Discharge Parameters

Table 7.1B

Proposed Monitoring Program
Parameter Lists
Hydrogeologic Assessment - Landfill Expansion
Brooks Road Landfill
2270386 Ontario Limited

List (s)	Analytical Group	Analytical Parameters
A	Indicator Parameters (groundwater)	alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, DOC, turbidity
B	Inorganic Chemistry	alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulfate, DOC, TDS, suspended solids, phenol, BOD_5, COD, pH, total phosphorus, conductivity, turbidity
B	Metals	arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, nickel, potassium, calcium, aluminum
B	PAHs	naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, benzo(ghi)perylene
B	VOCs	chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, acetone, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, methyl-t-butyl ether, 1,1-dichloroethane, methyl ethyl ketone, cis-1,2-dichloroethene, chloroform, 1,2-dichloroethane, 1,1,1-trichloroethane, carbon tetrachloride, benzene, 1,2-dichloropropane, trichloroethene, bromodichloromethane, cis-1,3-dichloropropene, methyl isobutyl ketone, trans-1,3-dichloropropene, 1,1,2-trichloroethane, toluene, 2-hexanone, dibromochloromethane, 1,2-dibromoethane, tetrachloroethene, 1,1,1,2-tetrachloroethane, chlorobenzene, ethylbenzene, m,p,o-xylenes, bromoform, styrene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene
C	Indicator Parameters (surface water)	alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, pH, total phosphorus, TDS, suspended solids, sulphate, BOD5, COD, phenol, turbidity, temperature (field), and dissolved oxygen (field)
D	PSWMS Pond Parameters	General Chemistry: alkalinity, conductivity, hardness, pH, chloride, sulphate, nitrite, nitrate, ammonia, TSS, TDS, COD, total phosphorus, TKN, BOD_5, phenols Metals: arsenic, barium, boron, cadmium, chromium, copper, iron, lead, mercury, zinc Organics: ethylbenzene, naphthalene, benzo(a)pyrene Field Parameters: conductivity, dissolved oxygen, pH, temperature
E	PSWMS Pond Trigger Parameters	TSS, pH, un-ionized ammonia, iron, total phosphorus, zinc, boron, toluene, fluorene, napthalene Field Parameters: conductivity, dissolved oxygen, pH, temperature

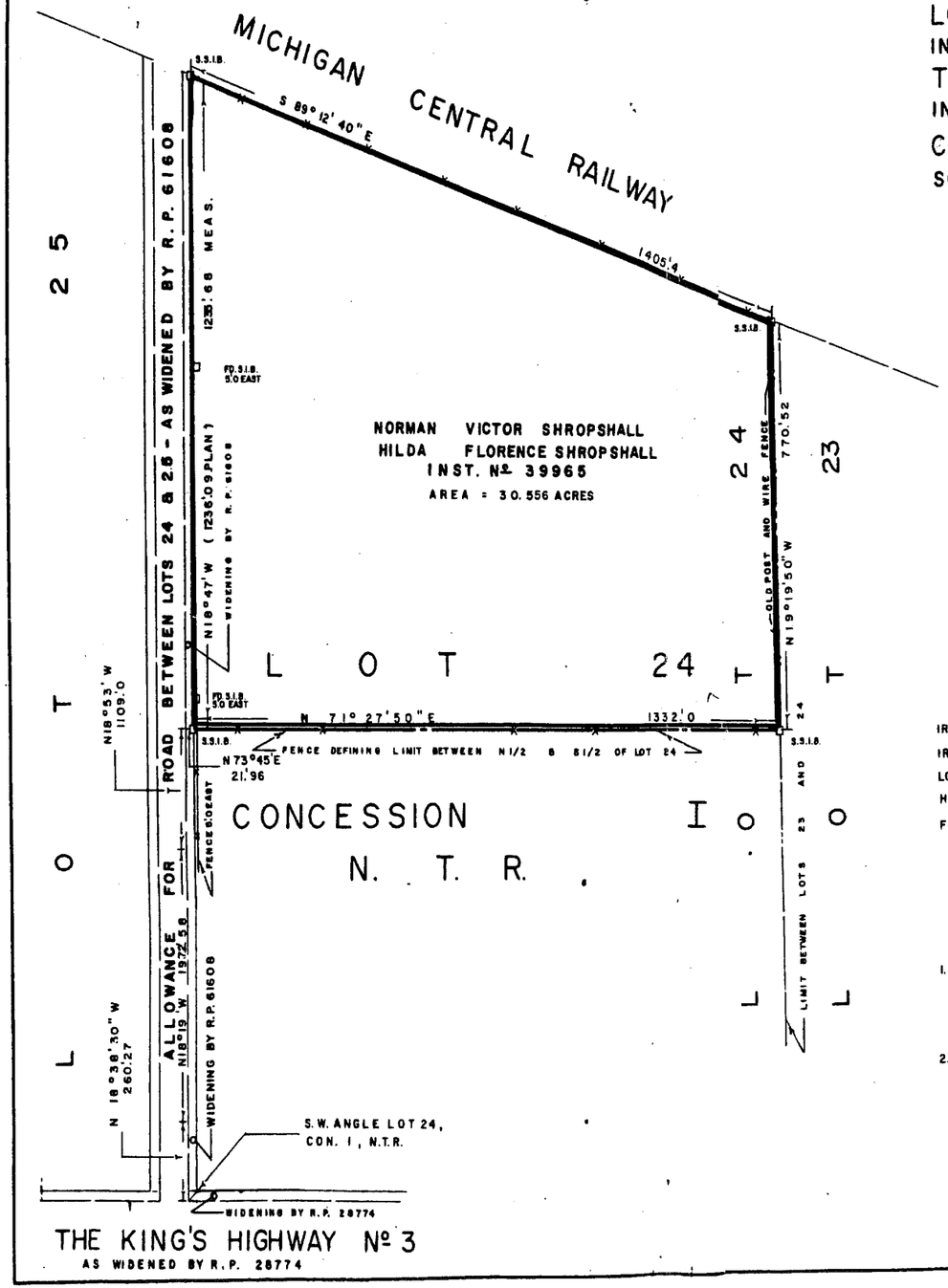
Appendices

Appendix A

Legal Site Survey

18235

PLAN OF SURVEY
OF PART OF
LOT 24 - CONCESSION I - N.T.R.
IN THE
TOWNSHIP OF NORTH CAYUGA
IN THE
COUNTY OF HALDIMAND
SCALE: 1" = 200'



N

LEGEND

IRON BARS 1"x1"x48" SHOWN	S.I.B.
IRON BARS 1"x1"x36" SHOWN	S.S.I.B.
LOT LINES SHOWN	
HALF LOT LINES SHOWN	
FENCES SHOWN	x—x—x

I HEREBY CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT AND THE REGISTRY ACT AND THE REGULATIONS MADE THEREUNDER.

2. THE SURVEY WAS COMPLETED ON THE 2ND DAY OF NOVEMBER, 1973

DATED NOVEMBER 5TH, 1973 — H. V. Jewitt

H. V. JEWITT
ONTARIO LAND SURVEYOR
90 KENT ST. S, SIMCOE, ONTARIO.

C.A.L. 1-49

120-0228ENG

PLAN OF SURVEY OF

PART OF THE NORTH HALF OF LOT 24 CONCESSION 1, NORTH OF TALBOT ROAD

GEOGRAPHIC TOWNSHIP OF NORTH CAYUGA

HALDIMAND COUNTY

SCALE 1 : 1000

10 0 10 20 30 40 50 60 70 80 90 100 metres

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
2014

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT

DATE March 10 2014

LES RUDNICKI
ONTARIO LAND SURVEYOR

PLAN 18R-7151

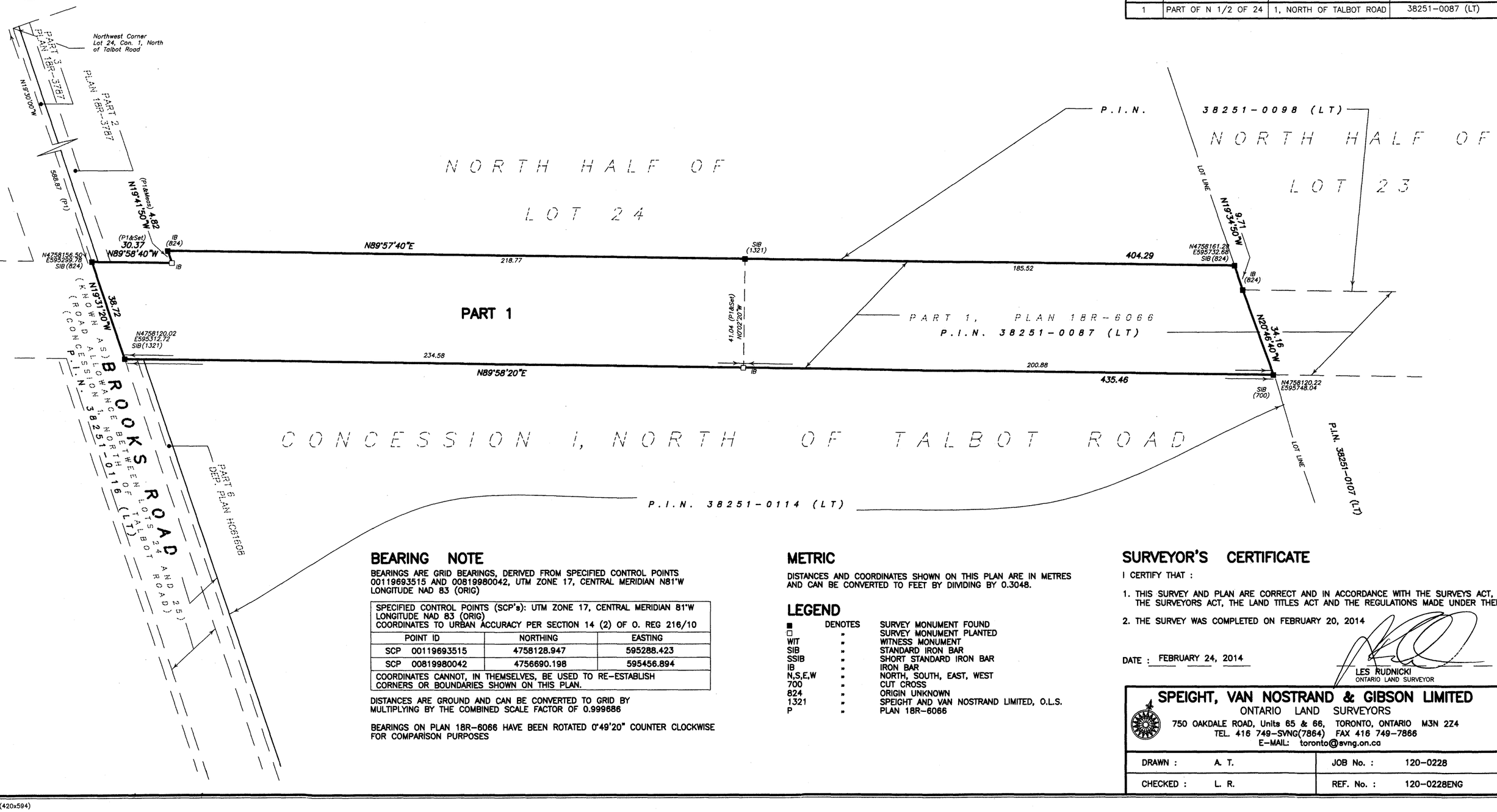
RECEIVED AND DEPOSITED

DATE March 11, 2014

REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF THE HALDIMAND REGISTRY OFFICE (No. 18)

SCHEDULE

PART	LOT	CONCESSION	PART OF PIN
1	PART OF N 1/2 OF 24	1, NORTH OF TALBOT ROAD	38251-0087 (LT)



BEARING NOTE

BEARINGS ARE GRID BEARINGS, DERIVED FROM SPECIFIED CONTROL POINTS 00119693515 AND 00819980042, UTM ZONE 17, CENTRAL MERIDIAN N81°W LONGITUDE NAD 83 (ORIG)

SPECIFIED CONTROL POINTS (SCP's): UTM ZONE 17, CENTRAL MERIDIAN 81°W LONGITUDE NAD 83 (ORIG)
COORDINATES TO URBAN ACCURACY PER SECTION 14 (2) OF O. REG 216/10

POINT ID	NORTHING	EASTING
SCP 00119693515	4758128.947	595288.423
SCP 00819980042	4756690.198	595456.894

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999686

BEARINGS ON PLAN 18R-6066 HAVE BEEN ROTATED 0°49'20" COUNTER CLOCKWISE FOR COMPARISON PURPOSES

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	"	SURVEY MONUMENT PLANTED
WIT	"	WITNESS MONUMENT
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
IB	"	IRON BAR
N,S,E,W	"	NORTH, SOUTH, EAST, WEST
700	"	CUT CROSS
824	"	ORIGIN UNKNOWN
1321	"	SPEIGHT AND VAN NOSTRAND LIMITED, O.L.S.
P	"	PLAN 18R-6066

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON FEBRUARY 20, 2014

DATE : FEBRUARY 24, 2014

LES RUDNICKI
ONTARIO LAND SURVEYOR

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
750 OAKDALE ROAD, Units 65 & 66, TORONTO, ONTARIO M3N 2Z4
TEL. 416 749-SVNG(7864) FAX 416 749-7866
E-MAIL: toronto@svng.on.ca

DRAWN :	A. T.	JOB No. :	120-0228
CHECKED :	L. R.	REF. No. :	120-0228ENG

A2 (420x594)

Appendix B

Existing Environmental Compliance Approvals

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 7323-C6EJUM
Issue Date: September 24, 2021

2270386 Ontario Limited
162 Cumberland Street
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd North, Cayuga, Haldimand County, Ontario.

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

- one (1) landfill site, having a capacity of 1,045,065 cubic metres (including waste and daily cover), a maximum fill rate of 250,000 tonnes per year and 1,000 tonnes per day;
- one (1) leachate treatment system, having a rated capacity of 200 cubic metres per day, complete with a leachate collection sump, a raw leachate primary settling tank, an aeration system and above-grade treated effluent storage tanks;

all in accordance with the supporting information listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Acoustic Assessment Report" means the report, prepared in accordance with Publication NPC-233 submitted in support of the application, that documents all sources of noise emissions and Noise Control Measures present at the Facility. "Acoustic Assessment Report" also means the Acoustic Assessment Report prepared by GHD, dated September 7, 2021 and signed by Michael Masschaele;
2. "Approval" means this Environmental Compliance Approval, including the application and supporting documentation listed above;
3. "Company" means 2270386 Ontario Limited, that is responsible for the construction or operation of the Facility and includes any successors and assigns;
4. "District Manager" means the District Manager of the appropriate local district office of the Ministry, where the Facility is geographically located;

5. "EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;
6. "Equipment" means all the equipment, described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval;
7. "ESDM report" means the Emission Summary and Dispersion Modelling Report which was prepared in accordance with section 26 of O. Reg. 419/05 and the Procedure Document by GHD and dated June 11, 2021, submitted in support of the application, and includes any changes to the report made up to the date of issuance of this Approval;
8. "Facility" means the entire operation located on the property where the Equipment is located;
9. "Manual" means a document or a set of documents that provide written instructions to staff of the Company;
10. "Ministry" means the ministry of the government of Ontario responsible for the EPA and includes all officials, employees or other persons acting on its behalf;
11. "Noise Control Measures" means measures to reduce the noise emissions from the Facility and/or Equipment including, but not limited to, silencers, acoustic louvres, enclosures, absorptive treatment, plenums and barriers;
12. "Noise Guidelines for Landfill Sites" means the Ministry draft publication "Noise Guidelines for Landfill Sites", October 1998, as amended;
13. "Odour Management Plan" means the Odour Management Plan, Brooks Road Landfill Site, Haldimand County, prepared by GHD, dated June 11, 2021 that includes mitigation measures to minimize off-Site odour impacts, and if appropriate, a trigger mechanism and contingency plan;
14. "Publication NPC-233" means the Ministry Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995;
15. "Publication NPC-300" means the Ministry Publication NPC-300, “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300”, August 2013, as amended;
16. “Site" means the entire waste disposal site, including the buffer lands, at the Brooks Road Landfill Site, Lot 24, Concession 1 North, Haldimand County; and
17. "Truck(s)" means trucks carrying waste for disposal at the Facility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **OPERATION AND MAINTENANCE**
    1. The Company shall prepare, not later than three (3) months from the date of this Approval, implement and continue to update as necessary, a Manual outlining the operating procedures and maintenance programs for the Equipment/Facility, which shall specify as a minimum:
        a. routine operating and maintenance procedures in accordance with good engineering practices;
        b. emergency procedures;
        c. frequency of inspections and scheduled preventative maintenance;
        d. procedures to prevent upset conditions;
        e. all appropriate measures to prevent/minimize fugitive particulate matter, noise and odorous emissions from all potential sources at the Site; and
        f. procedures for record keeping activities relating to the operation and maintenance programs.
    2. The Company shall ensure that the Facility/Equipment is properly operated and maintained at all times and in accordance with this Approval, the operating procedures and maintenance Manual, and the Odour Management Plan.
2. **ODOUR MANAGEMENT PLAN**
    1. The Company shall forthwith implement the Odour Management Plan and continue to review and update as necessary and in consultation with the District Manager as applicable.
    2. If there is any odour complaint, or significant odour is detected during daily inspection, and the odour is confirmed to originate from the Site, mitigation measures shall be implemented immediately in accordance with the Odour Management Plan.
    3. If odour causes adverse off-site impacts that are not mitigated through implementation of odour mitigation measures according to the Odour Management Plan, the Company shall, upon written notification from the District Manager, conduct an investigation into the cause as to why the impacts were not mitigated and submit to the District Manager within the time frame identified in the notice, an assessment of the issues and the need for implementation of contingency actions in accordance with the Odour Management Plan.
    4. If the Ministry deems the odour mitigation measures taken as per Condition

2.3 to be unsuitable, insufficient or ineffective, the District Manager may direct the Company, in writing, to propose further measures to address the noted failure, upset or malfunction, which may include requiring a reduction in the receipt of waste, cessation of the receipt of waste, removal and disposal of waste from the waste diversion area, the removal of leachate from the Site as well as, making repairs or modifications to equipment or processes. Such measures shall be implemented by the Company upon approval by the District Manager.

5. If the cessation of the receipt of waste is required, as determined by Condition 2.4, no waste shall be received at the Site until the District Manager is satisfied that odour impacts have been adequately mitigated.
6. The Company shall prepare and maintain an annual summary of the actions taken and achievements made under the Odour Management Plan as of December 31 of the previous calendar year.

3. **NOISE**
    1. The Company shall, at all times, ensure that the noise emissions from the Facility comply with the limits set out in Ministry Publication NPC-300.
    2. The Company shall, at all times, ensure that the noise emissions from the landfill site operations at the Facility comply with the limits set out in Ministry draft publication "Noise Guidelines for Landfill Sites".
    3. The Company shall ensure that the operating times and numbers of Equipment are limited as detailed in Section 2 of the Acoustic Assessment Report.
    4. The Company shall limit Truck arrivals and departures to a maximum of sixteen (16) trucks per sixty (60) minute period, restricted to the daytime hours from 7 a.m. to 7 p.m.

4. **COMPLAINTS RESPONSE PROCEDURE**
    1. The Company shall develop in consultation with the District Manager, not later than three (3) months from the date of this Approval, implement and continue to update as necessary, a Complaint Response Protocol for dealing with and responding to environmental complaints as a result of operation of the Equipment/Facility approved by this Approval. The Complaint Response Protocol shall include:
        a. procedures for recording the complaint;
        b. procedures for investigating the complaint, including determining all possible causes of the complaint, and the necessary actions to appropriately deal with the cause of the subject matter of the complaint;

c. procedures for taking the necessary actions to appropriately deal with the cause of the subject matter of the complaint in a timely and effective manner;

d. a description of any measures taken to address the complaint, outcome of the actions taken and steps to be taken to avoid the recurrence of similar incidents;

e. procedures for record keeping of activities relating to the complaints;

f. procedures for notifying the District Manager of the complaint in a manner acceptable to the District Manager; and

g. procedures for replying to the complainant.

5. **RECORD RETENTION**
    1. Any information requested by any employee in or agent of the Ministry concerning the Facility and its operation under this Approval, including, but not limited to, any records required to be kept by this Approval, shall be provided to the employee in or agent of the Ministry, upon request, in a timely manner. Unless otherwise specified in this Approval, the Company shall retain, for a minimum of five (5) years from the date of their creation all reports, records and information described in this Approval, including,
        a. a copy of the ESDM Report;
        b. a copy of the Odour Management Plan and activities pertaining to the implementation of the Odour Management Plan;
        c. a copy of the Acoustic Assessment Report;
        d. records of maintenance, repair and inspection of Equipment/Facility;
        e. all records of any upset conditions associated with the operation of the Equipment/Facility;
        f. all records on the environmental complaints, as required under condition 4.

SCHEDULE A

Supporting Documentation

1. Environmental Compliance Approval Application and all supporting information, dated June 1, 2021, signed by Richard Weldon and submitted by the Company;
2. Emission Summary and Dispersion Modelling Report, dated June 11, 2021 and prepared by GHD;

3. Odour Management Plan, dated June 11, 2021 and prepared by GHD;
4. Acoustic Assessment Report prepared by GHD, dated September 7, 2021 and signed by Michael Masschaele; and the additional information provided by Sam East of GHD in the email dated September 7, 2021 and Daniel Turner of GHD in the email dated September 10, 2021.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No. 1 is included to emphasize that the Equipment/Facility must be maintained and operated according to a procedure that will result in compliance with the EPA, the Regulations and this Approval.
2. Condition No. 2 is included to ensure that the Equipment/Facility is operated in a manner that does not result in unacceptable odour emissions and mitigation measures are employed in event of an odour impact.
3. Condition No. 3 is included to provide the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Equipment/Facility.
4. Condition Nos. 4 and 5 are included to require the Company to keep records and to provide information to the Ministry so that compliance with the EPA, the regulations and this Approval can be verified.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 8922-9ZHR29 issued on October 8, 2015.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of September, 2021

Neryed Ragbar, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

QN/
c: District Manager, MECP Hamilton - District
Daniel Turner, GHD

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 1122-BKUPSM
Issue Date: February 3, 2020

2270386 Ontario Limited
162 Cumberland St
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd, Lot 24, Concession 1 North of Talbot Road
County of Haldimand

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

A stormwater management facility and a leachate collection, treatment, and disposal system to service the Brooks Road Landfill Site (formerly Edwards Landfill Site), located in Part of Lot 24, Concession 1, North of Talbot Road, Haldimand County, discharging to a roadside ditch along the east side of Brooks Road, consisting of the following:

Leachate Treatment System

A leachate treatment system designed and installed for a Rated Capacity of 200 m³/day to service the Brooks Landfill Site, located at the south-central side of the landfill site, with an effluent discharge system to discharge effluent to a roadside ditch along Brooks Road with a Rated Capacity of 45 m^3 /day, with a Peak Daily Flow of 60 m^3/day and such other removal of effluent from the Landfill Site in compliance with law, including Ontario Regulation 347, and consisting of the following:

- One (1) leachate collection sump located in the south-east corner of Stage One part of the landfill, equipped with one (1) 6.3 L/sec at 14 m TDH pump discharging through one (1) approximately 35 m long 76.2 mm diameter forcemain into the primary settling tank described below.

- One (1) 28 m³ **Primary Settling Tank** receiving leachate from the existing leachate collection sump, equipped with baffle walls and one (1) 7 L/sec at 9.0 m TDH PST pump, three (3) level floats, and pH monitor, discharging through one (1) 500 micron opening strainer installed on the

feed line to an aeration system described below.

- One (1) **Aeration System** comprising of two (2) 114 m³ capacity concrete tanks in series each aeration tank equipped with 1" lateral air diffusers, two (2) air blowers each with 910 m³/hr (530 cfm) capacity at 13 psi head loss, and the second aeration tank fitted with three (3) level floats, discharging via one (1) 66 m³/hr capacity at 106 m TDH feed pump to the Membrane Biofiltration Reactor (MBR) treatment system described below.

- One (1) 200 m³/day Rated Capacity **Membrane Biofiltration Reactor (MBR) Treatment System** consisting 8 mm diameter membranes housed in four (4) 200 mm diameter tubular modules installed in series and providing a filtration surface area of 36.7 m² per module, designed to operate at maximum pressure of 8 Bar (116 psi) at 40º C with a circulation velocity of 3 m/sec, providing a total filtration area of 146.8 m², equipped with one (1) 200 m³/hr capacity MBR recirculation pump to be used to recirculate activated sludge across the membranes, discharging to a UV disinfection system described below.

- Two (2) **UV Disinfection Units** operating in parallel, each unit capable of providing minimum UV dosage of 40 mJ/cm² at a flow of 114 L/min, discharging by gravity to an effluent transfer tank described below.

- Effluent discharge system consisting of:
  - One (1) 12.5 m³ capacity **Effluent Transfer Tank** equipped with one (1) 7 L/sec at 11 m TDH capacity effluent pump and three (3) level floats, to be used as temporary storage tank to transfer effluent to the existing effluent discharge holding tanks described below.
  - Three (3) 150 m³ capacity **Effluent Discharge Holding Tanks.**
  - Discharge piping from the **Effluent Discharge Holding Tanks** and flow measuring device for a Rated Capacity of 45 m^3/day with a Peak Daily Flow of 60 m^3/day, discharging to the roadside ditch.
  - Discharge piping from the **Effluent Discharge Holding Tanks** and control valve for loading of haulage units for lawful removal of effluent from the Site

- One (1) 12.5 m³ capacity **Sludge Storage Tank**, providing approximately eight (8) days sludge storage capacity, equipped with one (1) 7 L/sec at 7 m TDH capacity sludge pump transferring sludge to the landfill for disposal.

- A chemical feed system consisting of:

  Nitrification
  - one (1) 9 L/hr at 44 psi capacity chemical metering pump dosing **magnesium hydroxide** from a dual wall storage tank to the aeration tank described above for alkalinity control.

  Phosphorus Removal
  - one (1) 9 L/hr at 44 psi capacity chemical metering pump dosing **alum** into the feed line of the aeration tank described above for phosphorus removal.

  Acid Cleaning

- one (1) 24 L/hr at 145 psi capacity chemical metering pump dosing **citric acid** into the MBR feed piping during an acid cleaning of the membranes to remove calcified minerals.

Oxidation Cleaning
- one (1) 78 L/hr at 145 psi capacity chemical metering pump dosing **sodium hypochlorite** into the MBR feed piping during a chlorine cleaning of the membranes to remove accumulated sludge.

Alkaline Cleaning
- one (1) 24 L/hr at 145 psi capacity chemical metering pump dosing **magnesium hydroxide** into the MBR feed piping during an alkaline cleaning of the membranes to remove accumulated fats, oil, and grease.

Leachate Collection System

- a leachate collection, transmission, and storage, designed to handle a maximum of 60 m³/day of leachate generated from the site, consisting of two (2) 75.7 L/min capacity leachate pumps and one (1) 50 mm diameter HDPE forcemain.

Stormwater Management System

A stormwater management facility to service the Brooks Road Landfill Site with a total drainage area of 14.91 ha and an approved landfill footprint of 6.07 ha, designed to provide quantity and quality control of stormwater runoff from storm events with up to 1:100 year return frequency, consisting of the following:

Stormwater Management System (SWMS)

A stormwater management system to provide quality and quantity control of stormwater runoff from the site during the active operation and post closure of the landfill site, consisting of the following:

- one (1) perimeter ditch running from the north-east corner of the landfill site along the east side and south side of the landfill foot print, having a 0.3 m bottom width, a minimum of 1.0 m depth, and 3H:1V side slopes on the road side, conveying collected stormwater runoff to a stormwater management pond described below.

- one (1) perimeter ditch running from the north-east corner of the landfill site along the north side and west side of the landfill foot print, having a 0.3 m bottom width, a minimum of 1.0 m depth, and 3H:1V side slopes on the road side, conveying collected stormwater runoff to a stormwater management pond described below.

- one (1) inlet structure including two (2) 600 mm diameter concrete culverts and an open swale covered with turf reinforcement mat discharging into a forebay described below.

- one (1) forebay with approximate length of 29 m, upstream width of 4 m and downstream width of 15 m, a permanent pool depth of 0.60 m, and side slopes of 4H:1V, equipped with a berm with top

elevation 197.85 m AMSL, discharging to a stormwater management pond described below.

- one (1) wet detention stormwater management pond **(SWMS Pond)** to be located on south west corner of the site providing a total storage capacity of 6,768 m³ consisting of a permanent pool storage volume of 1,266 m³ (at elevation 197.85 m AMSL) with a maximum depth of 0.60 m and an extended storage volume of 5,502 m³ with an extended storage depth of 0.34 m (at elevation of 198.19 m AMSL).

- one (1) outlet structure consisting of one (1) 150 mm diameter perforated PVC pipe with an invert elevation of 197.85 m AMSL, equipped with 75 mm orifice plate, an outlet control valve, and one (1) 600 mm x 1200 mm concrete catch basin, discharging to a roadside ditch along the east side of Brooks Road.

- one (1) emergency by-pass structure consisting of a 2.0 meter wide rip-rap spillway at invert elevation of 199.10 m AMSL discharging to a roadside ditch along Brooks Road,

Including all controls and associated appurtenances,

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document and any schedules attached to it, and the application;

"BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"CBOD5" means 5 day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in unfiltered sample;

"Daily Concentration" means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for purposes of Part II.1, EPA;

"District Manager" means the District Manager of the Hamilton District Office;

"EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

"Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of a named equipment;

"Limited Operational Flexibility" (LOF) means any modifications that the Owner is permitted to make to the Works under this Approval;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Monthly Average Concentration" means the arithmetic mean of all Daily Concentrations of a contaminant in the effluent sampled or measured, or both, during a calendar month;

"Monthly Average Daily Flow" means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month;

"Notice of Modifications" means the form entitled "Notice of Modifications to Sewage Works";

"Owner" means 2270386 Ontario Limited and its successors and assignees;

"OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

"Previous Works" means those portions of the sewage works previously constructed and approved under an Approval;

"Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this Approval;

"Rated Capacity" means the Monthly Average Daily Flow for which the Works are approved to handle;

"Works" means the sewage works described in the Owner's application, and this Approval, and includes Proposed Works, Previous Works, and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

I. GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(3) Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the documents listed in the Schedule submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner or operating authority, or both.

(b) change of address of Owner or operating authority or address of new owner or operating authority.

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Partnerships Registration Act.

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the Corporations Information Act shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this Condition will refer to this Approval's number.

II. LEACHATE COLLECTION AND TREATMENT FACILITY

3. LEACHATE MANAGEMENT

(1) Leachate generated at the landfill Site shall be collected, treated and disposed of using the on-site leachate treatment system

(a) Notwithstanding Condition 3(1), leachate generated at the landfill Site that is not treated using the on-site leachate treatment system shall be removed to an off-site facility that is approved by the Ministry to treat leachate generated at the landfill Site.

(b) In the event there is effluent from leachate that has been treated in the on-site leachate treatment system that cannot be disposed of to the roadside ditch, such effluent may be disposed of to an off-site facility provided such disposal is completed lawfully, including pursuant to Ontario Regulation 347.

(2) Leachate generated at the Landfill Site that is not treated using the on-site leachate treatment system shall not be discharged to the natural environment at any time.

4. OPERATIONS AND MAINTENANCE

(1) Within six (6) months of the issuance date of this Approval, the Owner shall prepare and submit for approval to the Director and a copy to the District Manager a "Contingency and Remedial Action Plan for the Works (**On-site leachate treatment system**)" which shall provide detailed action plans that will be implemented during any event when the effluent limits set under Condition 6(1) are not met;

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the works.

(b) inspection programs, including frequency of inspection, for the works and the methods or tests employed to detect when maintenance is necessary.

(c) repair and maintenance programs, including the frequency of repair and maintenance for the works.

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager, and

(e) complaint procedures for receiving and responding to public complaints.

(3) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

5. EFFLUENT OBJECTIVES

(1) The Owner shall use best efforts to design, construct and operate the works with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the Works.

Table 1 - Effluent Objectives	
Effluent Parameter	**Concentration Objective** (milligrams per litre unless otherwise indicated)
CBOD5	5.0
Total Suspended Solids (TSS)	5.0
Total Ammonia Nitrogen (TAN)	1.0
Total Phosphorus (TP)	0.2
Zinc	0.03
Phenols	0.005
Ethylbenzene	0.008

(2) As a further effluent objective, the Owner shall use best efforts to maintain the pH of the effluent from the works within the range of 6.5 to 8.5, inclusive, at all times.

(3) The Owner shall include in all reports submitted in accordance with Condition 12 a summary of the efforts made and results achieved under this Condition.

6. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the works such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the works.

Table 2 - Effluent Limits	
Effluent Parameter	**Concentration Limit** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
CBOD5	10.0
Total Suspended Solids (TSS)	10.0
Total Ammonia as Nitrogen (TAN)	3.0
Total Phosphorus (TP)	0.29
Toxicity (Daphnia magna)	Non-acutely lethal
Toxicity (Rainbow Trout)	Non-acutely lethal
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

(2) The Owner shall ensure that monitoring results for effluent discharge parameters outlined in Condition 9(3) meet the concentration limits set out in Column 2 of subsection (1).

(3) For the purposes of determining compliance with and enforcing subsection (1):

(a) The Concentration of a parameter named in Column 1 of subsection (1), sampled in accordance with Condition 9(3) shall not exceed the corresponding maximum concentration set out in Column 2 of subsection (1).

(b) The pH of the effluent shall be maintained within the limits outlined in subsection (1), at all times.

(4) In the event of any instance of non-compliance with the effluent limits stipulated under Condition 6(1), the Owner shall implement the "Contingency and Remedial Action Plan for the Works (**On-site leachate treatment system**)" prepared under Condition 3(1), and shall determine appropriate control measures to achieve effluent limits and the time lines for the implementation of identified control measures. The Owner shall submit the proposed control measures and implementation time lines for approval to the Director and a copy to the District Manager.

(5) If compliance with effluent limits are not met within the time lines approved under Condition 6(4), the Owner shall discontinue effluent discharge from the Works and implement off-site disposal of leachate for proper treatment.

(6) In the event that any of the control measures proposed under Condition 6(4) require the installation or an upgrade of the Works, the Owner shall submit an application to the Director for an amendment of this Approval.

7. EFFLUENT - VISUAL OBSERVATIONS

(1) Notwithstanding any other condition in this Approval, the Owner shall ensure that the effluent from the works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters.

8. SPECIAL CONDITION

(1) The Owner shall operate the roadside ditch discharge system for the On-Site Leachate Treatment System at the approved Rated Capacity of 45 m^3/day and Peak Daily Flow of 60 m^3/day until an approval is issued by the Director to operate the roadside ditch discharge system at a higher rated capacity. To obtain approval for using the roadside ditch discharge system at a higher rated capacity, the Owner shall complete a detailed receiving surface water assimilative capacity study and submit the study report along with a proposal for effluent limits to the Ministry's Regional Technical Support Section for review and recommendation. Upon receiving review comments and recommendation of the effluent limits from the Technical Support Section, the Owner shall submit to the Director an application for amendment of this Approval and a detailed design brief for approval of the higher rated capacity for the roadside ditch discharge system.

9. EFFLUENT MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the sewage works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Leachate grab samples shall be collected and analyzed at the following sampling point and at the sampling frequencies specified for each parameter listed:

Table 3 - Influent Leachate Monitoring
Sampling Point: Leachate Storage Tank

Parameters	Frequency	Parameter	Frequency
CBOD5	Monthly	Chlorides	Quarterly
Total Suspended Solids (TSS)	Monthly	Nitrate as Nitrogen	Quarterly
Total Ammonia as Nitrogen (TAN)	Monthly	Arsenic	Quarterly
Total Phosphorus (TP)	Monthly	Barium	Quarterly
pH	Monthly	Boron	Quarterly
Zinc	Monthly	Chromium	Quarterly
Phenols	Monthly	Copper	Quarterly
Ethylbenzene	Monthly	Iron	Quarterly
		Lead	Quarterly
		Benzo(a)pyrene	Quarterly
		Naphtalene	Quarterly
		Benzene	Quarterly
		Toluene	Quarterly

(3) Effluent samples shall be collected and analyzed at the following sampling point, at the sampling frequencies and using the sample type specified for each parameter listed:

Table 4 - Effluent Monitoring
Sampling Point: Effluent Discharge Pipe
Discharge to Brooks Road Ditch

Parameters	Sample Type	Frequency
CBOD5	Grab	Monthly
Total Suspended Solids (TSS)	Grab	Monthly
Total Ammonia as Nitrogen (TAN)	Grab	Monthly
Total Phosphorus (TP)	Grab	Monthly
pH	Grab	Monthly
Zinc	Grab	Monthly
Phenols	Grab	Monthly
Ethylbenzene	Grab	Monthly
Chlorides	Grab	Quarterly
Nitrate as Nitrogen	Grab	Quarterly
Arsenic	Grab	Quarterly
Barium	Grab	Quarterly
Boron	Grab	Quarterly
Chromium	Grab	Quarterly
Copper	Grab	Quarterly
Iron	Grab	Quarterly
Lead	Grab	Quarterly
Benzo(a)pyrene	Grab	Quarterly
Naphtalene	Grab	Quarterly
Benzene	Grab	Quarterly
Toluene	Grab	Quarterly
Acute Lethality Test (Rainbow Trout and Daphnia magna)	Grab	Quarterly

(4) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended from time to time by more recently published editions.
(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions, and
(c) the Environment Canada publications "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" (EPS 1/RM/13 Second Edition - December 2000)

and "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna" (EPS 1/RM/14 Second Edition - December 2000), as amended from time to time by more recently published editions.

(5) The measurement frequencies specified in subsections (2) and (3) in respect of any parameter are minimum requirements which may, after one (1) year of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(6) The owner shall install and maintain (a) continuous flow measuring device(s) to measure the flow rate of the effluent discharged from the sewage works, with an accuracy to within plus or minus fifteen (15) per cent of the actual flow rate for the entire design range of the flow measuring device and record the flow rate at a daily frequency..

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

III - STORMWATER MANAGEMENT FACILITY

10. MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following stormwater monitoring program. Stormwater grab samples shall be collected from the Stormwater Management System **(SWMS) Pond** at a **quarterly frequency** (Spring, Summer, Fall, and Winter) and analysed for the following parameters:

Table 5 - Stormwater Monitoring
Sampling Point: **SWMS Pond**

General Parameters	Metals	Field Parameters
Alkalinity	Arsenic	Conductivity
Conductivity	Barium	Dissolved Oxygen
Hardness	Boron	pH
pH	Cadmium	Temperature
Chloride	Chromium	
Sulphate	Copper	
Nitrate as Nitrogen	Iron	
Nitrite as Nitrogen	Lead	
Total Ammonia as Nitrogen (TAN)	Mercury	
Total Suspended Solids	Zinc	
Total Dissolved Solids		
Chemical Oxygen Demand	**Organics**	
Total Phosphorus	Benzo(a)pyrene	
Total Kjeldahl Nitrogen	Ethylbenzene	
Biological Oxygen Demand (BOD5)	Naphthalene	
Phenols		

(2) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions.

11. OPERATION AND MAINTENANCE

(1) The stormwater run-off generated from the active waste fill area shall be considered contaminated and treated as leachate. The Owner shall ensure that any precipitation falling unto active waste fill areas, not under interim cover, shall be directed to the leachate collection system.

(2) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(3) The Owner shall prepare an operations manual within six (6) months of Substantial Completion of the Works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works.

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary for operational efficiency and environmental protection of the receiving body.

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works.

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager, and

(e) complaint procedures for receiving and responding to public complaints.

(4) The Owner shall maintain the operations manual current and retain a copy at the location of the Works or operational office of the Owner for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(5) The Owner shall undertake an inspection of the condition of the stormwater management ponds and ditches, at least once a year, and undertake any necessary cleaning and maintenance to prevent the

excessive build-up of sediment and/or decaying vegetation.

(6) The Owner shall undertake an inspection and necessary maintenance of the SWMS pond and associated erosion controls including temporary berms, silt fences, rocks and straw bale check dams at least once a year to ensure that the Works are effectively protecting the environment.

(7) The Owner shall maintain a logbook to record the results of the stormwater management pond inspections and any cleaning and maintenance operations undertaken and shall keep the logbook at the site or operational office of the Owner for inspection by the Ministry.

Stormwater Management System (SWMS)

(8) Before the commencement of operation of the Works, the Owner shall prepare a "Stormwater Contingency and Remedial Action Plan" for the Works and provide a copy to the District Manager.

(9) The Owner shall operate the Works in a **normally open position**. The Owner shall compare monitoring results obtained from the Works under Condition 10(1) with the trigger levels of the selected trigger parameters listed in Table 7 to identify any potential leachate impact to stormwater discharged from the ponds.

Table 7 - Trigger Parameters

Parameter	Trigger Level (mg/L)
Un-ionized Ammonia	0.02
Arsenic	0.005
Boron	1.5
pH (unitless)	6.5 to 8.5

(10) In the event that a monitoring result for any of the parameters listed in Table 7 exceeds its corresponding trigger level concentration, the Owner shall re-sample within two weeks period to confirm the trigger level concentration exceedance for that parameter.

(11) In the event that the trigger level concentration exceedance of any parameter of concern is not confirmed after the second round of sampling conducted under Condition 11(10), then, normal stormwater monitoring shall be resumed.

(12) In the event that the trigger level concentration exceedance of any parameter of concern is confirmed after the second round of sampling conducted under Condition 11(10), the Owner shall operate the Works in a **normally closed position** and notify the District Manager forthwith.

(13) While operating the Works in a **normally closed position**, the Owner shall implement the "Stormwater Contingency and Remedial Action Plan" prepared under Condition 11(8) and collect a grab sample and analyze for the trigger parameters listed under Condition 11(9) at a **weekly frequency** preferably after a rainfall event.

(14) The Owner shall resume operating the Works in a **normally open position** if monitoring results for all

trigger parameters from three (3) consecutive sampling events conducted under Condition 11(13) are less than their respective trigger level concentrations.

(15) Discharge of contaminated stormwater from the Works to storm sewer/surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

IV - GENERAL

12. REPORTING

(1) One week prior to the start up of the operation of the works, the Owner shall notify the District Manager (in writing) of the pending start up date.

(2) The Owner shall report to the District Manager or designate, any exceedance of any parameter specified in Condition 6 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedance.

(3) In addition to the obligations under Part X of the Environmental Protection Act, the Owner shall, within ten (10) working days of the occurrence of any reportable spill as defined on Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(4) The Owner shall prepare and submit a performance report to the District Manager on an annual basis by April 30th. The first such report shall cover the first annual period following the commencement of operation of the works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 6, including an overview of the success and adequacy of the sewage works.

(b) a description of any operating problems encountered and corrective actions taken.

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works.

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period.

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment, and

(f) a description of efforts made and results achieved in meeting the effluent objectives outlined in Condition 5.

13. LIMITED OPERATIONAL FLEXIBILITY

(1) The Owner may make modifications to the Works in accordance with the Terms and Conditions of this Approval and subject to the Ministry's "Limited Operational Flexibility Criteria for Modifications to Sewage Works", included under Schedule B of this Approval, as amended.

(2) Sewage works under Limited Operational Flexibility shall adhere to the design guidelines contained within the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended.

(3) The Owner shall ensure at all times, that the Works, related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this Approval.

(4) For greater certainty, the following are not permitted as part of Limited Operational Flexibility:

(a) Modifications to the Works that result in an increase of the approved Rated Capacity of the Works.

(b) Modifications to the Works that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall.

(c) Modifications to the treatment process technology of the Works, or modifications that involve construction of new reactors (tanks) or alter the treatment train process design.

(d) Modifications to the Works approved under s.9 of the EPA, and

(e) Modifications to the Works pursuant to an order issued by the Ministry.

(5) Implementation of Limited Operational Flexibility is not intended to be used for piecemeal measures that result in major alterations or expansions.

(6) If the implementation of Limited Operational Flexibility requires changes to be made to the Emergency Response, Spill Reporting and Contingency Plan, the Owner shall, provide a revised copy of this plan for approval to the local fire services authority prior to implementing Limited Operational Flexibility.

(7) For greater certainty, any modification made under the Limited Operational Flexibility may only be carried out after other legal obligations have been complied with, including those arising from the *Environmental Protection Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, Lake Simcoe Protection Act* and *Greenbelt Act.*

(8) At least thirty (30) days prior to implementing Limited Operational Flexibility, the Owner shall complete a Notice of Modifications describing any proposed modifications to the Works and submit it to the District Manager.

(9) The Owner shall not proceed with implementation of Limited Operational Flexibility until the District Manager has provided written acceptance of the Notice of Modifications or a minimum of thirty (30) days have passed since the day the District Manager acknowledged the receipt of the Notice of Modifications.

Schedule A

1. Application for Approval of Industrial Sewage Works submitted by Mr. Richard Weldon, Managing Partner, 2270386 Ontario Inc., dated September 9, 2019 and supporting information prepared by GHD Consulting Engineers.

2. Letter from GHD to Mr. Paul Widmeyer, Ministry of Environment, Conservation and Parks, Re: Permanent Stormwater Management System ECA No. 4142-ASEKJ2 dated September 17, 2019.

3. Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated September 11, 2013 and design specifications and drawings Prepared by Conestoga-Rovers & Associates Ltd., Waterloo, Ontario.

4. Letter from Peter Kemp, B. Eng., Conestoga-Rovers & Associates Ltd., to Stefanos Habtom, P. Eng., dated May 31, 2014 in response to an additional information request dated April 10, 2014.
5. Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated May 15, 2015 and design specifications and drawings for the leachate treatment system prepared by KOESTER CANADA, Brantford, Ontario.

6. Revised Application for Environmental Compliance Approval amendment submitted by 2270386 Ontario Limited dated December 15, 2017 but received on January 8, 2018 and revised design specifications and drawings for the leachate treatment system prepared by KOESTER CANADA, Brantford, Ontario.

Schedule B

Limited Operational Flexibility Criteria for Modifications to Industrial Sewage Works

1. The modifications to sewage works approved under an Environmental Compliance Approval (Approval) that are permitted under the Limited Operational Flexibility (LOF), are outlined below and are subject to the LOF conditions in the Approval, and require the submission of the Notice of Modifications. If there is a conflict between the sewage works listed below and the Terms and Conditions in the Approval, the Terms and Conditions in the Approval shall take precedence.

1.1 Sewage Pumping Stations

a. Alter pumping capacity by adding or replacing equipment where new equipment is located within an existing sewage treatment plant site or an existing sewage pumping station site, provided that the modifications do not result in an increase of the sewage treatment plant Rated Capacity and the existing flow process and/or treatment train are maintained, as applicable.

1.2 Sewage Treatment Process

a. Installing additional chemical dosage equipment including replacing with alternative chemicals for pH adjustment or coagulants (non-toxic polymers) provided that there are no modifications of treatment processes or other modifications that may alter the intent of operations and may have negative impacts on the effluent quantity and quality.

b. Expanding the buffer zone between a sanitary sewage lagoon facility or land treatment area and adjacent uses provided that the buffer zone is entirely on the proponent's land.

c. Optimizing existing sanitary sewage lagoons with the purpose to increase efficiency of treatment operations provided that existing sewage treatment plant rated capacity is not exceeded and where no land acquisition is required.

d. Optimizing existing sewage treatment plant equipment with the purpose to increase the efficiency of the existing treatment operations, provided that there are no modifications to the works that result in an increase of the Rated Capacity, and may have adverse effects to the effluent quality or location of the discharge.

e. Replacement, refurbishment of previously approved equipment in whole or in part with Equivalent Equipment, like-for-like of different make and model, provided that the firm capacity, reliability, performance standard, level of quality and redundancy of the group of equipment is kept the same. For clarity purposes, the following equipment can be considered under this provision: screens, grit separators, blowers, aeration equipment, sludge thickeners, dewatering equipment, UV systems, chlorine contact equipment, bio-disks, and sludge digester systems.

1.3 Sewage Treatment Plant Outfall

a. Replacement of discharge pipe with similar pipe size provided that the outfall location is not changed.

1.4 Sanitary Sewers

a. Pipe relining and replacement with similar pipe size within the Sewage Treatment Plant site, where the nominal diameter is not greater than 1,200 mm.

1.5 Pilot Systems

a. Installation of pilot systems for new or existing technologies provided that:

i. any effluent from the pilot system is discharged to the inlet of the sewage treatment plant or hauled off-site for proper disposal,
ii. any effluent from the pilot system discharged to the inlet of the sewage treatment plant or sewage conveyance system does not significantly alter the composition/concentration of the influent sewage to be treated in the downstream process; and that it does not add any inhibiting substances to the downstream process, and
iii. the pilot system's duration does not exceed a maximum of two years; and a report with results is submitted to the Director and District Manager three months after completion of the pilot project.

2. Sewage works that are exempt from section 53 of the OWRA by O. Reg. 525/98 continue to be exempt and are not required to follow the notification process under this Limited Operational Flexibility.

3. Normal or emergency operational modifications, such as repairs, reconstructions, or other improvements that are part of maintenance activities, including cleaning, renovations to existing approved sewage works equipment, provided that the modification is made with Equivalent Equipment, are considered pre-approved.

4. The modifications noted in section (3) above are <u>not</u> required to follow the notification protocols under Limited Operational Flexibility, provided that the number of pieces and description of the equipment as described in the Approval does not change.

Ontario
Ministry of
the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:
1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Conforms with the Limited Operational Flexibility as per the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name (Print)	PEO License Number

Signature	Date (mm/dd/yy)

Name of Employer

Part 4 – Declaration by Owner

I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name of Owner Representative (Print)	Owner representative's title (Print)

Owner Representative's Signature	Date (mm/dd/yy)

Notice of Modifications Dec-2013.pdf

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent Owners of the works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is imposed to ensure consistency between approvals granted by the Ministry.

4. Conditions 4 and 11 are included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the works.

5. Condition 5 is imposed to establish non-enforceable effluent quality objectives which the Owner is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 5 are exceeded.

6. Conditions 6 and 7 are imposed to ensure that the effluent discharged from the Works to the Brooks Road side ditch meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.

7. Condition 8 is included to ensure that treatment capacity for the leachate treatment system is established based on proper receiving surface water assimilative capacity assessment and effluent limits requirements.

8. Conditions 9 and 10 are included to require the Owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved Works is consistent with the (design objectives and) effluent limits specified in the Approval and that the approved works does not cause any impairment to the receiving watercourse.

9. Condition 12 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

10. Condition 13 is included to ensure that the Works are operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider. These Conditions are also included to ensure that a Professional Engineer has reviewed the proposed modifications and attests that the modifications are in line with that of Limited Operational Flexibility, and provide assurance that the proposed modifications comply with the Ministry's requirements stipulated in the Terms and Conditions of this Approval, Ministry policies, guidelines, and industry engineering standards and best management practices.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4142-ASEKJ2 issued on January 29, 2018.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 3rd day of February, 2020

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

HV/

c: District Manager, MECP Hamilton - District
Greg Ferraro, GHD

Notice of Modifications Dec-2013.pdf

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A110302
Issue Date: October 1, 2021

2270386 Ontario Limited
162 Cumberland St
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd North Cayuga
Haldimand County,
N0A 1E0

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

a waste disposal site (landfill) with a total site area of 14.3 hectares of which 6 hectares is approved for landfilling.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" or "ECA" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A";
"Contaminating Life Span" means contaminating life span as defined in Ontario Regulation 232/98;
"Design and Operations Report" means the Design and Operations Report Vertical Expansion – Rev. 1, Brooks Road Landfill Site, Prepared by GHD, June 14, 2021 that was submitted in support of the Approval
"Director" means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part II.1 of the EPA;
"District Manager" means the District Manager of the local district office of the Ministry in which the Site is geographically located;
"EPA" means Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended;
"Improvement Area" means the area of Brooks Road, between Highway #3 (also known as Talbot Road) and Townline Road;
"Ministry" means the Ontario Ministry of the Environment, Conservation and Parks;
"NMA" means Nutrient Management Act, 2002, S.O. 2002, c. 4, as amended;
"Odour Management Plan" means a document which describes the measures to minimize odour emissions from the Site;
"Operator" means any person, other than the Owner's employees, authorized by the

Owner as having the charge, management or control of any aspect of the Site and includes its successors or assigns;
"Owner" means any person that is responsible for the establishment or operation of the Site being approved by this Approval, and includes 2270386 Ontario Limited and its successors and assigns;
“OWRA” means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
“PA” means the Pesticides Act, R.S.O. 1990, c. P-11, as amended;
"Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the OWRA, Section 5 of the EPA, Section 17 of the PA, Section 4 of the NMA, or Section 8 of the SDWA;
"Refrigerant Appliances" means household appliances which use, or may use refrigerants, and which include, but is not restricted to, refrigerators, freezers and air-conditioning systems;
"Regional Director" means the Regional Director of the local Regional Office of the Ministry in which the Site is located;
"Regulation 232" means Ontario Regulation 232/98 - Landfilling Sites made under the EPA, as amended;
"Regulation 347" or "Reg. 347" means means Regulation 347, R.R.O. 1990, General - Waste Management, made under the EPA, as amended;
"Regulation 406" means means Regulation 406/19, R.S.O. 1990, On-site and Excess Soil Management, made under the EPA, as amended;
"Regulation 558" means Ontario Regulation 558/00 - General Waste Management, made under the EPA, as amended;
"Regulation 903" means Regulation 903 - Wells, R.R.O. 1990, made under the OWRA, as amended;
"SDWA" means Safe Drinking Water Act, 2002, S.O. 2002, c. 32, as amended;
“Site" means the entire waste disposal site, including the buffer lands, at the Brooks Road Landfill Site, Lot 24, Concession 1 North, Haldimand County; and
“Trained Personnel” means personnel knowledgeable in the following through instruction and/or practice:
a. relevant waste management legislation, regulations and guidelines;
b. major environmental concerns pertaining to the waste to be handled;
c. occupational health and safety concerns pertaining to the processes and wastes to be handled;
d. management procedures including the use and operation of equipment for the processes and wastes to be handled;
e. emergency response procedures;
f. specific written procedures for the control of nuisance conditions;
g. specific written procedures for refusal of unacceptable waste loads; and
h. the requirements of this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

Compliance

(1) This Approval revokes all previous Approvals and Notices of Amendment issued under Part V of the Environmental Protection Act for this Site. The approval given herein, including the terms and conditions set out, replaces all previously issued Approvals and related terms and conditions under Part V of the Act for this Site.
(2) The Owner and Operator shall ensure compliance with all the conditions of this Approval and shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
(3) Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Approval.

In Accordance

(4) Except as otherwise provided by this Approval, the Site shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule “A”.
(5) 1. Construction and installation of aspects described in Schedule "A" must be completed within 5 years of the later of:
(a) the date this Approval is issued; or
(b) if there is a hearing or other litigation in respect of the issuance of this Approval, the date that this hearing or litigation is disposed of, including all appeals.
2. This Approval ceases to apply in respect of the aspects of the Site noted above that have not been constructed or installed before the later of the dates identified in Condition 1(5)1.

Interpretation

(6) Where there is a conflict between a provision of any document listed in Schedule "A" in this Approval, and the conditions of this Approval, the conditions in this Approval shall take precedence.
(7) Where there is a conflict between the application and a provision in any document listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and the Ministry approved the amendment.
(8) Where there is a conflict between any two documents listed in Schedule "A", the document bearing the most recent date shall take precedence.
(9) The conditions of this Approval are severable. If any condition of this Approval, or the application of any condition of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

Other Legal Obligations

(10) The issuance of, and compliance with, this Approval does not:
(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; and

(b) limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner and Operator to furnish any further information related to compliance with this Approval.

Adverse Effect

(11) The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the present, past and historical operations at the Site. Such steps may include accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

(12) Despite an Owner, Operator, or any other person fulfilling any obligations imposed by this Approval, the person remains responsible for any contravention of any other condition of this Approval or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

(13) At no time shall the Owner or Operator allow the discharge of a contaminant that causes or is likely to cause an adverse effect.

Change of Ownership

(14) The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:

(a) the ownership of the Site;

(b) the Operator of the Site;

(c) the address of the Owner or Operator; and

(d) the partners, where the Owner or Operator is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R. S. O. 1990, c. B.17, shall be included in the notification.

(15) No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

(16) In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Approval, and the Owner shall provide a copy of the notification to the District Manager and the Director.

Registration on Title Requirement

(17) Prior to dealing with the property in any way, the Owner shall provide a copy of this Approval and any amendments, to any person who acquires an interest in the property as a result of the dealing.

(18) (a) If not already completed, within ninety (90) calendar days from the date of issuance of this Approval, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:

(i) a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the Site where waste has been and is to

be deposited at the Site;
(ii) proof of ownership of the Site;
(iii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director, verifying the legal description provided in the Certificate of Requirement;
(iv) the legal abstract of the property; and
(v) any supporting documents including a registerable description of the Site.

(b) If not already completed, within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the Director, the Owner shall:

(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and the District Manager, written verification that the Certificate of Requirement has been registered on title.

Registration on Title Requirement - Contaminant Attenuation Zone (CAZ)
(19) Within thirty (30) calendar days from the date of establishing a contaminant attenuation zone (CAZ) (overburden and/or bedrock aquifers) in either fee simple or by way of a groundwater easement, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:
(a) If rights are obtained in fee simple, the Owner shall provide:

(i) documentation evidencing ownership of the CAZ obtained in compliance with Regulation 232, as amended;
(ii) a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and
(iii) a letter signed by a member of the Law Society of Upper Canada; or other qualified legal practitioner acceptable to the Director, verifying the legal description of the CAZ.

(b) within fifteen (15) calendar days of receiving a Certificate of Requirement signed or authorized by the Director,the Owner shall:

(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and the District Manager, a written verification that the Certificate of Requirement has been registered on title.

(c) If rights are obtained by way of a groundwater easement, the Applicant shall:

(i) provide a copy of the agreement for the easement;
(ii) provide a plan of survey signed and sealed by an Ontario Land Surveyor

for the CAZ; and
(iii) submit proof of registration on title of the groundwater easement to the Director and District Manager;

(d) The Owner shall not amend, or remove, or consent to the removal of the easement or CAZ from title without the prior written consent of the Director.

Inspections by the Ministry

(20) No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the OWRA, the EPA, the PA, the SDWA or the NMA, of any place to which this Approval relates, and without limiting the foregoing:
(a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept;
(b) to have access to, inspect, and copy any records required to be kept by the conditions of this Approval;
(c) to inspect the Site, related equipment and appurtenances;
(d) to inspect the practices, procedures, or operations required by the conditions of this Approval; and
(e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the EPA, the OWRA, the PA, the SDWA or the NMA.

Information and Record Retention

(21) (a) Except as authorized in writing by the Director, all records required by this Approval shall be retained at the Site for a minimum of two (2) years from their date of creation.
(b) The Owner shall retain all documentation listed in Schedule “A” for as long as this Approval is valid.
(c) All information and logs required in Conditions 9(1), 10(1), 11(3), 11(4), 12(3), and 12(4) shall be kept at the Site until they are included in the Annual Report.
(d) The Owner shall retain employee training records as long as the employee is working at the Site.
(e) The Owner shall make all of the above documents available for inspection upon request of Ministry staff.
(22) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action under this Approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
(a) an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Approval or any statute, regulation or other legal requirement; or
(b) acceptance by the Ministry of the information’s completeness or accuracy.
(23) The Owner shall ensure that a copy of this Approval, in its entirety and including all its Notices of Amendment, and documentation listed in Schedule "A", are retained at the Site at all times.
(24) Any information related to this Approval and contained in Ministry files may be

made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

2. FINANCIAL ASSURANCE

(1) (a) Within twenty (20) days of issuance of this Notice, the Owner shall submit to the Director, Financial Assurance as defined in Section 131 of the Environmental Protection Act, in the amount of **$8,371,282.00.** This Financial Assurance shall provide sufficient funds for the closure and post-closure care/monitoring of the Site.

(i) The total amount of financial assurance specified in Condition 2(1)(a) shall be updated by the Owner, as follows, by the specified dates:

i. October 1, 2021 - **$9,956,333.00**
ii. October 1, 2022 - **$11,541,383.00**
iii. October 1, 2023 - **$10,424,285.00**
iv. October 1, 2024 - **$10,097,075.00**

(b) Commencing on October 1, 2023 and on a three (3) year basis thereafter, the Owner shall provide to the Director a re-evaluation of the amount of the Financial Assurance to facilitate the actions required under Condition 2(1)(a). The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of alternative measures required by the Director upon review of the annual reports. The Financial Assurance must be submitted to the Director within twenty (20) days of written acceptance of the re-evaluation by the Director;

(c) The amount of Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is received, indicating Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial Assurance at least sixty (60) days before the Financial Assurance terminates, the Owner shall forthwith replace the Financial Assurance with cash.

3. SITE OPERATION

Operation

(1) The Site shall be operated and maintained at all times including management and disposal of all waste, in accordance with the EPA, Regulation 347, Regulation 232, and the conditions of this Approval.

Service Area

(2) Waste categories of Industrial, Commercial and Institutional ("ICI waste"), generated from within the geographic boundaries of the Province of Ontario may be received for disposal at this Site.

Waste Types

(3) Only solid non-hazardous ICI waste, including contaminated soils, and processed

organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), shall be received for disposal at this Site. No hazardous waste or liquid industrial waste , as defined in Reg. 347, as amended by Reg. 558/00, shall be disposed at this Site.
(4) The Owner shall develop and implement a program to inspect waste to ensure that the waste received at the Site is of a type approved for acceptance under this Approval.
(5) The Owner shall ensure that all loads of waste are properly inspected by Trained Personnel prior to acceptance at the Site and that the waste vehicles are directed to the appropriate areas for disposal or transfer of the waste. The Owner shall notify the District Manager, in writing, of load rejections at the Site within one (1) business day from their occurrence.

Approved Waste Quantities

(6) The maximum volumetric capacity for the Site including waste and daily cover shall not exceed 1,045,065 cubic metres.
(7) The Owner shall ensure that the waste received at the Site does not exceed:
(a) a total of 250,000 tonnes in any calendar year; and
(b) the daily maximum received at the site does not exceed 1,000 tonnes.

Waste Placement

(8) No waste shall be landfilled outside of the approved six (6) hectare footprint fill area. The site shall be developed, maintain established buffer areas, and adhere to final contours for waste and final cover material in accordance with the design drawings provided in Appendix L of the Design and Operations Report.
(a) The maximum elevation of the fill zone, including final cover, shall be 221.50 metres above mean sea level.

Signage

(9) A sign shall be installed and maintained at the main entrance/exit to the Site on which is legibly displayed the following information:
(a) the name of the Site and Owner;
(b) the number of the Approval;
(c) the name of the Operator;
(d) the normal hours of operation;
(e) the allowable and prohibited waste types;
(f) the telephone number to which complaints may be directed;
(g) a warning against unauthorized access;
(h) a twenty-four (24) hour emergency telephone number (if different from above); and
(i) a warning against dumping outside the Site.
(10) All landfill signs shall be kept legible, in good repair, and cleaned when required.

Nuisance Control (Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic)

(11) The Site shall be operated and maintained such that vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.
(12) The Owner/Operator shall install visual screening berms, in accordance with the Design and Operations Report and shall inspect and maintain them as required, during the operating life of the landfill Site.

(13) The Owner/Operator shall conduct inspections and ensure that appropriate controls are in place to prevent the acceptance of liquid industrial waste and hazardous waste and to prevent the acceptance of waste from outside the approved service area. Records of violations by haulers or waste generators shall be maintained in the daily records for the Site operations. The Owner/Operator shall ensure that any waste refused for disposal leaves the Site immediately, and the District Manager is notified forthwith, of all waste load refusals at the Site related to requirements in this Certificate, including service area and waste types.
(14) The Owner/Operator shall ensure that the leachate collection system piping in the fill area and the connecting forcemain piping which leads to the leachate holding tank, shall be cleaned out at least once per year with a high pressure wash, and video inspections conducted, as necessary, to confirm that the pipes are clean and to determine the need for more frequent cleaning. Assessment of the need to amend the cleaning frequency shall be based on regular inspections of the leachate collection system and monitoring results.
(15) A thickness of at least 5 metres of compacted waste and cover material shall be maintained between any landfilled sludge (solid non-hazardous as per Reg. 347) and the granular leachate collection layer and leachate monitoring wells.
(16) The Owner/Operator shall take all reasonable steps to prevent off-site nuisance impacts, including visual impacts, transfer of waste, mud, or dust from the Site onto public roads due to landfill operations.

Burning of Waste

(17) Burning of waste at the Site is prohibited.

Scavenging

(18) Scavenging (as defined in Reg. 347) of deposited and/or stockpiled waste is prohibited at the Site. Controlled removal of recycleable/reusable material from the Site may only occur in a designated paved area on the Site, and shall be supervised by Trained Personnel.

Hours of Operation

(19) The permitted hours of operation for the site are from 6:00 a.m. to 6:00 p.m., Monday to Friday, and from 6:00 a.m. to 2:00 p.m. on Saturdays, for site preparation, site maintenance and daily cover activities. The operating hours for receipt of waste for disposal at the Site shall be from 7:00 a.m. to 5:00 p.m., Monday to Friday, and from 7:00 a.m. to 1:00 p.m., on Saturdays. No operations shall take place at the Site outside of the stated hours and the Site shall be closed on statutory holidays.
(20) The hours of operation may be amended from time to time to accommodate seasonal or unusual demand, based on prior consultation with the PLC and written concurrence from the District Manager.

Site Security

(21) No waste shall be received, landfilled or removed from the Site unless a site supervisor or other Trained Personnel are present to supervise the operations during operating hours. The Site shall be closed when a supervisor or Trained Personnel are not present to supervise operations at the Site.

(22) The Site shall be operated and maintained in a safe and secure manner. During non-operating hours, the Site entrance and exit gates shall be locked and the Site shall be secured against access by unauthorized persons.

Cover Material

(23) Alternative materials to soil may be used as weekly and interim cover material, based on an application with supporting information and applicable fee for a trial use or permanent use, submitted by the Owner to the Director, copied to the District Manager and as approved by the Director via an amendment to this Approval. The alternative material shall be non-hazardous according to Regulation 347 and will be expected to perform at least as well as soil in relation to the following functions:

(a) control of blowing litter, odours, dust, landfill gas, gulls, vectors, vermin and fires;

(b) provision for an aesthetic condition of the landfill during the active life of the Site;

(c) provision for vehicle access to the active tipping face; and

(d) compatibility with the design of the Site for groundwater protection, leachate management and landfill gas management.

(24) Daily, interim and final cover material shall be shall be applied as follows:

a. Daily Cover - At the end of each working day, the entire working face shall be compacted and covered with a minimum thickness of 150 mm of soil cover, compost, wood chips, or other approved daily cover material. Prior to placing waste at the start of the next operating day, the existing daily cover material shall be scarified or removed to the extent practical, to ensure vertical hydraulic connection is maintained between layers of waste and to promote percolation of leachate downwards to the leachate collection system.

b. Interim Cover - In areas where landfilling ceases temporarily for a period of 6 months or more, a minimum thickness of 300 mm of soil shall be placed as interim cover and graded to promote surface water runoff. The quality of soil for use as interim cover shall, as a minimum, meet the standards specified in Table 3 of Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Prior to the use of interim cover soil, representative samples shall be taken and analysed for metals, Volatile Organic Compounds (VOCs) and PAHs, to confirm the soil meets the above-mentioned standards.

c. Final Cover - Final cover shall be applied progressively as areas of the landfill reach final waste elevations within the fill area. Prior to placement of final cover, the Owner/Operator shall submit for the approval of the Director, a report detailing the specifications, including particle size distribution of the final cover soil which shall confirm the designed infiltration rate of 0.15 m/year, as well as the protocols for testing and acceptance for on-site and off-site final cover soils. All areas of final cover shall be graded and vegetated as soon as practically possible. The final soil cap shall be regularly inspected and maintained after the installation and during the post-closure period. Without limiting the above, the Owner/Operator shall ensure for a minimum of five years after completion of the cap that the Site shall be inspected at least on a quarterly basis to ensure that there is positive drainage along the cap and that during the frost free period of the first two years following completion, such inspections shall

be monthly. If any inspection indicates that there is an area of ponding or zero slope, the Owner/Operator shall take all steps necessary to provide positive drainage and rehabilitate the final cover as soon as practically possible.
d. All on-site and excess soil used for daily, interim, and final cover shall be managed in accordance with Regulation 406.

Traffic Control

(25) The Owner/Operator shall ensure that vehicles carrying waste or materials to and from the Site shall only enter the Site from Highway #3 and Brooks Road. At no time shall any vehicle carrying waste or materials to and from the Site travel along Townline Road to access the Site.
(26) The Owner/Operator shall be responsible for maintenance and remedial work to the Improvement Area. The Improvement Area shall be maintained to the following minimum requirements:
(a) 300 mm thick granular "A" layer of gravel, meeting all applicable Haldimand County and Ontario Provincial Standards Specification (OPSS) to the Improvement Area; and
(b) Maintain asphalt on the entranceway/exit to the landfill and the parking area for the landfill Site, as well as 30 metres of the road approach on Brooks Road to the entranceway/exit to the Site, extending both north and south of the entranceway/exit, in base asphalt and top coat. The thickness of asphalt shall be a base coarse of 60 mm (HL8), and a surface coarse of 50 mm (HL3).

4. GROUNDWATER AND SURFACE WATER MONITORING

Compliance

(1) The Site shall be operated in such a way as to ensure compliance with the following:
(a) Reasonable Use Guideline B-7 for the protection of the groundwater at the Site; and
(b) Provincial Water Quality Objectives included in the July 1994 publication entitled Water Management Policies, Guidelines, Provincial Water Quality Objectives, as amended from time to time, or limits set by the Regional Director, or the Canadian Water Quality Guidelines published by the Canadian Council of Ministers of the Environment, 1999 for the protection of the surface water at and off the Site.

Surface Water and Groundwater

(2) The Owner shall monitor surface water and groundwater in accordance with the environmental monitoring program outlined in Schedule "B".
(3) A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic and hydrologic training and experience shall execute or directly supervise the execution of the environmental monitoring and reporting program.

Groundwater Wells and Monitors

(4) The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage and maintained in accordance with Regulation 903.
(5) Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.
(6) Any groundwater monitoring well included in the on-going monitoring program that

is damaged shall be assessed, repaired, replaced or decommissioned by the Owner, as required.

(a) The Owner shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed.

(b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the Director or the District Manager for abandonment, shall be decommissioned by the Owner, as required, in accordance with Regulation 903, to prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

Trigger Mechanisms and Contingency Plans

(7) In the event of a confirmed exceedance of a site-specific trigger level relating to groundwater or surface water impacts due to leachate, the Owner shall immediately notify the District Manager, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the Owner in accordance with the approved trigger mechanisms and associated contingency plans provided in Appendix J of the Design and Operations Report.

(8) If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the Owner shall ensure that the following steps are taken:

(a) the Owner shall notify the District Manager, in writing of the need to implement contingency measures, no later than seven (7) days after confirmation of the exceedances;

(b) within thirty (30) days from the date of confirming the need to implement contingency measures, detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the Owner to the Director for approval; and

(c) the contingency measures shall be implemented by the Owner upon approval by the Director.

(9) The Owner shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to surface water or groundwater, are approved in advance by the Director via an amendment to this Approval.

Changes to the Monitoring Plan, Trigger Mechanism and Contingency Plan

(10) The Owner may request to make changes to the environmental monitoring program, Trigger Mechanism and Contingency Plan to the District Manager in accordance with the recommendations of the annual report. The Owner shall make clear reference to the proposed changes in a separate letter that shall accompany the annual report.

(11) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the environmental monitoring program, the Owner shall forward a letter

identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to the changes to the monitoring program, to the Director requesting the Approval be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

(12) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the Owner shall follow current Ministry procedures for seeking approval for amending the Approval.

5. LEACHATE MANAGEMENT AND DISPOSAL

(1) Leachate generated at the landfill Site shall be collected, treated and disposed of using the on-site Leachate Treatment System, in accordance with the terms and conditions of the Industrial Sewage Works Approval No. 1122-BKUPSM dated February 3, 2020, as amended.

(a) Notwithstanding Condition 5(1), leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall be removed to an off-site facility that is approved by the Ministry to treat leachate generated at the landfill Site.

(2) Leachate generated at the landfill Site that is not treated using the on-site Leachate Treatment System shall not be discharged to the natural environment at any time.

(3) Any alternative proposal for leachate management and disposal must receive prior written approval of the District Manager.

(4) The Owner shall reduce the level of leachate within the landfill to an elevation 191 metres above mean sea level (AMSL), which equates to an average leachate depth of no greater than 0.3 metres, by the earlier of:

(a) five (5) years from the issuance date of this ECA; or

(b) the date the landfill reaches capacity.

(5) In addition to the requirements of Condition 5(4), the interim annual leachate elevation levels and interim landfill capacity-based leachate elevations shall be adhered to pursuant to Schedules "C" and "D" respectively.

(a) The leachate elevation, as determined by the pressure transducer located in the leachate collection sump riser pipe shall be used to establish the landfill leachate elevation. The leachate elevation will be considered in compliance with the target leachate elevations if the measurement meets the elevations stated in Schedules "C" and "D" within fifteen (15) days of the compliance date.

(6) The Owner shall implement the leachate management contingency measures in the report titled "Leachate Removal Plan – Revision 2, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited", prepared June 1, 2021, as amended, as necessary to meet the leachate elevations in Schedules "C" and "D".

(a) if the leachate elevations in Schedules "C" and "D" are not met within 105 days of the anniversary date of the issuance of this Approval the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below the leachate elevation in Schedules "C" and "D":

(i) notify the District Manager;
(ii) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site;
(iii) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site;
(iv) install interim cover to cells that have not reached final waste contours and to the working face;
(v) install final cover to cells that have reached final waste contours;
(vi) establish vegetation on installed cover material where appropriate and weather permitting; and
(vii) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate.

(b) landfilling activities may commence again when the compliance leachate elevation has been attained; and
(c) prior to amending the Leachate Removal Plan proposed amendments shall be submitted to the District Manager for approval.
(7) If the leachate elevation in the landfill reaches 199.0 metres AMSL, the Owner shall cease accepting waste at the Site and immediately undertake the following actions until the leachate elevation is below 199.0 metres AMSL:
(a) notify the District Manager;
(b) increase trucking of raw leachate to an off-Site facility approved to accept leachate from the Site;
(c) increase trucking of treated leachate from the on-Site leachate treatment system to an off-Site facility approved to accept treated leachate from the Site;
(d) install interim cover to cells that have not reached final waste contours and to the working face;
(e) install final cover to cells that have reached final waste contours;
(f) establish vegetation on installed cover material where appropriate and weather permitting; and
(g) provide a plan to the District Manager regarding additional contingency measures deemed to be appropriate.
(8) The Owner shall monitor leachate in accordance with the monitoring program outlined in Schedule "B".

6. LANDFILL GAS MANAGEMENT

(1) The Owner/Operator shall ensure that all buildings and structures containing enclosed spaces at the Site, shall be situated, constructed and monitored in a manner which minimizes the potential for explosive hazards due to landfill gas. The Owner/Operator shall install and maintain in good working condition, methane detection

and alarm equipment (with active venting or with an effective passive venting system to relieve any possible landfill gas accumulation) for all enclosed buildings at the Site.
(2) The Owner/Operator shall ensure that site design plans, specifications and descriptions for the control of landfill gas are such that the subsurface migration of landfill gas meets the requirements of the Ministry's Landfill Standards Guideline, Section 4.10, including but not limited to the following:
(a) the concentration of methane gas below the ground surface at the Site boundary must be less than 2.5 per cent by volume;
(b) the concentration of methane gas in any on-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition, must be less than 1.0 per cent by volume;
(c) sub-condition (b) does not apply to a leachate collection, storage or treatment facility or a landfill gas collection or treatment facility for which specific health and safety measures and procedures are in place relating to the risk of asphyxiation and the risk of explosion; and
(d) the concentration of methane gas from the Site in any off-Site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, must be less than 0.05 per cent by volume (i.e. not present).
(3) If the measured gas concentration at a gas probe exceeds the applicable limit listed in Condition 6(2) above, the District Manager shall be notified immediately. The gas concentrations shall be re-measured immediately and daily for a period of up to three
(3) consecutive days. If these readings confirm that the applicable limit has been exceeded, the Owner/Operator shall forthwith, implement appropriate control measures.
(4) The Owner shall monitor landfill gas in accordance with the monitoring program outlined in Schedule "B".

7. STORMWATER MANAGEMENT

(1) Stormwater runoff generated from the active waste fill area shall be treated by the Owner/Operator as leachate. The Owner/Operator shall ensure that any precipitation falling unto active waste fill areas, not under interim cover, shall be directed to the leachate collection system. If necessary, granular sumps shall be dug into the waste to facilitate drainage of contaminated stormwater towards the leachate collection system.
(2) The Owner shall monitor the stormwater management pond in accordance with the monitoring program outlined in Schedule "B".

8. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the Owner or the Operator. Only Trained Personnel shall operate any aspect of the Site or carry out any activity required under this Approval.
(2) The Owner shall ensure that all site operations employees have been adequately trained and received on-going training with respect to the following, but not limited to:
(a) terms, conditions and operating requirements of this Approval for the Site;

(b) the operation, inspection, and maintenance of the Site with respect to the approved design and operations documents;
(c) relevant waste management legislation and regulations;
(d) environmental concerns related to waste management at the Site;
(e) occupational Health and Safety concerns related to waste management at the Site; and
(f) emergency procedures and contingency plans in case of fire, spills, off-site impacts and any other emergency situations.

9. COMPLAINTS RESPONSE PROCEDURE

(1) If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:
(a) The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;
(b) The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a written reply to the complainant; and
(c) The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and recommendations, if any, for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

10. EMERGENCY AND SPILL RESPONSE

(1) All Spills as defined in the EPA occurring at or from the Site shall be immediately reported to the **Ministry's Spills Action Centre at 1-800-268-6060** and shall be recorded in the log book. The Owner/Operator shall record for each Spill event the contaminant(s) spilled, the quantity or volume of contaminants spilled, the spatial distribution of the area impacted by the Spill, a root cause analysis of the events leading up to the Spill and a list of actions designed to prevent similar Spill events.
(2) In addition, the Owner shall submit, to the District Manager a written report within three (3) business days of the Spill event, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the Site.
(3) All wastes resulting from a Spill event shall be managed and disposed of in accordance with the EPA and Regulation 347.
(4) All equipment and materials required to handle the Spill event shall be:
(a) kept on hand at all times that waste landfilling and/or handling is undertaken at the Site; and
(b) adequately maintained and kept in good repair.
(5) The Owner shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).

11. PUBLIC LIAISON COMMITTEE (PLC)

(1) The Owner or Operator shall maintain and participate in a landfill PLC, which shall

function in accordance with the Terms of Reference for the PLC, as amended from time to time. Any amendment to the Terms of Reference must be approved by the District Manager. The PLC shall serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the landfill Site, including environmental monitoring, maintenance, complaint resolution, and new approvals or amendments to existing approvals related to the operation of this landfill Site.
(2) The Owner/Operator shall invite representation from the following groups to participate on the PLC:
(a) the County of Haldimand;
(b) Six Nations of the Grand River;
(c) landowners within a minimum 500 metre distance of the Site;
(d) residents of Haldimand County; and
(e) Lower Grand River Land Trust.
The number of representatives from each group shall be as specified in the Terms of Reference approved by the District Manager.
(3) Copies of all reports or other submissions required by the conditions of this Approval shall be made available to the PLC and the County of Haldimand, in accordance with the deadlines specified in the Conditions.
(4) The Owner or Operator shall provide to the PLC and the County of Haldimand, reasonable notice and opportunities to make comments regarding any proposed amendment to this Approval. The Owner or Operator shall forward to the Director for consideration any written comments received by the Owner or Operator and advise the Director of the essence of any verbal comments received by the Owner or Operator regarding the proposed amendment.

12. INSPECTIONS, RECORD KEEPING AND REPORTING

Daily Inspections and Inspection Log

(1) A visual inspection of the entire Site and all equipment on the Site shall be conducted each day the Site is open to ensure that:
(a) the Site is secure;
(b) the operation of the Site is not causing any nuisances;
(c) the operation of the Site is not causing any adverse effects on the environment or impairing water quality; and
(d) the Site is being operated in compliance with this Approval.
(2) Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the Site if needed **.**
(3) An electronic or written record of the inspections shall be maintained and shall include the following:
(a) the name and signature of person that conducted the inspection;
(b) the date and time of the inspection;
(c) the list of all deficiencies discovered during the inspections, including but not limited to:

(i) the presence of any leachate seeps;
(ii) the condition of the methane venting system;
(iii) poor drainage conditions and ponding of surface water; and
(iv) the presence of waste outside of the approved fill area;

(d) the recommendations for remedial action to address the identified deficiencies; and
(e) the date, time and description of the remedial actions taken.

Daily Waste Log

(4) A daily log shall be maintained in written or electronic format and shall include the following information:
(a) the type, date and estimated quantity (tonnes) of all waste, including non-landfilled waste received at the Site;
(b) the type, date and estimated quantity (tonnes) of cover material applied at the Site;
(c) the area of the Site in which waste disposal operations are taking place;
(d) a record of litter collection activities and the application of any dust suppressants;
(e) a record of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known; and
(f) a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service.

Other Information

(5) Any information requested, by the Director, the District Manager or a Provincial Officer, concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided to the Ministry, upon request.

Annual Report

(6) A written report on the development, operation and monitoring of the Site, shall be completed annually (the “Annual Report”). The Annual Report shall be submitted to the District Manager, by March 31st of the year following the period being reported upon.
(7) The Annual Report shall include but not be limited to the following information:
(a) the results and an interpretive analysis of the results of all leachate, groundwater surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
(b) an assessment on the Site’s compliance with Guideline B7;
(c) an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the Ministry approved contingency plans;
(d) site plans showing the existing contours of the Site; areas of landfilling operation during the reporting period; areas of intended operation during the next reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; facilities existing, added or

removed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;
(e) summaries of any actions taken for the odour management plan and compliance with the leachate removal plan;
(f) summaries of any actions taken for the compliance with the leachate removal plan;
(g) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;
(h) a calculation of the remaining capacity of the Site or an estimate of the remaining Site life;
(i) summary of total annual quantity (tonnes) of waste received at the Site;
(j) a summary of any complaints received and the responses made;
(k) a summary of the information included in the logs required by Conditions 9(1), 10(1), 11(3), 11(4), 11(5), and 12(2);
(l) a summary of the daily waste log;
(m) a discussion of any operational problems encountered at the Site and corrective action taken;
(n) any changes to the Ministry approved Design and Operations Report and the Closure Plan that have been approved by the Director since the last Annual Report;
(o) a report on the status of all monitoring wells and a statement as to compliance with Regulation 903;
(p) a description and location of any leachate seeps identified during the daily inspection of the Site and the mitigative measures taken to address the presence of seeps;
(q) a summary of the daily inspections conducted over the monitoring period;
(r) any other information with respect to the Site which the District Manager may require from time to time;
(s) a copy of the most current ministry approved monitoring programs in table format;
(t) compliance status with all conditions of the Approval and the approved Design and Operations Plan;
(u) a "Monitoring and Screening Checklist" completed and signed by a Qualified Professional; and
(v) items identified in Section 7.7 Annual Progress Report of the Design and Operations Report;

13. CLOSURE PLAN

(1) At least two (2) years prior to the anticipated date of closure of this Site, or when the Site reaches 90% capacity, whichever comes first, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site closure plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring, and end use. The plan shall include but not be limited to the following information:
(a) A plan showing Site appearance after closure;
(b) A description of the proposed end-use of the Site;

(c) Description of the procedures for closure of the Site, including:

i. advance notification of the public of the landfill closure;
ii. posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
iii. completion, inspection and maintenance of the final cover and landscaping;
iv. site security;
v. removal of unnecessary landfill-related structures, buildings and facilities;
vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
vii. a schedule indicating the time-period for implementing sub-conditions (i) to (vi) above.

(d) Description of the procedures for post-closure care of the Site, including:

i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
ii. record keeping and reporting; and
iii. complaint contact and response procedures;

(e) An assessment of the adequacy of and need to implement the contingency plans for leachate and landfill gas;
(f) An updated estimate of the contaminating life span of the Site, based on the results of the monitoring programs to date; and
(g) An update of the cost estimate for financial assurance and the amount which has been provided to the Director.
(2) The Site shall be closed in accordance with the closure plan as approved by the Director.
The following Schedule "A" forms part of this Approval

Schedule "A"

1. Application for an amendment to ECA No. A110302 for a vertical expansion. Signed by Richard Weldon, Managing Partner, 2270386 Ontario Limited. Dated April 26, 2019. The application includes all supporting documentation and consists of the following:

i. Design and Operations Report Vertical Expansion, Brooks Road Landfill Site, 2270386 Ontario Inc., Prepared by GHD, April 18, 2019;
ii. Appendix A - Provisional CofA No. A110302 and Amendments;
iii. Appendix B - Site Preparation Reports;
iv. Appendix C - Site Legal Surveys;
v. Appendix D - Geotechnical Assessment;
vi. Appendix E - HELP Model Outputs;
vii. Appendix F - Hydrologic Modeling;
vii. Appendix G - Surface Water Supporting Engineering Calculations;
viii. Appendix H - Landfill Gas Production and Air Dispersion Modeling Results;
ix. Appendix I - Fugitive Odour Best Management Practices Plan and BRE Odour Complaint Response Procedure;
ix. Appendix J - Trigger Level Program;
ix. Appendix K - Financial Assurance Plan; and
ix. Appendix L - Design and Operations Report Drawings.

2. Leachate Removal Plan, Brooks Road landfill Site Haldimand County, 2270386 Ontario Limited. Report No 90. Prepared by GHD, February 7, 2020.
3. Environmental Compliance Approval Application. Signed by Richard Weldon, Managing Partner, 2270386 Ontario Limited. Dated June 1, 2021.
4. Design and Operations Report, Vertical Expansion – Rev. 1, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited. Prepared by GHD, Signed/stamped and dated June 14, 2021.

5. Leachate Removal Plan - Revision 2, Brooks Road Landfill Site, Haldimand County, 2270386 Ontario Limited. Prepared by GHD, June 1, 2021.

The following Schedule "B" forms part of this Approval

Schedule "B"

Table B1: Groundwater, Surface Water, Leachate and Landfill Gas Monitoring Programs

	Location	March	May	August	November
Groundwater	OW1A-06	-	B [4]	-	A [3]

1	OW1B-06	-	B	-	A
	OW3A-07	-	B	-	A
	OW3B-07	-	B	-	A
	OW5A-06	-	B	-	A
	OW5B-07	-	B	-	A
	OW8A-06	-	B	-	A
	OW8B-06	-	B	-	A
	OW8D-07 (Gypsum Mine)	-	B	-	WL - only [6]
	OW8S-07 (Gypsum Mine)	-	B	-	WL - only
	OW9A-06	-	B	-	A
	OW9B-06	-	B	-	A
	MW1-03	-	WL - only	-	WL - only
	MW1A-07	-	B	-	A
	MW1B-07	-	B	-	A
	MW1D-07 (Gypsum Mine)	-	B	-	WL - only
	MW1S-07 (Gypsum Mine)	-	B	-	WL - only
	MW2-03	-	WL - only	-	WL - only
	MW2A-01	-	B	-	A
	MW2B-07	-	B	-	A
	MW2D-07 (Gypsum Mine)	-	B	-	WL - only
	MW2S-07 (Gypsum Mine)	-	B	-	WL - only
	MW3-03	-	WL - only	-	WL - only
	MW4A-09	-	WL - only	-	WL - only
	MW5A-09	-	B	-	A
	MW5B-09	-	B	-	A
	MW6A-07	-	B	-	A
	MW6B-07	-	B	-	A
	MW10A-18	-	B	-	A

	MW10B-18	-	B	-	A
	MW11A	-	B	-	A
	MW11B	-	B	-	A
	MW12A	-	B	-	A
	MW12B	-	B	-	A
Surface Water [2]	SW1	C [5]	B	C	B
	SW3	C	B	C	B
	SW4	C	B	C	B
	SW5	C	B	C	B
	SW6	C	B	C	B
	SW7	C	B	C	B
	SW8	C	B	C	B
	SW9	C	B	C	B
Leachate [7]	Leachate Collection System Sump Riser Pipe	See Note #7	B	-	-
	LW1-17		-	-	-
Landfill Gas [8]	GP-1A	See Note #8			
	GP-1B				
	GP-2A				
	GP-2B				
	GP-3A				
	GP-3B				
	GP-4A				
	GP-4B				
	GP-5				
	GP-6				
	GP-7				
	GP-8				
QA/QC	Groundwater Duplicate	-	B	-	A
	Surface Water Duplicate	C	B	C	B
	Field Blank	C	B	C	B

Notes:

1. Groundwater levels will be measured during May and November sampling events.
2. Surface water levels and flows will be measured for all sampling events.
3. **A - Indicator parameters (groundwater):** alkalinity, ammonia, barium, boron,

calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, and DOC.

4. **B - Metals:** aluminum, arsenic, barium, beryllium, boron, cadmium, total chromium, copper, iron, lead, magnesium, manganese, mercury, silver, sodium, zinc, vanadium, thallium, molybdenum, cobalt, nickel.

B - PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, benzo(ghi)perylene.

B - VOCs: chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, acetone, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, methyl-t-butyl ether, 1,1-dichloroethane, methyl ethyl ketone, cis-1,2-dichloroethene, chloroform, 1,2-dichloroethane, 1,1,1-trichloroethane, carbon tetrachloride, benzene, 1,2-dichloropropane trichloroethene, bromodichloromethane, cis-1,3-dichloropropene, methyl isobutyl ketone, trans-1,3-dichloropropene, 1,1,2-trichloroethane, toluene, 2-hexanone, dibromochloromethane, 1,2-dibromoethane, tetrachloroethene, 1,1,1,2-tetrachloroethane, chlorobenzene, ethylbenzene, m,p,o-xylenes, bromoform, styrene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene.

B - Inorganic chemistry parameters: alkalinity, ammonia, hardness, nitrate, nitrite, TKN, chloride, sulfates, DOC, TDS, suspended solids, phenol, BOD5, COD, pH, total phosphorus, potassium, conductivity, calcium.

5. **C - Indicator parameters (surface water):** alkalinity, ammonia, chloride, conductivity, iron, nitrate, nitrite, TKN, pH, total phosphorus, TDS, suspended solids, sulphate, BOD5, COD, phenol, temperature, and dissolved oxygen.

6. **WL - only:** water level or leachate level only.

7. **Leachate:** Leachate water levels shall be collected on a monthly basis at leachate monitoring well LW1-17 and the inclined leachate collection sump riser pipe, while an annual leachate chemistry sample is required to be collected in May from the collection sump. Compliance with the leachate level elevation shall be determined by the pressure transducer that is located in the leachate collection sump riser pipe.

8. **Landfill Gas:** Sampling is to occur monthly from December 1 to April 30 and quarterly from May through November for % lower explosive limit methane concentration of combustible gas, carbon dioxide, oxygen and balance gases, gas pressure, and water level.

The following Schedule "C" forms part of this Approval

Schedule "C"

Table C1: Target leachate elevations to reach leachate elevation 191 m AMSL based on the date of March 27, 2020.

Date	Required Leachate Elevation	Estimated Leachate Volume in	Volume Removed in Excess of	Forecasted Leachate Generation	LTS Discharge to Ditch (m	Required Average Excess

	(m AMSL)	Landfill (m^3)	Generation (m^3)	Rate (m^3 /day)	^{3} /day)	Leachate Removal (m^3 /day)
March 27, 2020	198.5	40,000	-	44	45	0
March 27, 2021	196	28,000	12,000	44	45	32
March 27, 2022	193.8	18,000	10,000	42	45	24
March 27, 2023	192.1	10,000	8,000	44	45	21
March 27, 2024	191.3	4,000	6,000	45	45	16
March 27, 2025	191	2,000	2,000	49	45	9.5
March 27, 2026	191	2,000	0	33	45	0

The following Schedule "D" forms part of this Approval

Schedule "D"

Table D1: Capacity-Based Target Leachate Elevations

Estimated Landfilled Volume (m^3)	Required Leachate Elevation (m AMSL)
680,000	197.9
710,000	197.4
740,000	196.8
770,000	196.2
800,000	195.7
830,000	195.1
860,000	194.5
890,000	193.9
920,000	193.4
950,000	192.8
980,000	192.2
1,010,000	191.7
1,040,000	191.1
1,045,065	191.0

The reasons for the imposition of these terms and conditions are as follows:

Conditions 1(1), 1(2), 1(4), 1(5), 1(6), 1(7), 1(8), 1(9), 1(10), 1(11), 1(13), 1(20), 1(21), 1(22), and 1(23) are to clarify the legal rights and responsibilities of the Owner and Operator under this Approval.
Conditions 1(3) and 7(4) are to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.
Condition 1(12) is to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.
Condition 1(14) is to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Approval.
Condition 1(15) is to ensure that the successor is aware of its legal responsibilities.
Conditions 1(16), 1(17) and 1(18) clarify that the Part II.1 Director is an individual with authority pursuant to Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the Approval to any person who will acquire an interest in the property as a result of the dealing.
Condition 1(19) is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Approval. This Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Act, the OWRA, the PA, the NMA and the SDWA.
Condition 1(24) clarifies what information may be subject to the Freedom of Information Act.
Condition 2(1) is to ensure that sufficient funds are available to the Ministry for closure and post-closure activities at the Site in the event that the Owner is unable or unwilling to do so.
Conditions 3(1), 3(11), 3(12), 3(13), 3(14), 3(15), 3(16), 12(1) and 12(2) are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.
Conditions 3(2), 3(3), 3(4), and 3(5) are to specify the approved area from which waste may be accepted at the Site, and the types of waste that may be accepted for disposal at the Site based on the Owner's application and supporting documentation.
Conditions 3(6), 3(7), and 3(8) are to specify restrictions on the extent of landfilling and the maximum rates to be accepted for disposal at the Site based on the Owner's application and supporting documentation. These limits define the approved volumetric capacity of the site.
Conditions 3(9) and 3(10) are to ensure that users of the Site are fully aware of important information and restrictions related to Site operations and access under this Approval.

Condition 3(17) is to ensure open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance effects, and the potential fire hazard.
Condition 3(18) is to ensure that uncontrolled removal of material from waste at the Site is avoided. Scavenging of deposited waste can be detrimental to the public health and safety and cause damage to the natural environment.
Conditions 3(19) and 3(20) are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.
Conditions 3(21) and 3(22) are to ensure that the Site is supervised by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.
Condition 3(23) is to specify the approval requirements for use of alternative cover material at the Site.
Condition 3(24) is to ensure that daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the site.
Condition 3(25) is to ensure that potential truck traffic impacts on the immediate local community is limited to the existing main roads.
Condition 3(26) is to ensure that public road servicing the Site (described as "Improvement Area") meets the applicable standards. Condition 3(26) also ensures that the Improvement Area is maintained regularly as per agreement between the Owner/Operator of the Site and Haldimand County.
Condition 4(1) is to provide the groundwater and surface water limits to prevent water pollution at the Site
Conditions 4(2), 4(3), 5(2), 6(4), and 7(2) are included to require the Owner to demonstrate that the Site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
Conditions 4(4), 4(5), and 4(6) are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.
Conditions 4(7), 4(8), and 4(9) are added to ensure the Owner has a plan with an organized set of procedures for identifying and responding to potential issues relating to groundwater and surface water contamination at the Site's compliance point.
Conditions 4(10), 4(11), and 4(12) are included to streamline the approval of the changes to the monitoring plan.
Condition 5(1) is added to ensure that leachate generated at this Site is disposed of in an environmentally acceptable manner.

Conditions 6(1), 6(2), 6(3), and 6(5) are to ensure that off-site migration of landfill gas is monitored and all buildings at the Site are free of any landfill gas accumulation, which due to a methane gas component may be explosive and thus create a danger to any persons at the Site.
Condition 7(1) is added to ensure to ensure that both surface water and stormwater is managed in an environmentally acceptable manner.
Conditions 8(1) and 8(2) are to ensure that the Site is operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.
Condition 9(1) is added to ensure that any complaints regarding landfill operations at this Site are responded to in a timely and efficient manner.
Condition 10(1) is to ensure the Owner immediately responds to a spill.
Conditions 10(2), 10(3), 10(4), and 10(5) are to ensure that the Owner notifies the Ministry forthwith of any spills so that an appropriate response can be determined.
Conditions 11(1), 11(2), 11(3), and 11(4) are added to establish a forum for the exchange of information and public dialogue on activities carried out at the landfill Site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and protection of the natural environment.
Condition 12(3) is to ensure that detailed records of Site inspections are recorded and maintained for inspection and information purposes.
Condition 12(4) and 12(5) are added to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.
Conditions 12(6) and 12(7) are added to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.
Condition 13(1) is added to ensure that final closure of the Site is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A110302 issued on March 27, 2020

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;

b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of October, 2021

Mohsen Keyvani, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

CM/
c: District Manager, MECP Hamilton - District
DAN TURNER P.Eng.

Matthew Griffin
Mike Masschaele - Air, GHD Limited

Appendix C

MECP Water Well Records

30L 13W

B

UTM 17 Z 5 9 5 8 4 8 E
17 R 4 7 5 6 9 6 1 N
Elev. 5 R 0 6 4 5
Basin 24

26 No 283

GROUND WATER BRANCH
MAR 27 1961
ONTARIO WATER RESOURCES COMMISSION

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District HALDIMAND Township, Village, Town or City N. CAYUGA

[redacted] te completed 16 (day) FEB (month) 1961 (year)

[redacted] dress CAYUGA

Casing and Screen Record

Inside diameter of casing 6 1/4
Total length of casing 48
Type of screen —
Length of screen —
Depth to top of screen —
Diameter of finished hole 6 1/4

Pumping Test

Static level 48
Test-pumping rate 5 G.P.M.
Pumping level 48
Duration of test pumping 1 HR.
Water clear or cloudy at end of test CLEAR
Recommended pumping rate 5 G.P.M.
with pumping level of 48

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
TOP SOIL	0	2			
BROWN CLAY	2	48		12	
LIMESTONE GREY	48	60	60		FRESH

Water Record

For what purpose(s) is the water to be used?
BARN

Is well on upland, in valley, or on hillside?
UPLAND

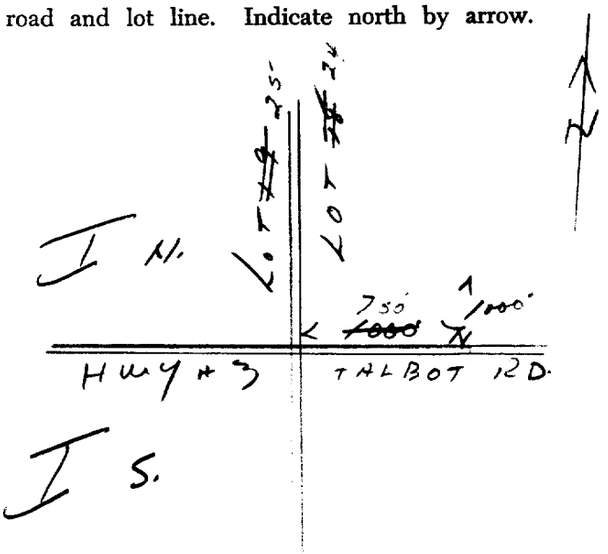
Drilling Firm CROSS BROS
Address RYCKMAN'S CORNER

Licence Number
Name of Driller ARTHUR CROSS
Address RYCKMAN'S CORNER
Date MARCH 7

Howard Cross
(Signature of Licensed Drilling Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

CSS.58

UTM | 17 Z | 5 9 5 0 5 9 E
| 9 R | 4 7 5 8 0 4 3 N
Elev. | 9 R | 0 6 5 5 (650)
Basin | 9 4 |

4 30L 13W

26 No. 284

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

County or District Haldimand Tp. N. Cayuga Con IV Lot 25 Pt. Lot

Owner [redacted] Address Cayuga Acres

Date Completed Nov 27, 1947 Cost of Well (not including pump) 2.25 per ft.

Pipe and Casing Record	Pumping Test
Casing diameter(s) 6¼	Date
Length(s) of casing(s) 56'	Developed Capacity
Length of screen	Duration of Test
Type of screen	Pumping Rate
Type of pump	Drawdown
Capacity of pump	Static level of completed well 48'
Depth of pump setting	Is well a gravel-wall type?

Water Record

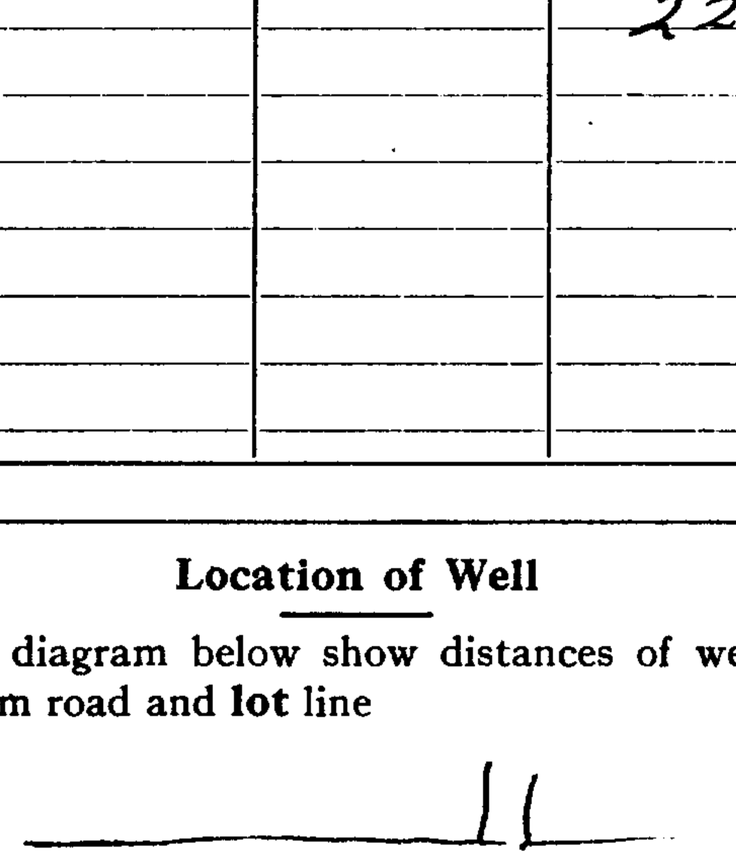
	Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
Kind (fresh or mineral) fresh			22'
Quality (hard, soft, contains iron, sulphur etc.)			
Appearance (clear, cloudy, coloured)			
For what purpose(s) is the water to be used? drinking water and fire protection			
How far is well from possible source of contamination?			
What is source of contamination?			
Enclose a copy of any mineral analysis that has been made of water			

Well Log

Drift and Bedrock Record	From	To
clay	0 ft.	51 ft.
trap rock	51	56
brown lime & shale	56	65'
shale & gypsum	65'	70

Location of Well

In diagram below show distances of well from road and **lot** line



Situation: Is well on upland, in valley, or on hillside?

Drilling Firm C. A. Ricker

Address Canboro

Recorded by Address

Date Licence Number

CSS.58

UTM 17 Z 5 9 4 9 4 9 E
9 R 4 7 5 8 3 6 5 N
Elev. 9 R 0 6 5 0
Basin 2 3

ONTARIO

30L 13W

26 No. 285

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

County or District Haldimand Tp. N. Cayuga Con 11E Lot 25 Pt. Lot
[redacted] Address Cayuga Acres
cluding pump)

Pipe and Casing Record

Casing diameter(s) 6¼"
Length(s) of casing(s) 49'
Length of screen
Type of screen
Type of pump
Capacity of pump
Depth of pump setting

Pumping Test

Date
Developed Capacity
Duration of Test
Pumping Rate
Drawdown
Static level of completed well 49'
Is well a gravel-wall type?

Water Record

Kind (fresh or mineral) fresh
Quality (hard, soft, contains iron, sulphur etc.)
Appearance (clear, cloudy, coloured)
For what purpose(s) is the water to be used? drinking water and fire protection
How far is well from possible source of contamination?
What is source of contamination?
Enclose a copy of any mineral analysis that has been made of water

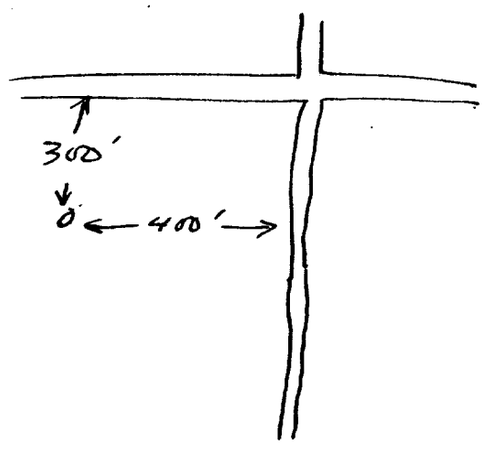
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
67		18'

Well Log

Drift and Bedrock Record	From	To
clay	0 ft.	28 ft.
gravel	28	32
gravel & hardpan	32	49
brown lime	49	65
shale & gypsum.	65	68
water at 67'		
drilled to 70'		

Location of Well

In diagram below show distances of well from road and **lot** line



1500' North of M.C. tracks.

Situation: Is well on upland, in valley, or on hillside?
Drilling Firm E. A. Ricker
Address Canboro
Recorded by Address
Date Licence Number

CSS.S8

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

304/13E

ONTARIO

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2601646 | MUNICIP. 26002 | CON. TR N | 01

COUNTY OR DISTRICT: [redacted]

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: North CAYUGA

CON., BLOCK, TRACT, SURVEY, ETC.: I NORTH

LOT: 024

DATE COMPLETED: DAY 20 MO Nov YR 73

[redacted] RH1 CAYUGA

RC. | ELEVATION | RC. | BASIN CODE | II | III | IV

2601646 17 595446 4757664 4 654 4 23 JUN 15, 1977 277

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
		TOP Soil		0	3.
		BROWN CLAY		3	20.
		BLUE CLAY		20	52.
		GRAVEL		52	66

31 | 0003 02 | 0020605 | 0052305 | 0066 11

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0064	1 ☑ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	62.
06				0062
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE		62	0066
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☑ BAILER

PUMPING RATE: 0010 GPM

DURATION OF PUMPING: 03. HOURS 00 MINS

1 ☑ PUMPING 2 ☑ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
020 FEET	050 FEET	025 FEET	035 FEET	045 FEET	050 FEET

IF FLOWING, GIVE RATE: GPM

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP

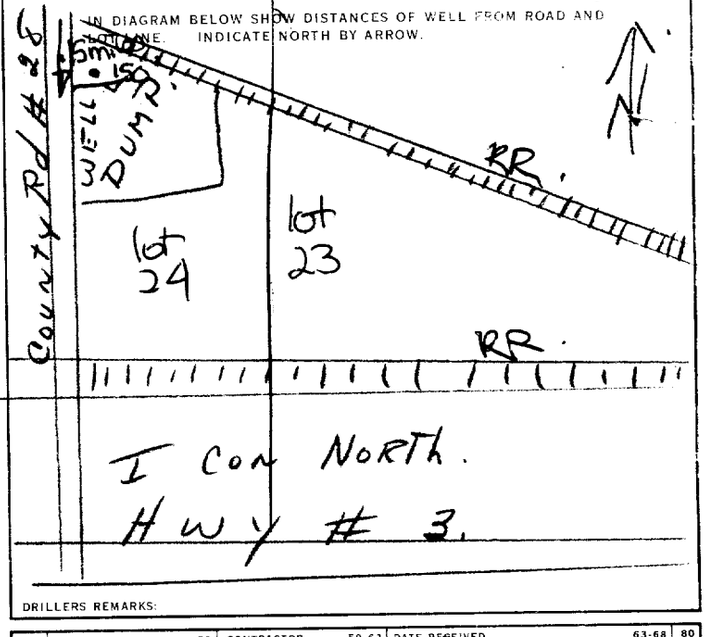
RECOMMENDED PUMP SETTING: 055 FEET

RECOMMENDED PUMPING RATE: 0010. GPM

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL 9557

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL 1

1 ☑ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE 05

1 ☑ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☑ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING 1

1 ☑ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: ERNEST CONSTABLE | LICENCE NUMBER: 1618

ADDRESS: MOUNT HOPE MOTE DNT

NAME OF DRILLER OR BORER | LICENCE NUMBER

SIGNATURE OF CONTRACTOR: Ernest Constable

SUBMISSION DATE: DAY 31 MO. Dec YR 73

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 1618 | DATE RECEIVED: 070174

DATE OF INSPECTION | INSPECTOR

REMARKS: APL CSS.S8

P KP

WI

FORM 7 07-091

MINISTRY OF THE ENVIRONMENT COPY

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below): A048009 / A048009

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only: MUN ____ CON ____ LOT ____

Well Owner's Information and Location of Well Information

First Name	Last Name	Mailing Address (Street Number/Name, RR, Lot, Concession)
Cam	HALDIMAND-NORFOLK SANITARY LANDFILL INC	6435 DIXIE ROAD, UNIT 3

County/District/Municipality	Township/City/Town/Village	Province	Postal Code	Telephone Number (include area code)
PEEL	MISSISSAUGA	Ontario	L5T 1X4	905-670-3180

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
Haldimand	NORFOLK	24	1-N.T.R.

RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.
160 Brooks Road	Cayuga	

GPS Reading: NAD 83 | Zone 17 | Easting 595621 | Northing 4757859 | Unit Make/Model: Magellan | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
Brown	Top Soil/Clay		Loose	0	0.30
Brown	Clay	Stones, Silt	Dense	0.30	5.00
Grey	Clay	Stones	Dense	5.00	5.15
Black	Gravel		Porous	5.15	17.2-18.97
Black	Shale	Gypsum	Hard	17.2-18.97	18.2-19.72

Note: ~~5~~ 8 wells installed in ~~three~~ 4 clusters.
one well in each cluster .40m to .60m into rock
one well in each cluster 4.57m into overburden

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	19.92	21

Water Record

Water found at Metres	Kind of Water
4 m	☒ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
18 m	☐ Fresh ☒ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was ☐ Clear and sediment free ☐ Other, specify

Chlorinated ☐ Yes ☒ No

Construction Record

Casing

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
5.25	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	0.29	0	15.2 / 16.92
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	10		

Screen

Outside diam	Material	Slot No.	Depth From	Depth To (Metres)
6.05	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	10	15.2 / 16.92	18.2 / 19.72

No Casing or Screen: ☐ Open hole

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	1		1	
Duration of pumping ___hrs + ___ min	2		2	
Final water level end of pumping ___metres	3		3	
Recommended pump type. ☐ Shallow ☐ Deep	4		4	
Recommended pump depth. ___metres	5		5	
Recommended pump rate. (litres/min)	10		10	
If flowing give rate - (litres/min)	15		15	
If pumping discontinued, give reason.	20		20	
	25		25	
	30		30	
	40		40	
	50		50	
	60		60	

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	12	Bentonite Slurry	0.37m³
12/14	182/19	Sand.	4.57

Method of Construction

☐ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☒ Boring ☐ Driving

Water Use

☐ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☒ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☐ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☒ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor	Well Contractor's Licence No.
Altech Drilling & Investigative Ltd.	7282

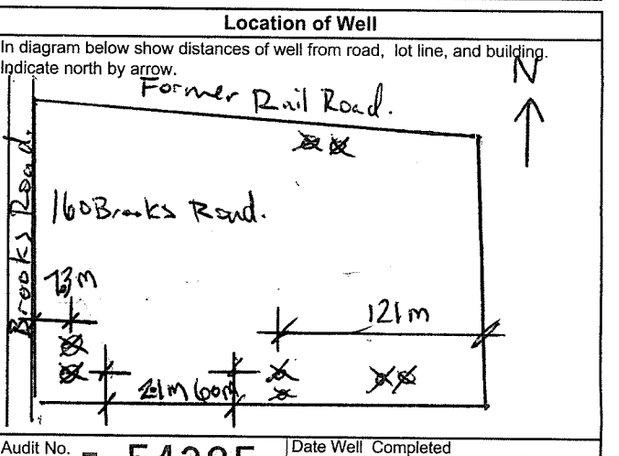
Business Address (street name, number, city etc.): 140 Bathurst Dr Waterloo

Name of Well Technician (last name, first name)	Well Technician's Licence No.
Patenk, Greg	T-29807

Signature of Technician/Contractor: X [signature] Date Submitted: 2006/12/21

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Audit No. Z 54395

Date Well Completed: 2006/12/06

Was the well owner's information package delivered? ☐ Yes ☒ No

Date Delivered: N/A

Ministry Use Only

Data Source	Contractor
	7282
Date Received: MAR 15 2007	Date of Inspection
Remarks	Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☒

Cette formule est disponible en français

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below): Abandonment.

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

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- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only: MUN | CON | LOT

Well Owner's Information and Location of Well Information

First Name	Last Name	Mailing Address (Street Number/Name, RR, Lot, Concession)
HALDIMAND NORFOLK	SANITARY LANDFILL INC	6435 DIXIE ROAD, UNIT 3

County/District/Municipality	Township/City/Town/Village	Province	Postal Code	Telephone Number (include area code)
PEEL	MISSISSAUGA	Ontario	L5T 1Y4	905-670-3150

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
HALDIMAND COUNTY	NORFOLK.	24	1-N.T.R

RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.
160 Brooks Road.	Cayuga	

GPS Reading	NAD	Zone	Easting	Northing	Unit Make/Model	Mode of Operation
	83	17	595662	4757881	Magellan	☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
Brown	Top Soil Clay.	Concrete	Loose.	0.	0.30
Brown	Clay.	Bonseal, PVC	Dense.	0.30	5.00
Grey	Clay/Stones	Bonseal, PVC.	Dense.	5.00	5.15
Blue	Shale	Sand., PVC Screen.	Dense.	5.15	17.2 18.9
	Well Material Remove entirely before overdrilling.				
	Wells sealed with Bonseal Grout to top of				
	Sand packs. PVC Pipe with cheese Cloth screens.				

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	18.97	21.

Water Record

Water found at ___ Metres	Kind of Water
☐ m	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas ☐ Other:
☐ m	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas ☐ Other:
☐ m	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas ☐ Other:

After test of well yield, water was: ☐ Clear and sediment free ☐ Other, specify: N/A

Chlorinated ☐ Yes ☒ No

Construction Record

Casing

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized		0	5.37 / 16.97
	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			

Screen

Outside diam	Material	Slot No.	Depth From	Depth To (Metres)
	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	—	5.37 / 16.97	7.01 / 18.97

No Casing or Screen: ☐ Open hole

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	1		1	
Duration of pumping ____hrs +____ min	2		2	
Final water level end of pumping ____metres	3		3	
Recommended pump type. ☐ Shallow ☐ Deep	4		4	
Recommended pump depth. ____metres	5		5	
Recommended pump rate. (litres/min)	10		10	
If flowing give rate - (litres/min)	15		15	
If pumping discontinued, give reason.	20		20	
	25		25	
	30		30	
	40		40	
	50		50	
	60		60	

Plugging and Sealing Record

☐ Annular space ☒ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	Top Depth	Bonseal & EZ mud 20% Solids mix.	0.6

Method of Construction

☐ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☒ Boring ☐ Driving

Water Use

☐ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☒ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☐ Water Supply ☐ Recharge well ☐ Unfinished ☒ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor	Well Contractor's Licence No.
Altech Drilling & Investigative	7282

Business Address (street name, number, city etc.): 140 Bathurst Dr. Waterloo

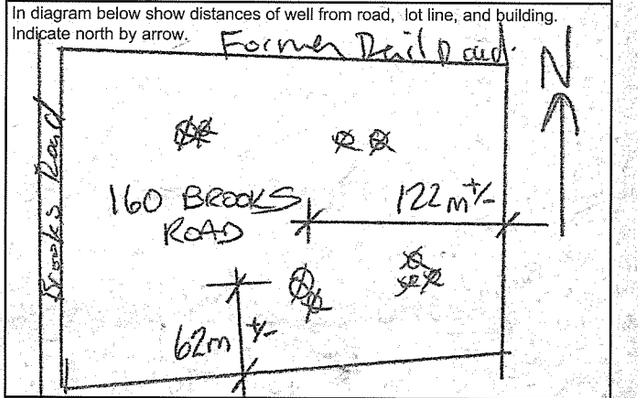
Name of Well Technician (last name, first name)	Well Technician's Licence No.
Fakeah, Corey.	T-25984.

Signature of Technician/Contractor: X

Date Submitted: 2007 / 02 / 27

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Audit No. Z 54397

Date Well Completed: 2006 / 12 / 19

Was the well owner's information package delivered? ☐ Yes ☒ No

Date Delivered: N/A

Ministry Use Only

Data Source | Contractor: 7282

Date Received: MAR 13 2007 | Date of Inspection

Remarks | Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☒ Well Owner's Copy ☐ *Cette formule est disponible en français*

09-0114-00

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well T A 086117 Below)

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Bohm Rosen of	SF Partners Inc.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
4950 Yonge Street, Suite 400	Toronto	ON	M2N6K1	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Brooks Road, City Road 28	Former North Cayuga Twp.	24	

County/District/Municipality	City/Town/Village	Province	Postal Code
Haldimand.	Cayuga	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	595663	4757716		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	clay			0	20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	4	Bentonite chips	0.02
4	20	Sand	0.08

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☑ Other, specify auger

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☑ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2	Plastic	Sch 40	0	5

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2	Plastic	10	5	20

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☑ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	20	8

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.

Please see attached map.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Aardvark Drilling Inc	7238

Business Address (Street Number/Name)	Municipality
25-C Lewis Rd	Wellington.

Province	Postal Code	Business E-mail Address
ON	N1H1E9	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5198269340	England M

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3059	M England	20090707

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered Y Y Y Y M M D D

Date Work Completed 20090623

Ministry Use Only

Audit No. Z 095990

Received JUL 14 2009

0506E (12/2007) Ministry's Copy

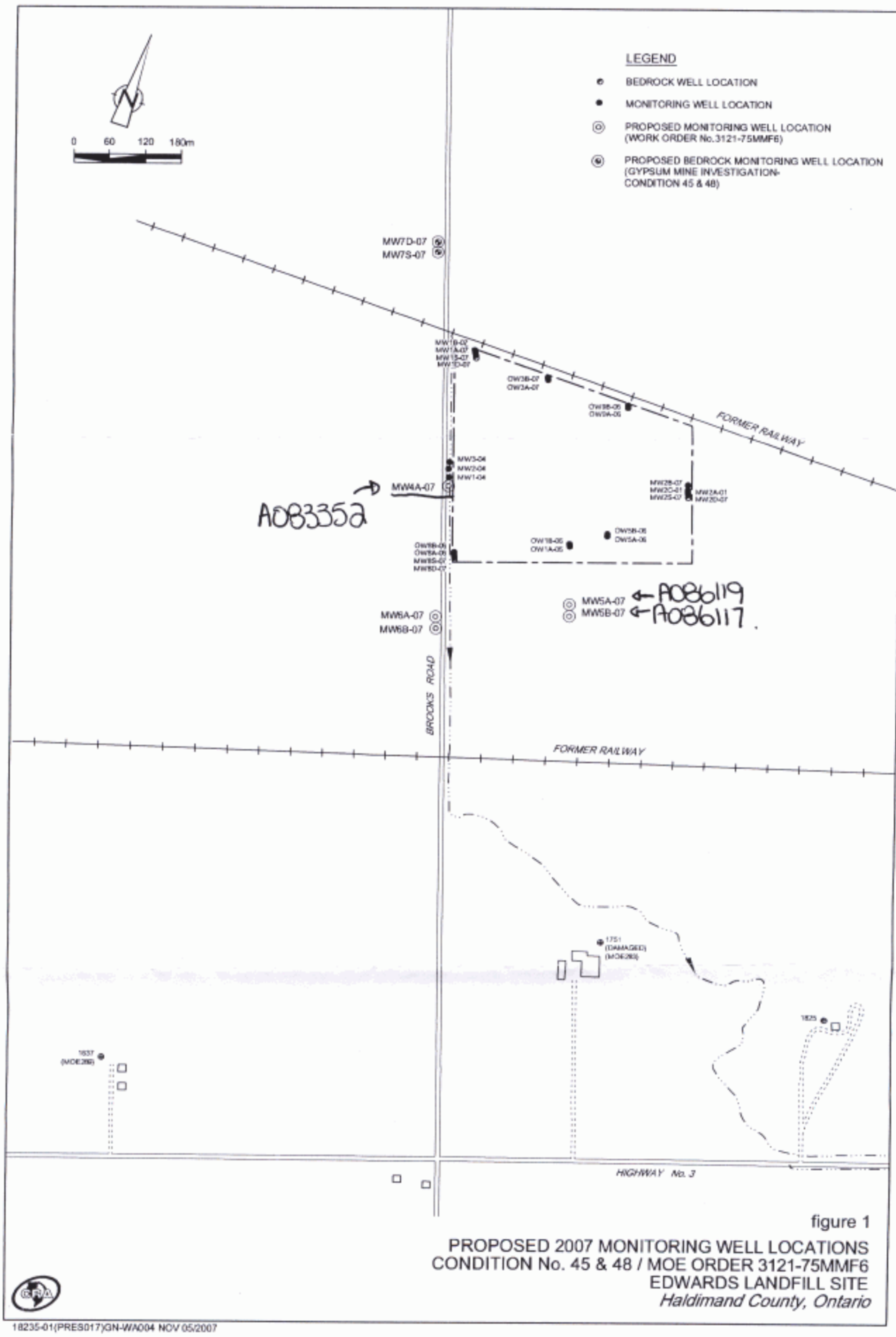


figure 1

PROPOSED 2007 MONITORING WELL LOCATIONS
CONDITION No. 45 & 48 / MOE ORDER 3121-75MMF6
EDWARDS LANDFILL SITE
Haldimand County, Ontario

18235-01(PRES017)GN-WA004 NOV 05/2007

C-7238 2095990

JUL 14 2009

09-0114-00

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well T: (Please Print Below) **A 086119**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Brahm Rosen of SF Partners Inc			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
4950 Yonge Street, Suite 400	Toronto.	ON	M2N6K1	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Brooks Road, City Road 28	Former North Cayuga Twp.	24	

County/District/Municipality	City/Town/Village	Province	Postal Code
Haldimand	Cayuga.	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	595385	4757833		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	clay		hard	0	30
grey	clay		soft	30	53.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	40	Bentonite grout	0.20
40	41	Bentonite chips	0.01
41	53.5	sand	0.05

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify*

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☑ Other, *specify* auger

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☑ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify*

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2	Plastic	sch 40	0	43.5

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2	Plastic	10	43.5	53.5

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☑ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, *specify*
☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, specify

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	53.5	8

Map of Well Location

Please provide a map below following instructions on the back.

Please see attached map.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Aardvark Drilling Inc	7238

Business Address (Street Number/Name)	Municipality
25-C Lewis Rd	Wellington

Province	Postal Code	Business E-mail Address
ON	N1A1E9	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
519 826 9340	England, M

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3059	M England	2009 07 07

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☐ No	Y Y Y Y M M D D	2009 06 23

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Audit No. Z 095992

Received JUL 14 2009

0506E (12/2007) **Ministry's Copy**

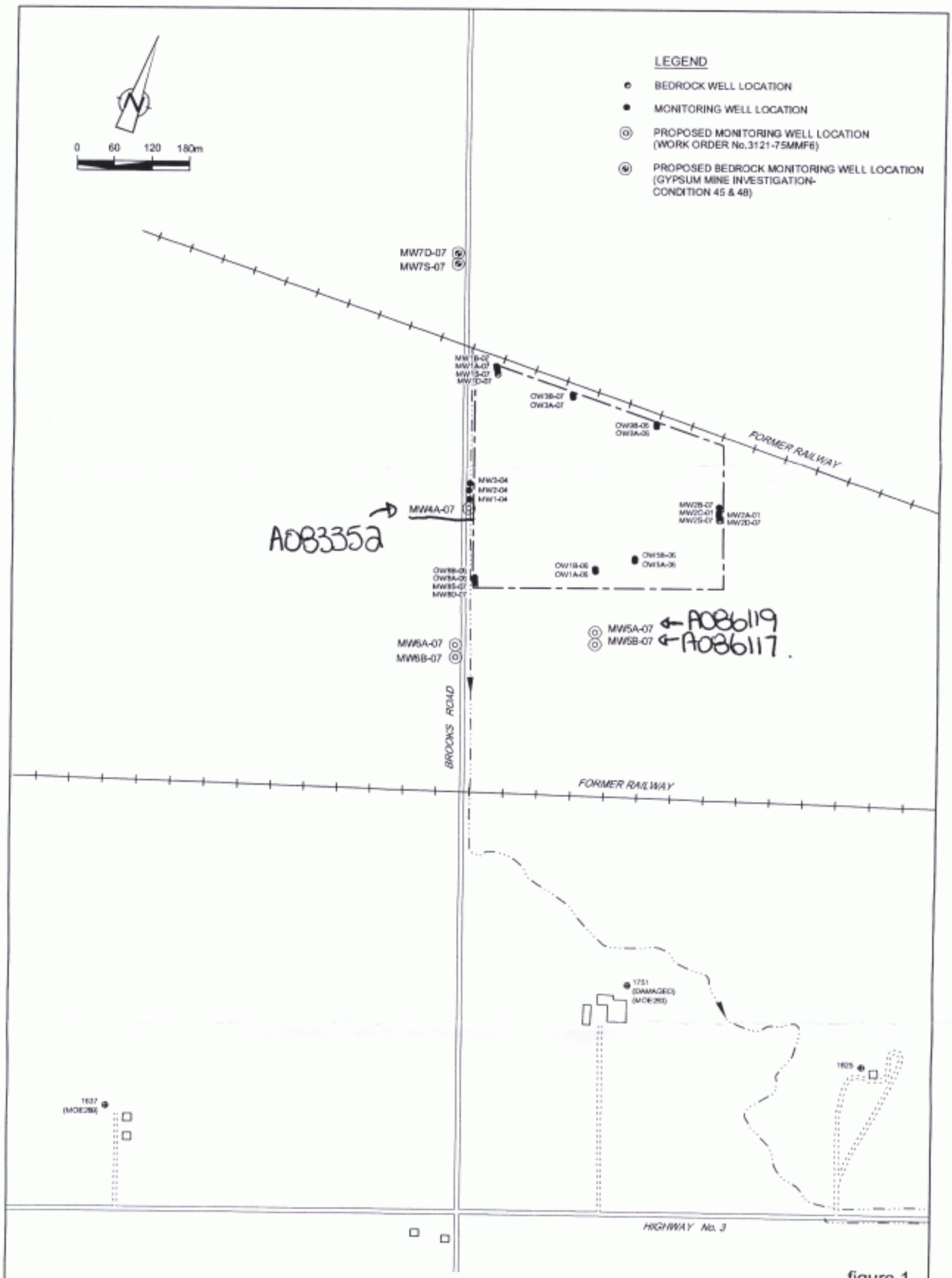


figure 1

PROPOSED 2007 MONITORING WELL LOCATIONS
CONDITION No. 45 & 48 / MOE ORDER 3121-75MMF6
EDWARDS LANDFILL SITE
Haldimand County, Ontario

18235-01(PRES017)GN-WA004 NOV 05/2007

C-7238
2095992

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Sticker Below) **A 083352**

09-0114-00.

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Brahm Rosen of	SF Partners Inc.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
4950 Yonge St, Suite 400	Toronto	ON	M2N6K1	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Brooks Rd, City Road 38	Former North Cayuga Twp.		

County/District/Municipality	City/Town/Village	Province	Postal Code
Haldimand.	Cayuga	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	559563	4757716		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	clay		hard	0	35
grey	clay		soft	35	58

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	46	Bentonite grout	0.23
46	58	Sand	0.06

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☑ Other, specify auger

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☑ Monitoring ☐ Livestock ☐ Test Hole ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
2	Plastic	sch40	0	46

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
2	Plastic	10	46	58

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☑ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	58	8

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.

Please see attached map.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Aardvark Drilling Inc	7238

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
25-C Lewis Rd	Wellington	ON	N1H1E9	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5198269340	England, M	3059	M England	20090707

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered

Date Work Completed 20090623

Ministry Use Only

Audit No. Z095991

Received JUL 14 2009

0506E (12/2007)

Ministry's Copy

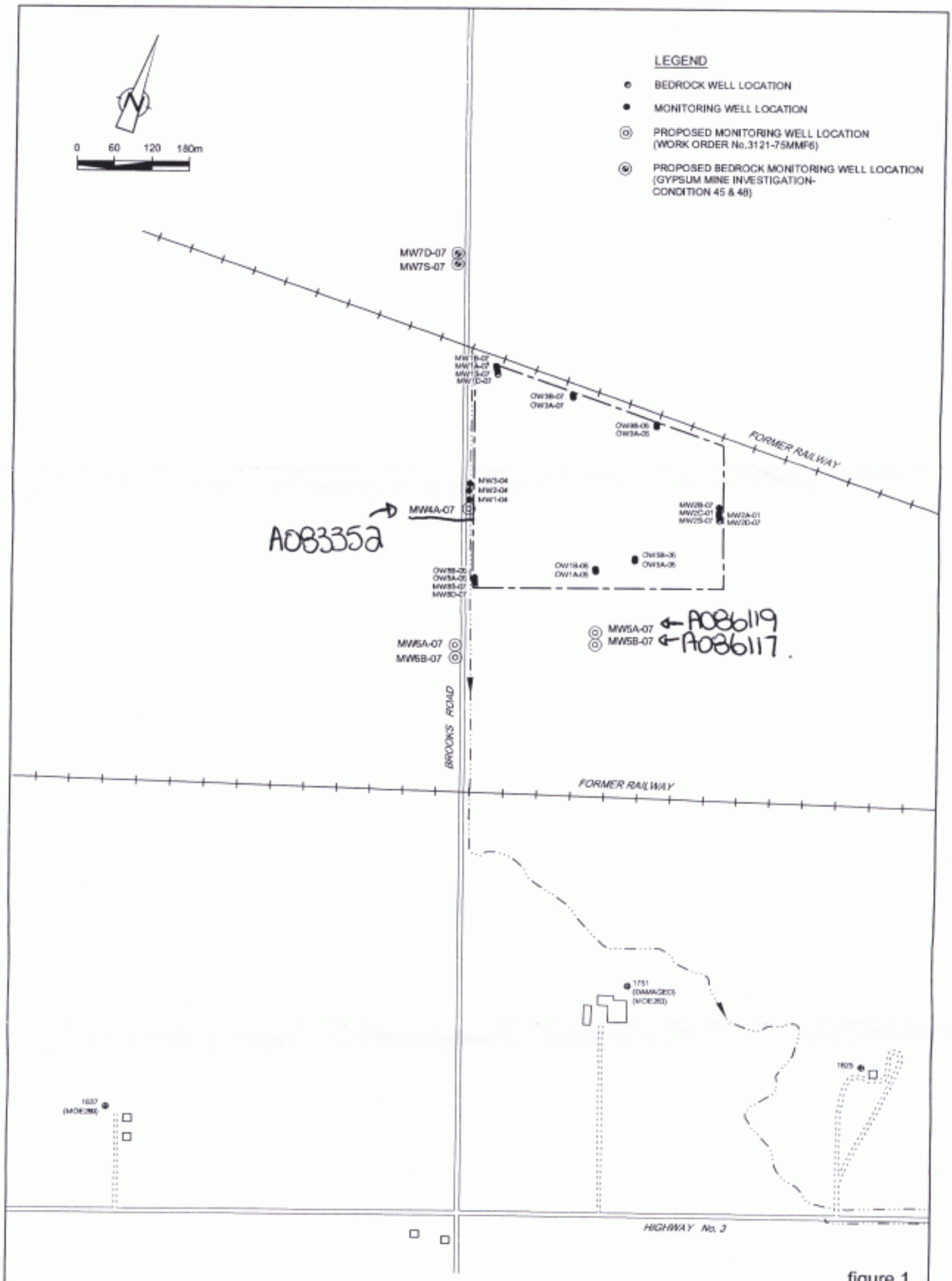


figure 1

PROPOSED 2007 MONITORING WELL LOCATIONS
CONDITION No. 45 & 48 / MOE ORDER 3121-75MMF6
EDWARDS LANDFILL SITE
Haldimand County, Ontario

18235-01(PRES017)GN-WA004 NOV 05/2007

C-7238
2095991

Ontario — Ministry of the Environment

Measurements recorded in: [x] Metric [x] Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: No tag Recovered.

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	Brooks Road Environmental c/o 2270386 Ontario Limited.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
160 Brooks Rd. R.R. #5	Cayuga	ON	N0A 1E0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
160 Brooks Rd.			

County/District/Municipality	City/Town/Village	Province	Postal Code
	Cayuga	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	595487	4758118		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
			Bentonite Grout	16m	0m

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

[ ] Cable Tool [ ] Diamond
[x] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, *specify*

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[x] Other, *specify* Decommission

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

[ ] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[x] Abandoned, other, *specify* Decommissioned
[ ] Other, *specify*

Results of Well Yield Testing

After test of well yield, water was:
[ ] Clear and sand free
[ ] Other, *specify*

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? [ ] Yes [ ] No

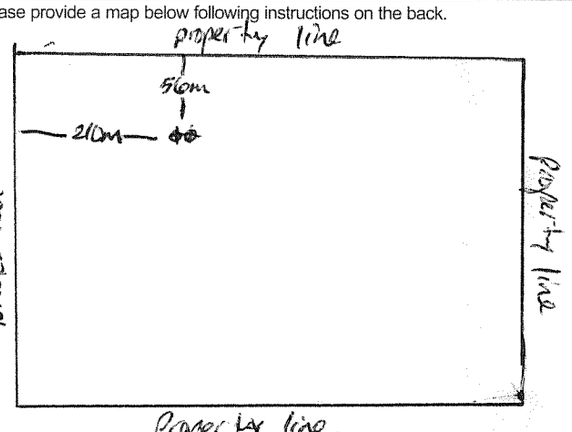
	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From (m/ft)	Depth To (m/ft)	Diameter (cm/in)
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, *specify*	16m	4m	2"
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, *specify*	4m	0m	9"
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, *specify*			

Map of Well Location

Please provide a map below following instructions on the back.



Comments: # Decommissioned wells.

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Profile Drilling Inc.	7215

Business Address (Street Number/Name)	Municipality
6525 Northam Dr	Mississauga

Province	Postal Code	Business E-mail Address
ONT	L4V1J2	jason@profiledrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
4166506444	Slocki, Jason / Slocki, Mike

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2978		2013/06/21

Well owner's information package delivered	Date Package Delivered	Date Work Completed
[ ] Yes [ ] No		2013/06/07

Ministry Use Only

Audit No. Z 163851

Received JUN 28 2013

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3571

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Ontario — Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)*: No Tag Recovered.

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: [X] Metric [ ] Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	Well Constructed by Well Owner
	Brooks Rd Environmental c/o 2270886 Ontario Limited		[ ]

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
160 Brooks Rd. R.R.#5	Cayuga	ON	N0A 1E0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
160 Brooks Rd.			

County/District/Municipality	City/Town/Village	Province	Postal Code
	Cayuga	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	595488	4758119		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
			Bentonite Grout	5m	0m

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, *specify* _____

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

[ ] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[X] Abandoned, other, *specify* Decommissioned
[ ] Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth (m/ft) From	To	Diameter (cm/in)
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, *specify* _____			
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, *specify* _____			
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, *specify* _____			

Results of Well Yield Testing

After test of well yield, water was:
[ ] Clear and sand free
[ ] Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping _____ hrs + _____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

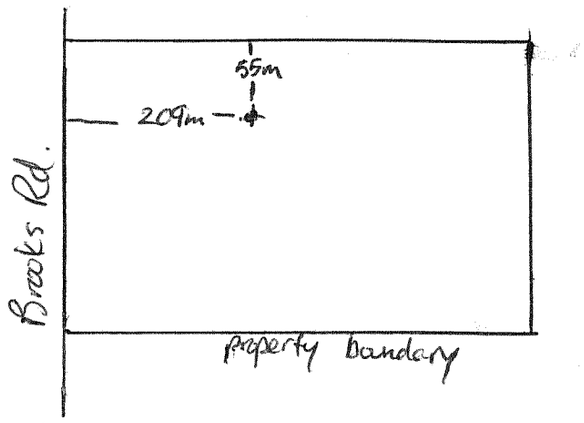
Well production (l/min / GPM)

Disinfected? [ ] Yes [ ] No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: Decommissioned well. Not to scale

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Profile Drilling Inc.	7215

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6525 Northam Dr	Mississauga	ONT	L4V 1J2	Mike@profiledrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
416 650 6444	Slocki, Adam	3767		2013 07 26

Well owner's information package delivered: [ ] Yes [ ] No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2013 06 07

Ministry Use Only

Audit No. Z 167203

Received JUL 31 2013

Ministry's Copy

Ontario

Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*
Tag#: A 235059

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
BROOKS Rd.	ENVIRONMENTAL		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
160 BROOKS Rd.	CAYUGA	ONT	N0A 1E0	888 402 7368

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
160 BROOKS Rd.			

County/District/Municipality	City/Town/Village	Province	Postal Code
	CAYUGA	Ontario	N0A 1E0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	559419	4757904		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
GRAY	SILT	CLAY GRAVEL	CLAY SILT TILL	0	27
GRAY	LIMESTONE				

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	3	CONCRETE	1.0
3	15	BENTONITE GROUT	3.0

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☑ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☑ Test Hole ☑ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2.0	PVC	SCH 40	0	17

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2.2	PVC	10	17	27

Status of Well

☐ Water Supply
☐ Replacement Well
☑ Test Hole
☐ Recharge Well
☐ Dewatering Well
☑ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, *specify*
☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From (m/ft)	Depth To (m/ft)	Diameter (cm/in)
NONE ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*	0	27	8"
☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			
☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM) N/A

Duration of pumping _____ hrs + _____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.

SEE ATTACHED DIAGRAM.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
NOVA DRILLING INC	6370

Business Address (Street Number/Name)	Municipality
233 ST. CHARLES ST. WEST	BRESLAU

Province	Postal Code	Business E-mail Address
ONT	N0B 1M0	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
519 893 6935	NOVA ROBERT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
7111		2018 08 31

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☑ No		2018 06 29

Ministry Use Only
Audit No. Z293405
SEP 14 2018
Received

0506E (2014/11)

Ministry's Copy

Google Maps 160 Brooks Rd

Imagery ©2018 Google, Map data ©2018 Google 100 m

C-6370 Z-293405

SEP 14 2018

Ontario

Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Tag#: A 235058

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
BROOKS Rd	ENVIRONMENTAL		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
160 BROOKS Rd.	CAYUGA	ONT	N0A1E0	8884027368

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
160 BROOKS Rd.			

County/District/Municipality	City/Town/Village	Province	Postal Code
	CAYUGA	Ontario	N0A1E0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	559541	4757906		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
GRAY	SILT	CLAY; GRAVEL	CLAY SILT TILL	0	56'
GRAY	SILT		SILT	56'	62.5'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used *(Material and Type)*	Volume Placed *(m³/ft³)*
0	3	CONCRETE	1.0
3	47'	BENTONITE GROUT	13.0

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☑ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☑ Test Hole ☑ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter *(cm/in)*	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness *(cm/in)*	Depth (m/ft) From	Depth (m/ft) To
2.0	PVC	SCH40	0	52.5

Construction Record - Screen

Outside Diameter *(cm/in)*	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2.2	PVC	10	52.5	62.5

Status of Well

☐ Water Supply
☐ Replacement Well
☑ Test Hole
☐ Recharge Well
☐ Dewatering Well
☑ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, *specify* _____
☐ Other, *specify* _____

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth (m/ft) From	To	Diameter *(cm/in)*
56 (m/ft) ☐ Gas	☐ Fresh ☑ Untested ☐ Other, *specify*	0	62.5	8"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)* N/A

Pumping rate *(l/min / GPM)*

Duration of pumping _____ hrs + _____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time *(min)*	Draw Down Water Level *(m/ft)*	Recovery Time *(min)*	Recovery Water Level *(m/ft)*
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.

SEE ATTACHED MAP

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
NOLL DRILLING INC	6370

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
233 ST. CHARLES ST. WEST	BRESLAU	ONT	N0B1M0	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5198936935	NOLL ROBERT	7411		2018 08 31

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☑ No		2018 06 29

Ministry Use Only

Audit No. Z293404

SEP 14 2018

Received

Google Maps 160 Brooks Rd

Imagery ©2018 Google, Map data ©2018 Google 100 m

C-6370 Z-293909

SEP 14 2018

30L 13W

WATER RESOURCES DIVISION
DEC 8 1964
ONTARIO WATER RESOURCES COMMISSION

UTM 17 Z 519318617 E
5 R 4756148 14 N

The Ontario Water Resources Commission Act

Elev. 5 R 0630

WATER WELL RECORD

Basin 23 | Haldimand

County or District

Township, Village, Town or City Cayuga

Con. ✓ Lot ✓

Date completed 21 (day) Oct (month) 1964 (year)

[redacted] ress Cayuga Post Office

Casing and Screen Record

Inside diameter of casing 5 in.

Total length of casing 40 ft.

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 6 in.

Pumping Test

Static level 28 ft.

Test-pumping rate 10 G.P.M.

Pumping level 29 ft.

Duration of test pumping 1 hr.

Water clear or cloudy at end of test clear

Recommended pumping rate 2 G.P.M.

with pump setting of 39 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
brown clay.	0	12	41 ft	fresh.
blue clay	12	30		
clay gravel.	30	~~40~~ 38		
gray lime	38	41		

For what purpose(s) is the water to be used? household.

Is well on upland, in valley, or on hillside? upland.

Drilling or Boring Firm James Wickett

Address Caledonia Ont.

Licence Number 1235

Name of Driller or Borer James Wickett

Address Box B13 Caledonia

Date Oct 21, 1964

James Wickett

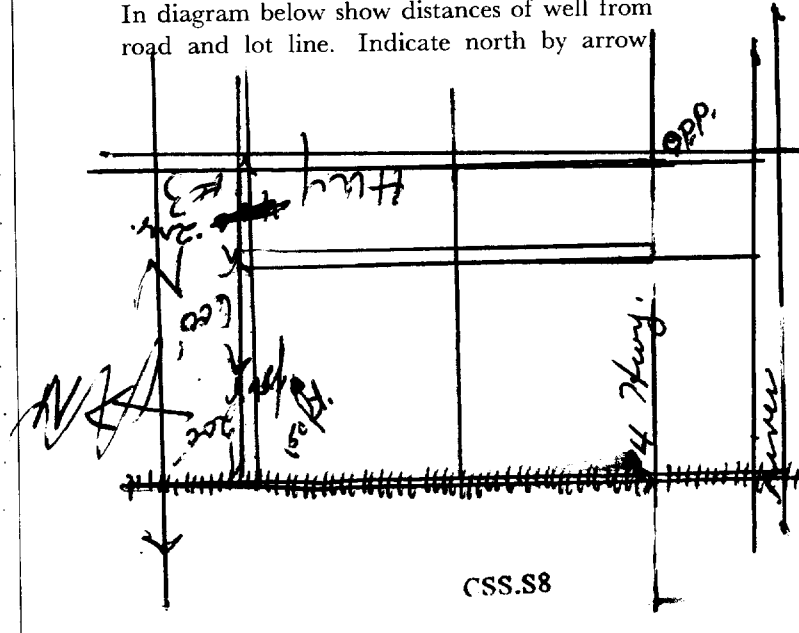
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

OBDEIAH

30L 13W 15

UTM 17 Z 591730 17 E
9 R 4751242 N
Elev. 9 R 0645
Basin 24

ONTARIO

RECEIVED
JUL 11 1951
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

26 No 282

The Well Drillers Act
Department of Mines, Province of Ontario

Water Well Record

Haldimand [redacted], Village, Town or City North Cayuga
[redacted] own or City) .....
[redacted] Cayuga
Date Completed June 22 1951 Cost of Well (excluding pump) 276
(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 5-5/8
Length(s) of casing(s) 75 ft
Type of screen
Length of screen
Distance from top of screen to ground level
Is well a gravel-wall type?

Pumping Test

Date June 22
Static level 30 ft down
Pumping level 50 ft down
Pumping rate 1000 gal HR
Duration of test 1/2 hr
Distance from cylinder or bowls to ground level 90 ft

Water Record

Kind (fresh or mineral) Sulphur
Quality (hard, soft, contains iron, sulphur, etc.)
Appearance (clear, cloudy, coloured) Cloudy
For what purpose(s) is the water to be used? Stock
How far is well from possible source of contamination? —
What is the source of contamination? —
Enclose a copy of any mineral analysis that has been made of water

Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
88	Sulphur	58 ft

Well Log

Overburden and Bedrock Record	From	To
Clay	0 ft.	75 ft.
~~Clay Gravel~~ Rock	75	90

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.

N.

Lot

100.
50
No 3 HY

Situation: Is well on upland, in valley, or on hillside? hillside
Drilling Firm Campbell Bros
Address
Name of Driller G. Campbell Address Dunnville 4
Date July 5 Licence Number Basin Laid
G. Campbell
Signature of Licensee

FORM 5

E

30L13W

UTM N° 17 Z 5 9 5 6 4 2 E
19 R 4 7 5 6 5 7 9 N

Elev. 19 R 0 6 3 5

Basin 2 3

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

26 No. 286

Talbot Rd. North
Con I
lot 25

Water-Well Record

County or Territorial District Welland Township, Village, ~~Town or City~~ North Cayuga

[redacted] in Village, Town or City)

Address Cayuga

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 6"
Length(s) 34 ft.
Type of screen (pulled)
Length of screen

Pumping Test

Static level
Pumping rate
Pumping level
Duration of test

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
clay & stones	0	34			
pebbly lime	34	60			
with streaks of shale	~~60~~				
brown lime mixed	60	112			
with shale					

Water Record

Sulphur

For what purpose(s) is the water to be used?

Is water clear or cloudy?

Is well on upland, in valley, or on hillside?

Drilling firm E. A. Ricker & Son
Address Canboro

Name of Driller James Ricker
Address Canboro

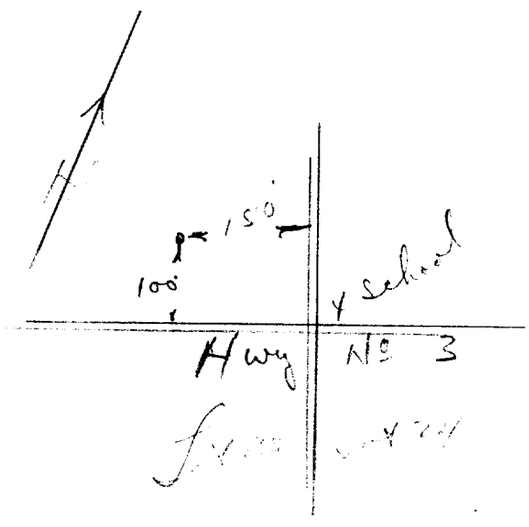
Licence Number 605

I certify that the foregoing statements of fact are true.

Date ..... James A. Ricker
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

CSS.S8

E

No 2

30L 13W

UTM 17 Z 5 9 5 6 4 7 E
9 R 4 7 5 6 5 7 9 N

Elev. 9 R 0 6 3 5

Basin 2 H

Talbot Rd N
Lot Con. I 25

ONTARIO

RECEIVED
JAN 31 1953 26
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

No. 287

The Water-well Drillers Act, 1954
Department of Mines

Water-Well Record

County or Territorial District Haldimand Township, ~~Village, Town or City~~ North Cayuga
[redacted] n Village, Town or City)
Address Cayuga

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 6"
Length(s) 32 ft
Type of screen pulled
Length of screen

Pumping Test

Static level
Pumping rate
Pumping level
Duration of test

Well Log

Overburden and Bedrock Record	From ft.	To ft.
clay & stony	0	32
Brown lime stone with shale	32	137

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)

For what purpose(s) is the water to be used?

Is water clear or cloudy?
Is well on upland, in valley, or on hillside?

Drilling firm E. A. Ricker & Son
Address Canboro

Name of Driller James Ricker
Address Canboro

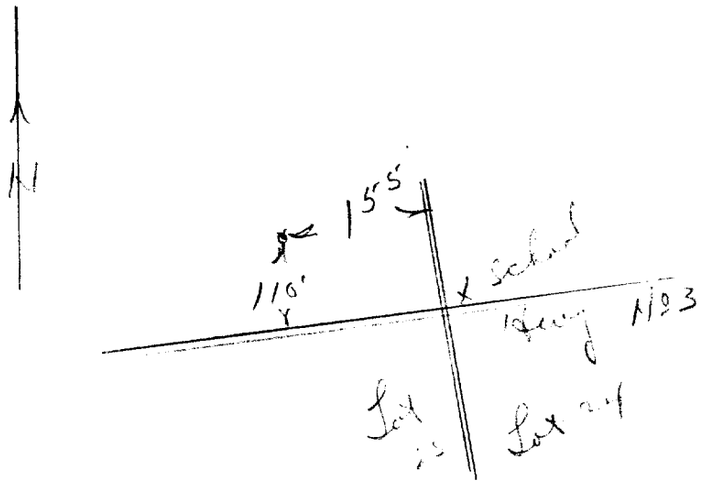
Licence Number 600

I certify that the foregoing statements of fact are true.

Date James a. Ricker
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

CSS.S8

E

No 3

30L 13W

UTM 17 Z 519516417 E
19 R 4175165179 N

Elev. 19 R 0635

Basin 23

Talbot Rd. N.
Con - I
Lot 25

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

RECEIVED
JAN 21 1955
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

26 No 288

Water-Well Record

County or Territorial District Haldimand Township, ~~Village, Town or City~~ North Cayuga
in Village, Town or City)
Address Cayuga

[redacted]

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 6"
Length(s) 37'
Type of screen
Length of screen

Pumping Test

Static level 54'
Pumping rate 200 G.P.H.
Pumping level 74'
Duration of test

Well Log

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Clay & stone	0	37			
brown lime	37	95'	85'	31	fresh

For what purpose(s) is the water to be used?
Farm
Is water clear or cloudy? Clear
Is well on upland, in valley, or on hillside?
upland
Drilling firm E. A. Ricker & Son
Address Caledonia

Name of Driller James Ricker
Address Caledonia

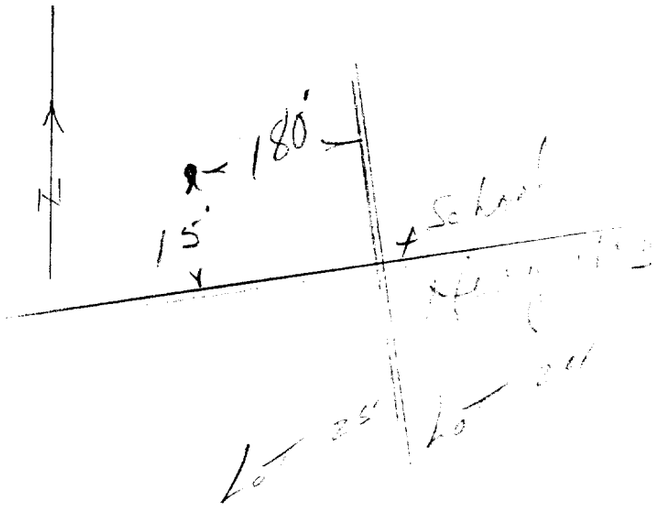
Licence Number 600

I certify that the foregoing statements of fact are true.

Date ..... James A. Ricker
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

CSS.S8

E

30L 13W

UTM 17Z 5 9 5 2 3 5 E
9R 4 7 5 6 5 1 9 N

Elev. 9R 0 6 4 0

Basin 23

T216ot Rd. N.
Con. I
Lot 26

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

RECEIVED
JAN 26
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

No. 289

Water-Well Record

County or Territorial District. Haldimand Township, Village, Town or City North Cayuga
(in Village, Town or City)
[redacted] Address Cayuga R.R. 1

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 6"
Length(s) 42'
Type of screen
Length of screen

Pumping Test

Static level 58'
Pumping rate 200 G.P.H.
Pumping level 85'
Duration of test

Well Log

Overburden and Bedrock Record	From ft.	To ft.
Clay	0	32
Hard pan	32	42
Brown lime & shale	42	107

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
101'	49'	fresh

For what purpose(s) is the water to be used?
Farm
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside? upland
Drilling firm E.A. Ricker & Son
Address Canboro

Name of Driller James Ricker
Address Canboro

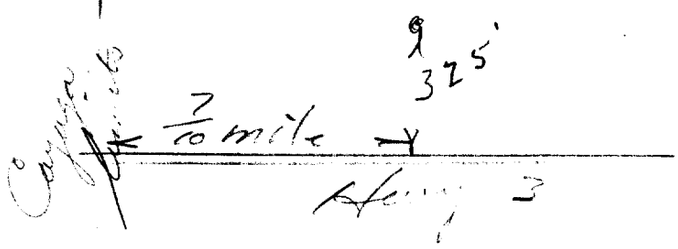
Licence Number 600

I certify that the foregoing statements of fact are true.

Date James A. Ricker
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

CSS.S8

30L 13W

26 No 912

UTM 17 Z 591711816 E

T5 R 4751691010 N

Elev. 650 R 06145

Basin 03

WATER WELL RECORD

The Ontario Water Resources Commission Act

County or District HALDIMAND Township, ~~Village, Town or City~~ NORTH CAYUGA

Con. 1 SOUTH Lot 21 NORTH HALF Date completed 6 (day) JUNE (month) 1966 (year)

[redacted] dress R.R. 1 CANFEILD

Casing and Screen Record

Inside diameter of casing 5"

Total length of casing 43'-8"

Type of screen —

Length of screen —

Depth to top of screen —

Diameter of finished hole 5"

Pumping Test

Static level 40 FT

Test-pumping rate 16 G.P.M.

Pumping level 42 FT

Duration of test pumping 30 MIN.

Water clear or cloudy at end of test CLEARING

Recommended pumping rate UP TO 20 G.P.M.

with pump setting of 70 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
BROWN CLAY	0	20		
GREY "	20	41		
~~Blue~~ BROWN LIME	41	75	69	FRESH

For what purpose(s) is the water to be used?

FARM

Is well on upland, in valley, or on hillside? UPLAND

Drilling or Boring Firm

J. R. NAUMAN

Address FISHERVILLE

ONT

Licence Number 1072

Name of Driller or Borer J.R. NAUMAN

Address FISHERVILLE ONT.

Date JUNE 6 1966

J. R. Nauman

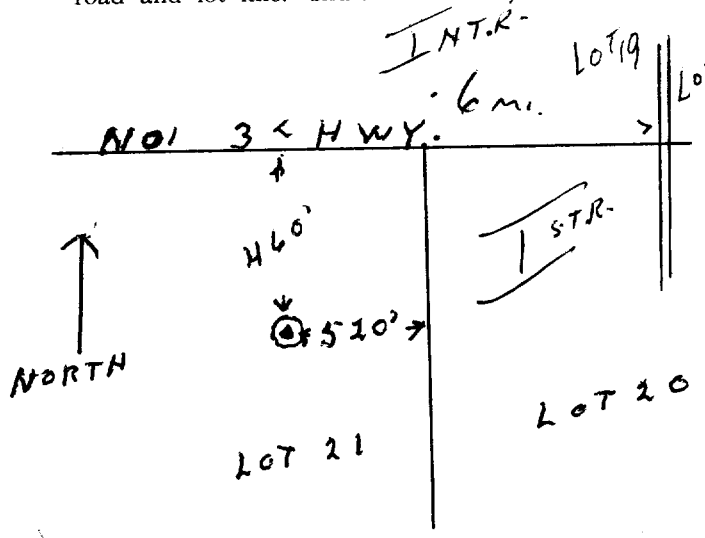
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

30L 13W

B

UTM 17 Z 5 9 6 3 2 1 E
17 R 4 7 5 6 6 1 4 N
Elev. 15 R 0 6 3 5
Basin 2 2

The Ontario Water Resources Commission Act, 1957

GROUND WATER BRANCH
MAR 27 1961
ONTARIO WATER RESOURCES COMMISSION

26 N 314

WATER WELL RECORD

County or District HALDIMAND Township, Village, Town or City N. CAYUGA

[redacted] te completed 8 (day) FEB. (month) 1961 (year)

[redacted] dress CAYUGA

Casing and Screen Record

Inside diameter of casing 6"
Total length of casing 41
Type of screen —
Length of screen —
Depth to top of screen —
Diameter of finished hole 6"

Pumping Test

Static level 40'
Test-pumping rate 5 G.P.M.
Pumping level 40'
Duration of test pumping 1 HR.
Water clear or cloudy at end of test CLEAR
Recommended pumping rate 5' G.P.M.
with pumping level of 40'

Well Log

Overburden and Bedrock Record	From ft.	To ft.
TOP SOIL	0	2
BROWN CLAY	2	41
LIMESTONE GREY	41	50

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
50	10	FRESH

For what purpose(s) is the water to be used?
BARN

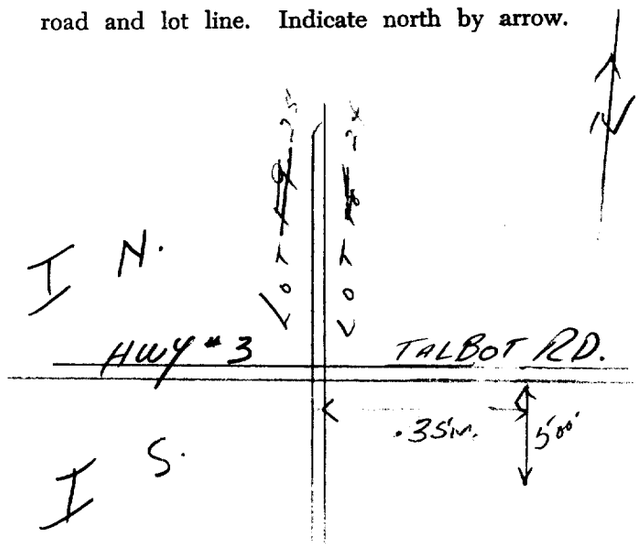
Is well on upland, in valley, or on hillside?
UPLAND

Drilling Firm CROSS BROS.
Address RYCKMAN'S CORNER

Licence Number
Name of Driller ARTHUR CROSS
Address RYCKMAN'S CORNER
Date MARCH 7 1961
Howard Cross
(Signature of Licensed Drilling Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

C88.88

30L13W

GROUND WATER BRANCH
MAR 2 1961
ONTARIO WATER RESOURCES COMMISSION

B

26 No. 315

X

UTM 17 Z 591631516 E
R 4751651418 N
Elev. R 0625
Basin 23

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District HALDIMAND Township, Village, Town or City N. CAYUGA.

[redacted] te completed 13 (day) FEB (month) 1961 (year)

[redacted] dress

Casing and Screen Record

Inside diameter of casing 6¼
Total length of casing 41'
Type of screen
Length of screen
Depth to top of screen
Diameter of finished hole 6¼

Pumping Test

Static level 40'
Test-pumping rate 5' G.P.M.
Pumping level 40'
Duration of test pumping 1 HR.
Water clear or cloudy at end of test CLEAR
Recommended pumping rate 5' G.P.M.
with pumping level of 40'

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
TOP SOIL	0	2			
BROWN CLAY	2	41			
GREY LIMESTONE	41	50	50	10	FRESH

Water Record

For what purpose(s) is the water to be used?
BARN.

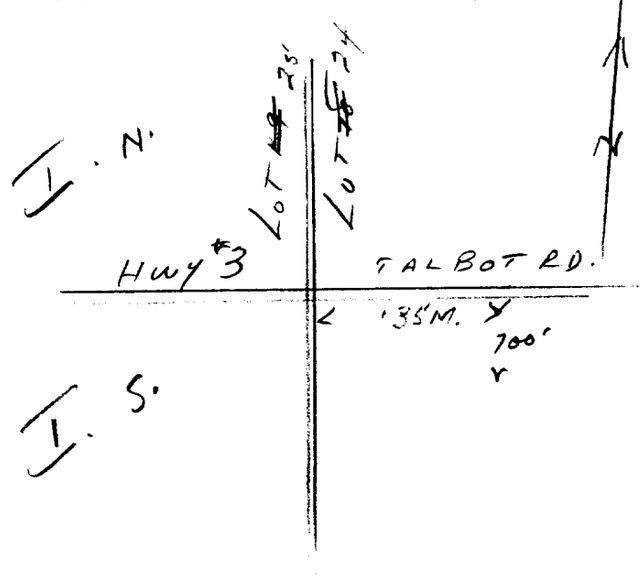
Is well on upland, in valley, or on hillside?

Drilling Firm CROSS BROS.
Address RYCKMAN CRS.

Licence Number
Name of Driller A. CROSS.
Address
Date MAR 7/61
Howard Cross
(Signature of Licensed Drilling Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

CSS.S8

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

306/13F

ONTARIO

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2601648 | MUNICIP. 26002 | CON. TR S | 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	Nor[illegible] CAYUGA	1 South	025
	RH 1 CAYUGA	DATE COMPLETED DAY 09 MO. Oct YR 73	

RC. ELEVATION RC. BASIN CODE

2601648 17 595705 4756510 4 652 4 23 JUN 15, 1977 277

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
		TOP Soil		0	5
		BROWN CLAY		5	20.
		BLUE CLAY		20	44.
		LIME STONE		44	84.

31 | 0005 02 | 002 0605 | 0044305 | 0084 15

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0080	1 ☐ FRESH 3 ☑ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
6 3/4	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	44
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE		0044	0084
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE		44	84
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☑ BAILER

PUMPING RATE: 0005 GPM

DURATION OF PUMPING: 03 HOURS 00 MINS

1 ☑ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
030 FEET	075 FEET	040 FEET	050 FEET	060 FEET	075 FEET

IF FLOWING, GIVE RATE: ____ GPM

PUMP INTAKE SET AT: ____ FEET

WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP

RECOMMENDED PUMP SETTING: 080 FEET

RECOMMENDED PUMPING RATE: 0005 GPM

____ GPM / FT. SPECIFIC CAPACITY

LOCATION OF WELL 9556

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.

WELL 5.00 FT
WEST OF RdH 25
175 FT South OF
#3 HWY.
ConIN lot 26 lot 25
CAYUGA.
HWY #3
WELL 175
ConI 5
400
8 1/2 Mile County Rd 28
N

DRILLERS REMARKS:

FINAL STATUS OF WELL 54: 1 ☑ WATER SUPPLY; 2 ☐ OBSERVATION WELL; 3 ☐ TEST HOLE; 4 ☐ RECHARGE WELL; 5 ☐ ABANDONED, INSUFFICIENT SUPPLY; 6 ☐ ABANDONED, POOR QUALITY; 7 ☐ UNFINISHED

WATER USE 55-56: 01 — 1 ☑ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; 9 ☐ NOT USED; ☐ OTHER

METHOD OF DRILLING 57: 1 ☑ CABLE TOOL; 2 ☐ ROTARY (CONVENTIONAL); 3 ☐ ROTARY (REVERSE); 4 ☐ ROTARY (AIR); 5 ☐ AIR PERCUSSION; 6 ☐ BORING; 7 ☐ DIAMOND; 8 ☐ JETTING; 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: ERNEST CONSTABLE — LICENCE NUMBER: 1618

ADDRESS: MOUNT HOPE MOTEL ONT

NAME OF DRILLER OR BORER: ____ — LICENCE NUMBER: ____

SIGNATURE OF CONTRACTOR: Ernest Constable

SUBMISSION DATE: DAY 31 MO. Dec YR 73

OFFICE USE ONLY

DATA SOURCE 58: 1 — CONTRACTOR 59-62: 1618 — DATE RECEIVED: 07 01 74

DATE OF INSPECTION: ____ — INSPECTOR: ____

REMARKS: ____

P K C

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FORM 7 07-09

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

304/13F

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2601651 | MUNICIP. 26002 | CON. TR S | LOT 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
HALDIMAND	North Cayuga	1 South	022

[redacted] R #1 CAYUGA

DATE COMPLETED: DAY 30 MO MAR YR 73

2601651 17 596131 4136820 4 638 4 23 JUN 15, 1977 277

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Top Soil			0	5
	Brown	Clay		5	20
	Blue	Clay		20	38.
	Blue	Shale		38	50.

31 | 0005 02 | 0020605 | 0038305 | 0050317

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0045	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR / 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼ 06	1 ☑ STEEL / 2 ☐ GALVANIZED / 3 ☐ CONCRETE / 4 ☐ OPEN HOLE	.188	0	0030.
	1 ☐ STEEL / 2 ☐ GALVANIZED / 3 ☐ CONCRETE / 4 ☑ OPEN HOLE		30	0050
	1 ☐ STEEL / 2 ☐ GALVANIZED / 3 ☐ CONCRETE / 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☑ BAILER

PUMPING RATE: 0005 GPM

DURATION OF PUMPING: 03 HOURS 00 MINS

WATER LEVELS DURING: 1 ☑ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
020 FEET	040 FEET	025 FEET	030 FEET	035 FEET	040 FEET

IF FLOWING GIVE RATE: GPM

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP

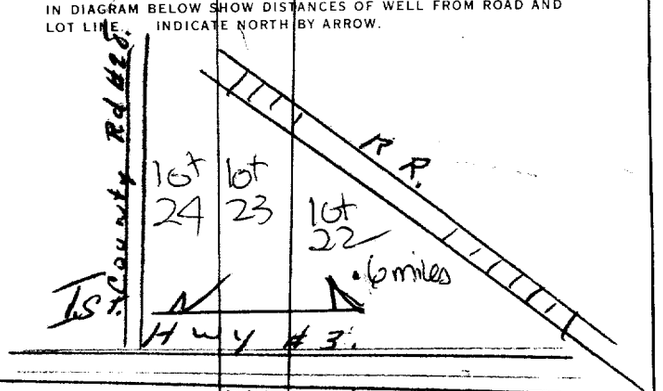
RECOMMENDED PUMP SETTING: 045 FEET

RECOMMENDED PUMPING RATE: 0005 GPM

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL 9656

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



1 Con S. WELL • #400 WELL 400 FT South of #3. ¼ MILE EAST of County Rd. # 28.

DRILLERS REMARKS:

FINAL STATUS OF WELL 54: 1 ☑ WATER SUPPLY; 2 ☐ OBSERVATION WELL; 3 ☐ TEST HOLE; 4 ☐ RECHARGE WELL; 5 ☐ ABANDONED, INSUFFICIENT SUPPLY; 6 ☐ ABANDONED, POOR QUALITY; 7 ☐ UNFINISHED

WATER USE 55-56: 01 — 1 ☑ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; ☐ OTHER; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; 9 ☐ NOT USED

METHOD OF DRILLING 57: 1 ☑ CABLE TOOL; 2 ☐ ROTARY (CONVENTIONAL); 3 ☐ ROTARY (REVERSE); 4 ☐ ROTARY (AIR); 5 ☐ AIR PERCUSSION; 6 ☐ BORING; 7 ☐ DIAMOND; 8 ☐ JETTING; 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: ERNEST CONSTABLE — LICENCE NUMBER: 1618

ADDRESS: MOUNT HOPE MOTEL ONT.

NAME OF DRILLER OR BORER: — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Ernest Constable

SUBMISSION DATE: DAY 31 MO Dec YR 73

OFFICE USE ONLY

DATA SOURCE 58: 1 — CONTRACTOR 59-62: 1618 — DATE RECEIVED 63-68: 0 80 1 74

DATE OF INSPECTION: — INSPECTOR: R

REMARKS: CSS.S8 — P KP — WI

FORM 7 07-091

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MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

304/13f

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2601691 | MUNIC. 26002 | CON. IR N | 01

COUNTY OR DISTRICT: [redacted] | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: North Cayuga | CON., BLOCK, TRACT, SURVEY, ETC.: North | LOT

[redacted] RR# 1 Cayuga | DATE COMPLETED: DAY 28 MO. 02 YR. 74

RC. | ELEVATION | RC. | BASIN CODE | II | III | IV

2601691 17 597112 4757059 4 652 4 23 JUN 15, 1977 277

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
	Top Soil			0	5
Brown		Clay		5	30.
Blue		Clay		30.	50.
	Gravel			50	64.
	Stone			64	86.
	Lime	Stone			

31 | 0005 02 | 0030605 | 0050305 | 0064 11 | 0086 15

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13: 0062	1 ☐ FRESH 3 ☑ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
15-18	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
20-23	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
25-28	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
30-33	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
10-11: 6 5/4 06	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	64 / 0064
17-18: 06 6 5/4	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE		64	0086 / 86
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☑ BAILER | PUMPING RATE: 0010 GPM | DURATION OF PUMPING: 03 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☑ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
040 FEET	070 FEET		050 FEET	060 FEET	065 FEET	070 FEET

IF FLOWING, GIVE RATE: GPM | PUMP INTAKE SET AT: FEET | WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP | RECOMMENDED PUMP SETTING: 084 FEET | RECOMMENDED PUMPING RATE: 0010. GPM

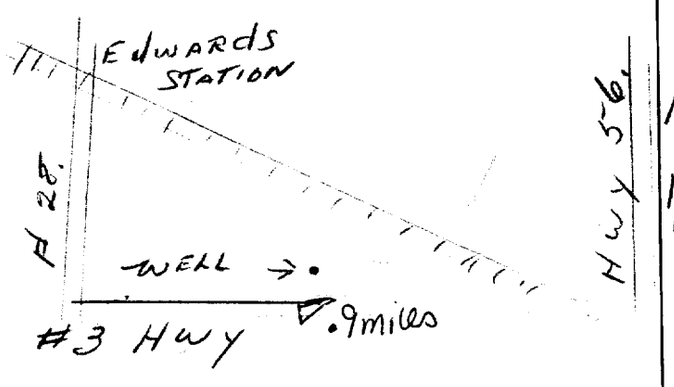
GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL 9757

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.

WELL 1 MILE EAST OF #20

100 FT NORTH OF #3 HWY.



DRILLERS REMARKS:

FINAL STATUS OF WELL: 1

1 ☑ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE: 01

1 ☑ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED ☐ OTHER

METHOD OF DRILLING: 1

1 ☑ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Ernest Constable | LICENCE NUMBER: 1618.

ADDRESS: Box 371 Cayuga PD.

NAME OF DRILLER OR BORER | LICENCE NUMBER

SIGNATURE OF CONTRACTOR: Ernest Constable | SUBMISSION DATE: DAY 1 MO. MAY YR. 74

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 1618 | DATE RECEIVED: 251074

DATE OF INSPECTION | INSPECTOR

REMARKS: CSS.S8 | P KO | WI

FORM 7 07-091

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Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2602174 | MUNICIP 26002 | CON. TR N | 101

COUNTY OR DISTRICT: Haldimand | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: North Cayuga | CON., BLOCK, TRACT, SURVEY, ETC: 1 NTR | LOT: ~~NTR~~ 27

[redacted], Box 382, Cayuga NOA 1E0

DATE COMPLETED: DAY 18 MO 7 YR 85

RC | ELEVATION | RC | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	TOPSOIL			0	3
BROWN	CLAY			3	18
BLUE	CLAY			18	47
GREY	LIMEROCK			47	60

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
60	1 ☒ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	57
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER | PUMPING RATE: 6 GPM | DURATION OF PUMPING: 1 HOURS ___ MINS

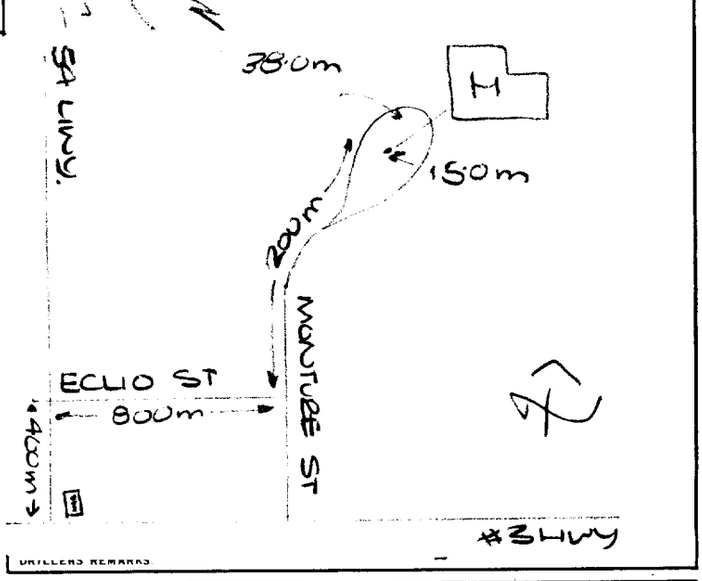
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
57 FEET	57 FEET		FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE: ___ GPM | PUMP INTAKE SET AT: ___ FEET | WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING: 59.6 FEET | RECOMMENDED PUMPING RATE: 6 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

FINAL STATUS OF WELL

1 ☐ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Kevin Vince | LICENCE NUMBER: 2805

ADDRESS: 176 Alderwood Dr. HAM

NAME OF DRILLER OR BORER: | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Kevin Vince | SUBMISSION DATE: DAY 14 MO April 86

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 2805 | DATE RECEIVED 07 05 86

DATE OF INSPECTION | INSPECTOR

REMARKS: CSS.58

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77 FORM 7

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

HALDIMAND

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2602340 | MUNICIP 26002 | CON. CON 91

COUNTY OR DISTRICT: [redacted] NORFOLK
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: NORTH CAYUGA
CON. BLOCK, TRACT, SURVEY ETC: CON. 1
LOT: 23
[redacted] 20 R.R.#1 NORTH CAYUGA
DATE COMPLETED: DAY 30 MO 6 YR 89
RC | ELEVATION | RC | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN		CLAY		0	39
"		BROWN LIME		39	61
GREY		BROWN LIME & SHALE		61	75

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
44	1 ☒ FRESH 2 ☐ SALTY; 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY; 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY; 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY; 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY; 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
5½	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC		0	41
5	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		40	75
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.): | DIAMETER: INCHES | LENGTH: FEET
MATERIAL AND TYPE: NIL | DEPTH TO TOP OF SCREEN: FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
0	40	GROUTED WITH CLAY

71 PUMPING TEST

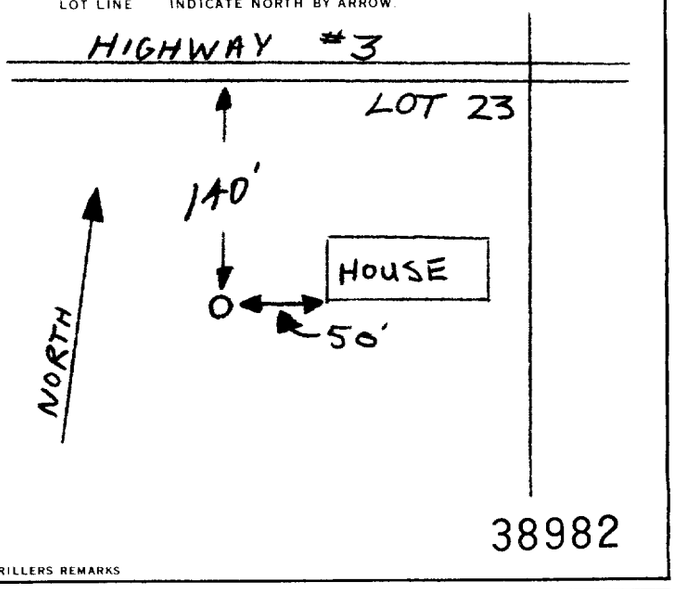
PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 7 GPM
DURATION OF PUMPING: 1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
38 FEET	58 FEET	43 FEET	48 FEET	53 FEET	58 FEET

IF FLOWING, GIVE RATE: — GPM
PUMP INTAKE SET AT: 70 FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 70 FEET
RECOMMENDED PUMPING RATE: 6 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



38982

DRILLERS REMARKS

FINAL STATUS OF WELL
1 ☒ WATER SUPPLY; 2 ☐ OBSERVATION WELL; 3 ☐ TEST HOLE; 4 ☐ RECHARGE WELL; 5 ☐ ABANDONED, INSUFFICIENT SUPPLY; 6 ☐ ABANDONED, POOR QUALITY; 7 ☐ UNFINISHED; 9 ☐ DEWATERING

WATER USE
1 ☒ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; ☐ OTHER; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; 9 ☐ NOT USED

METHOD OF CONSTRUCTION
1 ☐ CABLE TOOL; 2 ☐ ROTARY (CONVENTIONAL); 3 ☐ ROTARY (REVERSE); 4 ☒ ROTARY (AIR); 5 ☐ AIR PERCUSSION; 6 ☐ BORING; 7 ☐ DIAMOND; 8 ☐ JETTING; 9 ☐ DRIVING; ☐ DIGGING; ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: ELGIN MITCHELL & SONS
WELL CONTRACTOR'S LICENCE NUMBER: 3604
ADDRESS: R.R. #5 SIMCOE ONTARIO
NAME OF WELL TECHNICIAN: ROGER MITCHELL
WELL TECHNICIAN'S LICENCE NUMBER: T-0461
SIGNATURE OF TECHNICIAN/CONTRACTOR: Elgin Mitchell
SUBMISSION DATE: DAY 19 MO 10 YR 89

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR: 3604 | DATE RECEIVED: OCT 24 1989
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES

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FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2602384 | MUNICIP 26002 | CON. TR. N. | 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	N. Cayuga	1-North	20

152 Macdonald Cres. Missi. — DATE COMPLETED: DAY 11 MO Oct YR 90

RC. | ELEVATION | RC | BASIN CODE: 30515154yga

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Br	Clay			0	30
Grey	Clay			30	56
Grey	Gravel &	Broken Limestone		56	57

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
56	1 ☒ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	56
			56	57
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER (INCHES)	LENGTH (FEET)

MATERIAL AND TYPE: | DEPTH TO TOP OF SCREEN (FEET):

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☒ BAILER	6 GPM	1 HOURS ___ MINS

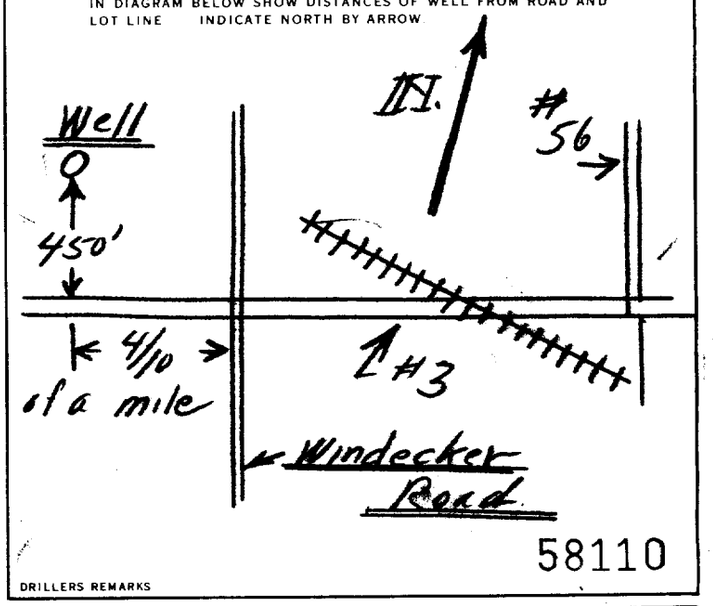
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
42 FEET	45 FEET	1 ☒ PUMPING 2 ☐ RECOVERY	45 FEET	45 FEET	45 FEET	45 FEET

IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	52 FEET	5 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



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DRILLERS REMARKS

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED ☐ DEWATERING

WATER USE

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: G.J. Wallis — WELL CONTRACTOR'S LICENCE NUMBER: 5417

ADDRESS: R.R. #2 Stony Creek

NAME OF WELL TECHNICIAN: Gene — WELL TECHNICIAN'S LICENCE NUMBER:

SIGNATURE OF TECHNICIAN/CONTRACTOR: Gene J. Wallis — SUBMISSION DATE: DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR: 5417 | DATE RECEIVED: OCT 18 1990

DATE OF INSPECTION | INSPECTOR

REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

HALDIMAND

11 | 2602550 | Municipality 26002 | Con. TR S | 01

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
HALD - NORFOLK	N. CAYUGA	I TRS	25
	Address CAYUGA	Date completed 19 day 6 month 98 year	

21 | Northing | RC | Elevation | RC | Basin Code | i | ii | iii | iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
BLACK	TOPSOIL			0	2
BROWN	CLAY			2	15
BLUE	CLAY	GRAVEL		15	38
BROWN	BROKEN LIMESTONE			38	43
BROWN	LIMESTONE			43	126

31
32

41 WATER RECORD

Water found at – feet	Kind of water
100	1 ☐ Fresh 3 ☑ Sulphur 14; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas
	1 ☐ Fresh 3 ☐ Sulphur 19; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas
	1 ☐ Fresh 3 ☐ Sulphur 24; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas
	1 ☐ Fresh 3 ☐ Sulphur 29; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas
	1 ☐ Fresh 3 ☐ Sulphur 34; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
5	☑ Steel; ☐ Galvanized; ☐ Concrete; ☐ Open hole; ☐ Plastic	.244	0	43
	☐ Steel; ☐ Galvanized; ☐ Concrete; ☐ Open hole; ☐ Plastic			
	☐ Steel; ☐ Galvanized; ☐ Concrete; ☐ Open hole; ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

☑ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)
0	10	3/8 HOLE PLUG

71 PUMPING TEST

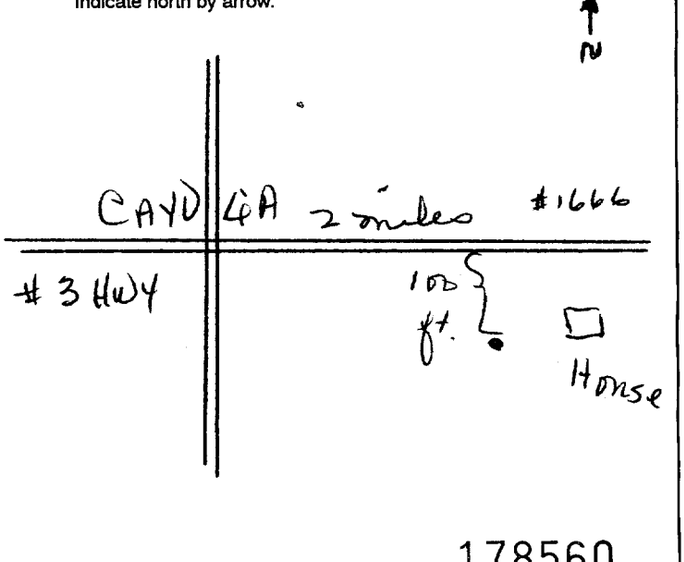
Pumping test method: 1 ☑ Pump 2 ☐ Bailer
Pumping rate: 1/2 GPM
Duration of pumping: ..... Hours 00 Mins

Static level	Water level end of pumping	Water levels during: 1 ☑ Pumping 2 ☐ Recovery			
46 feet	125 feet	15 minutes: 125 feet	30 minutes: 125 feet	45 minutes: 125 feet	60 minutes: 125 feet

If flowing give rate: ..... GPM
Pump intake set at: 125 feet
Water at end of test: ☑ Clear ☐ Cloudy
Recommended pump type: ☐ Shallow ☑ Deep
Recommended pump setting: 125 feet
Recommended pump rate: 1/2 GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line.
Indicate north by arrow.



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FINAL STATUS OF WELL

1 ☑ Water supply; 2 ☐ Observation well; 3 ☐ Test hole; 4 ☐ Recharge well; 5 ☐ Abandoned, insufficient supply; 6 ☐ Abandoned, poor quality; 7 ☐ Abandoned (Other); 8 ☐ Dewatering; 9 ☐ Unfinished; 10 ☐ Replacement well

WATER USE

1 ☑ Domestic; 2 ☐ Stock; 3 ☐ Irrigation; 4 ☐ Industrial; 5 ☐ Commercial; 6 ☐ Municipal; 7 ☐ Public supply; 8 ☐ Cooling & air conditioning; 9 ☐ Not used; 10 ☐ Other .....

METHOD OF CONSTRUCTION

1 ☑ Cable tool; 2 ☐ Rotary (conventional); 3 ☐ Rotary (reverse); 4 ☐ Rotary (air); 5 ☐ Air percussion; 6 ☐ Boring; 7 ☐ Diamond; 8 ☐ Jetting; 9 ☐ Driving; 10 ☐ Digging; 11 ☐ Other .....

Name of Well Contractor	Well Contractor's Licence No.
TED VANKESSEL WATERWELLS	5201
Address: 179 SHERMAN ST. SIMCOE	
Name of Well Technician: MARK VAN KESSEL	Well Technician's Licence No.: T-0528
Signature of Technician/Contractor	Submission date: day mo yr

MINISTRY USE ONLY

Data source	Contractor: 5201	Date received: JUN 06 1998
Date of inspection	Inspector	
Remarks: CSS. S9		

0506 (07/94) Front Form 9

2 - MINISTRY OF ENVIRONMENT & ENERGY COPY

Ontario Ministry of the Environment

Well Tag No. (Sticker and print number below) A 031827 A031821

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

RR#/Street Number/Name: Cayuga Quarry | City/Town/Village: Cayuga | Site/Compartment/Block/Tract etc.

GPS Reading | NAD 83 | Zone | Easting | Northing | Unit Make/Model: Extex | Mode of Operation: ☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
GREY	LIMESTONE			0	15.25

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	15.25	15

Water Record

Water found at 4 Metres / Kind of Water

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was ☐ Clear and sediment free ☐ Other, specify

Chlorinated ☐ Yes ☐ No

Construction Record

Inside diam (centimetres)	Material	Wall thickness (centimetres)	Depth From	Depth To (Metres)
Casing				
5	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	Sch 40	+1	10.6
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam 6.4	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	Slot No. 10	10.6	12.12
No Casing or Screen				
	☐ Open hole			

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	1		1	
Duration of pumping ____hrs + ____ min	2		2	
Final water level end of pumping ____metres	3		3	
Recommended pump type. ☐ Shallow ☐ Deep	4		4	
Recommended pump depth. ____metres	5		5	
Recommended pump rate. (litres/min)	10		10	
If flowing give rate - (litres/min)	15		15	
If pumping discontinued, give reason	20		20	
	25		25	
	30		30	
	40		40	
	50		50	
	60		60	

Plugging and Sealing Record ☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	8	Bentonite slurry + cement	
8	15.25	Silica sand	

Method of Construction

☐ Cable Tool ☐ Rotary (air) ☒ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☐ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☒ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☐ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☒ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: Aardvark Drilling | Well Contractor's Licence No.: 7238

Business Address (street name, number, city etc.): 25 Lewis Road Guelph, Ont.

Name of Well Technician (last name, first name): Richards Adam | Well Technician's Licence No.: 2554

Signature of Technician/Contractor: X | Date Submitted YYYY MM DD

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.

Lee

Audit No. Z 39769 | Date Well Completed YYYY MM DD: 2005 12 23

Was the well owner's information package delivered? ☐ Yes ☐ No | Date Delivered YYYY MM DD: 2006 02 01

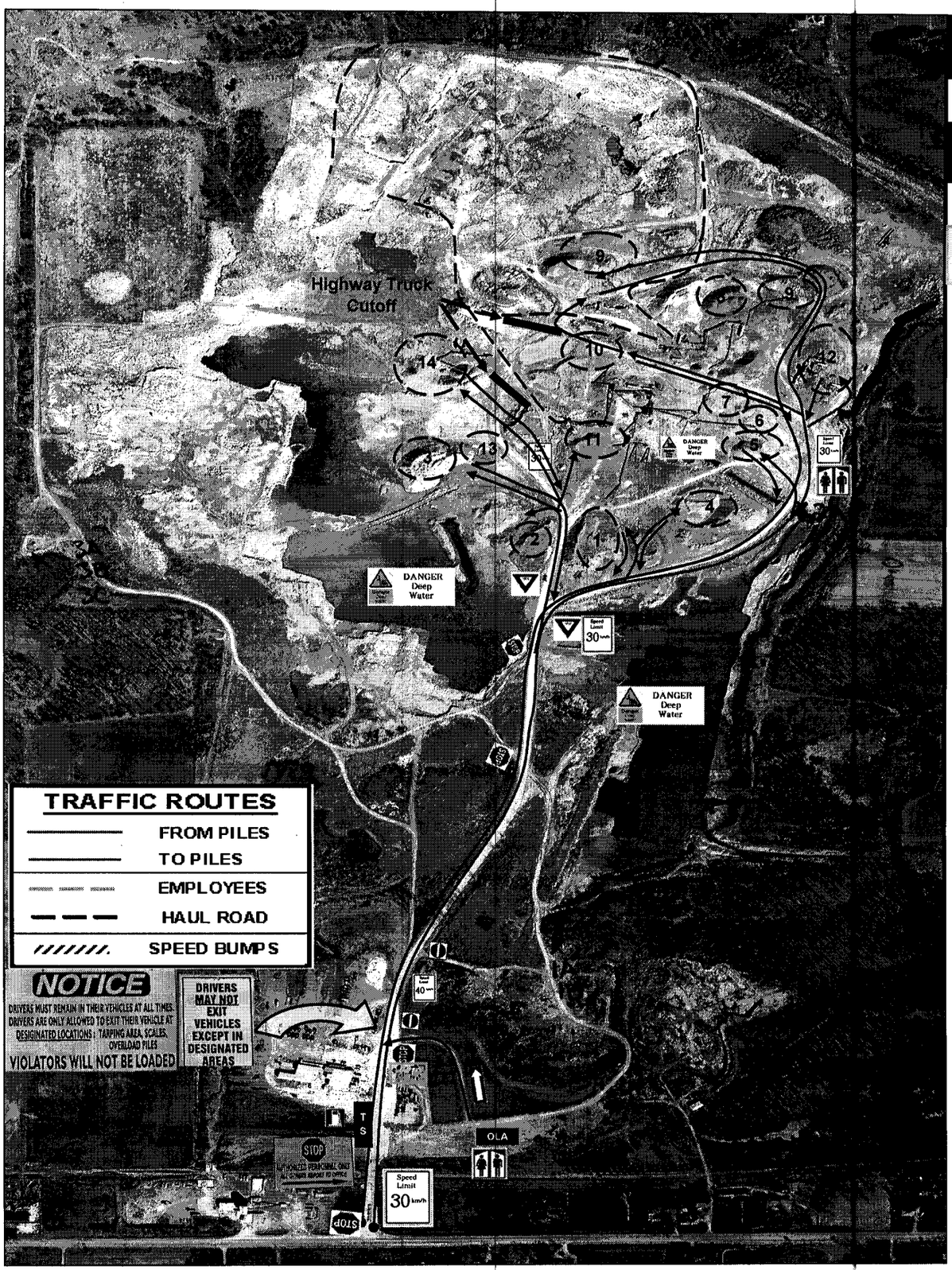
Ministry Use Only

Data Source | Contractor: 7238

Date Received FEB 07 2006 | Date of Inspection YYYY MM DD

Remarks | Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☑ Well Owner's Copy ☐ *Cette formule est disponible en français*



7238

Z 39769

FEB 07 2006

Appendix D

Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HALDIMAND-NORFOLK
LOCATION: CAYUGA, ONTARIO

HOLE DESIGNATION: MW2A-01
DATE COMPLETED: October 16, 2001
DRILLING METHOD: 108mm ID HSA, and AIR ROTARY
FIELD PERSONNEL: P. SMART

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.13 200.44					
	See MW2B-01 log description		CONCRETE HOLEPLUG 203.2mm Ø Borehole BENTONITE GROUT				
12	CL-SILTY CLAY, very stiff, brown silty laminations, grey, moist	188.25		1		100	11
14	SILT AND SAND (TILL), trace clay, fine to medium sand, trace coarse sand with gravel	185.96		2		100	40

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ October 19/01

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HALDIMAND-NORFOLK
LOCATION: CAYUGA, ONTARIO

HOLE DESIGNATION: MW2A-01
DATE COMPLETED: October 16, 2001
DRILLING METHOD: 108mm ID HSA, and AIR ROTARY
FIELD PERSONNEL: P. SMART

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
16	BEDROCK, auger ground into bedrock 0.6 m, air rotary drilling, no drill returns below 15.24m BGS	185.51	HOLEPLUG 101.6mm Ø COREHOLE SAND PACK WELL SCREEN				
19	END OF BOREHOLE @ 19.20m BGS	181.24					
20	(pp) - Pocket Penetrometer Value (70) - Field Shear Vane Value s - Field Vane Sensitivity		WELL DETAILS Screened interval: 184.29 to 181.24m ASD 16.15 to 19.20m BGS Length: 3.05m Diameter: 51mm Slot Size: #10 Sand Pack: 184.59 to 181.24m ASD 15.85 to 19.20m BGS Material: SILICA SAND #2				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ October 19/01

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HALDIMAND-NORFOLK
LOCATION: CAYUGA, ONTARIO

HOLE DESIGNATION: MW2C-01
DATE COMPLETED: October 16, 2001
DRILLING METHOD: 152mm Ø SOLID STEM AUGER
FIELD PERSONNEL: P. SMART

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.11 200.45					
	See log for MW2B-01		CONCRETE HOLEPLUG 152.4mm Ø Borehole BENTONITE GROUT HOLEPLUG SAND PACK WELL SCREEN				
12	END OF BOREHOLE @ 11.89m BGS	188.56					

(pp) - Pocket Penetrometer Value
(70) - Field Shear Vane Value
s - Field Vane Sensitivity

WELL DETAILS
Screened interval:
190.39 to 188.87m ASD
10.06 to 11.58m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: #10
Sand Pack:
190.70 to 188.56m ASD
9.75 to 11.89m BGS
Material: SILICA SAND #2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ October 19, 2001

OVERBURDEN LOG 18235.GPJ CRA_CORP.GDT 7/19/07

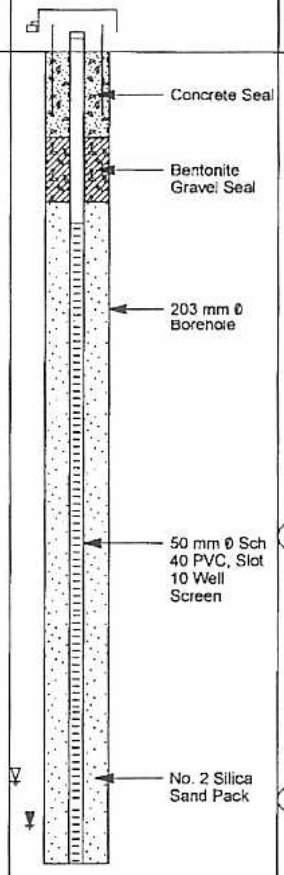
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OFF-SITE INVESTIGATION
PROJECT NUMBER: 18617
CLIENT: HALDIMAND-NORFOLK SANITARY LANDFILL INC.
LOCATION: EDWARDS LANDFILL SITE, HALDIMAND COUNTY

HOLE DESIGNATION: MW 1-03
DATE COMPLETED: September 16, 2003
DRILLING METHOD: 50 mm Geoprobe/ 108 mm ID HSA
FIELD PERSONNEL: D. Gray

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL
	TOP OF RISER	200.219
	GROUND SURFACE	199.4
0	ML-SILT (TOPSOIL) - little fine sand, trace clay, low plasticity, brown, moist, rootles	199.25
0.5	ML-SILT (FILL) - little fine sand, little to trace clay, low plasticity, dark brown, moist, rootlets	198.94
	GP-GRAVEL (FILL) - little fine sand, trace silt, medium grained, poorly graded, grey, moist	
1.0		
1.5	ML-SILT - with to little clay, trace fine sand, low plasticity, brown, moist, oxidized, mottled, some fracturing visible	197.98
2.0		
2.5		
3.0		
3.5	- with clay, medium to low plasticity, varving visible, no visible mottling or oxidation at 3.35m BGS	
4.0	ML-CLAYEY SILT - trace fine sand, low plasticity, grey, moist, varving visible, some slight oxidation	195.44
4.5	- medium plasticity, more competent, no varving visible at 4.72m BGS	
5.0	- very moist at 4.88m BGS	
5.5		
	END OF BOREHOLE @ 5.79m BGS	193.61
6.0		
6.5		
7.0		
7.5		
8.0		
8.5		

Monitoring Well



WELL DETAILS
Screened interval:
198.18 to 193.61m AMSL
1.22 to 5.79m BGS
Length: 4.57m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.79 to 198.33m AMSL
0.61 to 1.07m BGS
Material: Bentonite Gravel
Sand Pack:
198.33 to 193.61m AMSL
1.07 to 5.79m BGS
Material: No. 2 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID
1	P/S	30		0.2
2	P/S	100		0.3
3	P/S	100		1.7
4	P/S	100		0.2
5	P/S	100		1.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Sept.22 STATIC WATER LEVEL ▼ Sept.23
CHEMICAL ANALYSIS (3)

OVERBURDEN LOG 18617-2.GPJ CRA_COTP.GDT 10/1/03

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OFF-SITE INVESTIGATION
PROJECT NUMBER: 18617
CLIENT: HALDIMAND-NORFOLK SANITARY LANDFILL INC.
LOCATION: EDWARDS LANDFILL SITE, HALDIMAND COUNTY

HOLE DESIGNATION: MW 2-03
DATE COMPLETED: September 16, 2003
DRILLING METHOD: 50 mm Geoprobe/ 108 mm ID HSA
FIELD PERSONNEL: D. Gray

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID
	TOP OF RISER GROUND SURFACE	200.280 199.4						
0.0	ML-SILT (TOPSOIL) - little fine sand, trace clay, low plasticity, brown, moist, rootlets	199.25	Concrete Seal					
0.5	ML-SILT (FILL) - little clay, little to trace fine sand, trace gravel, low to medium plasticity, dark brown, moist, oxidized, wood fragments			1	P/S	80		1.7
1.0			Bentonite Gravel Seal					
1.5	- medium plasticity at 1.22m BGS	197.88						
2.0	ML-SILT - with clay, trace fine sand, low plasticity, brown, moist, oxidized, mottled, rootlets, visible fracturing, some fractures infilled with manganeese		203 mm Ø Borehole	2	P/S	100		0.9
2.5								
3.0								
3.5			50 mm Ø Sch 40 PVC, Slot 10 Well Screen	3	P/S	100		0.6
4.0	- medium plasticity, moist, some oxidation at 3.96m BGS	195.51						
4.5	ML-CLAYEY SILT - trace fine sand, low to medium plasticity, grey, moist, varving visible, some slight oxidation visible - moist to very moist, more competent, no visible varving at 4.57m BGS			(4)	P/S	60		2.4
5.0			No. 2 Silica Sand Pack					
5.5				(5)	P/S	100		1.1
6.0	END OF BOREHOLE @ 5.79m BGS	193.61						
6.5								
7.0								
7.5								
8.0								
8.5								

WELL DETAILS
Screened interval:
198.18 to 193.61m AMSL
1.22 to 5.79m BGS
Length: 4.57m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.79 to 198.33m AMSL
0.61 to 1.07m BGS
Material: Bentonite Gravel
Sand Pack:
198.33 to 193.61m AMSL
1.07 to 5.79m BGS
Material: No. 2 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Sept.22 STATIC WATER LEVEL ▼ Sept.23
CHEMICAL ANALYSIS (4) (5)

OVERBURDEN LOG 18617-2.GPJ CRA_CORP.GDT 10/14/03

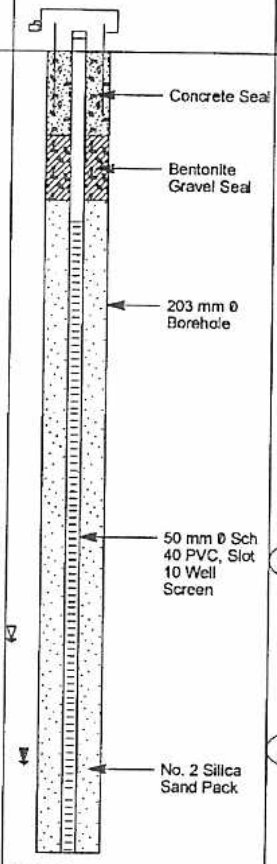
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OFF-SITE INVESTIGATION
PROJECT NUMBER: 18617
CLIENT: HALDIMAND-NORFOLK SANITARY LANDFILL INC.
LOCATION: EDWARDS LANDFILL SITE, HALDIMAND COUNTY

HOLE DESIGNATION: MW 3-03
DATE COMPLETED: September 16, 2003
DRILLING METHOD: 50 mm Geoprobe/ 108 mm ID HSA
FIELD PERSONNEL: D. Gray

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL
	TOP OF RISER	200.219
	GROUND SURFACE	199.3
0.0	ML-SILT (TOPSOIL) - little fine sand, trace clay, low plasticity, brown, moist, rootlets	199.15
0.5	ML-SILT (FILL) - little fine sand, little clay, low plasticity, brown, with some back intervals, moist, wood fragments	
1.0		198.23
1.5	MI-SILT - with to little clay, trace fine sand, low plasticity, brown, moist, rootlets, oxidized, mottled, fractured, some fractures infilled with manganeese	
2.0	- little clay, low plasticity at 1.52m BGS	
2.5		
3.0	- highly oxidized and mottled at 3.05m BGS	
3.5		
4.0	- slightly higher plasticity, some varving visible at 3.96m BGS	
4.5	ML-CLAYEY SILT - trace fine sand, medium plasticity, grey, very moist, varving visible, no evidence of oxidation, mottling of fracturing	195.03
5.0		
5.5		
6.0	END OF BOREHOLE @ 5.79m BGS	193.51
6.5		
7.0		
7.5		
8.0		
8.5		

Monitoring Well



WELL DETAILS
Screened Interval:
198.08 to 193.51m AMSL
1.22 to 5.79m BGS
Length: 4.57m
Diameter: 25mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.69 to 198.23m AMSL
0.61 to 1.07m BGS
Material: Bentonite Gravel
Sand Pack:
198.23 to 193.51m AMSL
1.07 to 5.79m BGS
Material: No. 2 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID
1	P/S	80		0.9
2	P/S	100		0.4
3	P/S	80		1.2
4	P/S	100		1.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Sept.22 STATIC WATER LEVEL ▼ Sept.23
CHEMICAL ANALYSIS (○)

OVERBURDEN LOG 18617-2.GPJ CRA_CORP.GDT 10/14/03

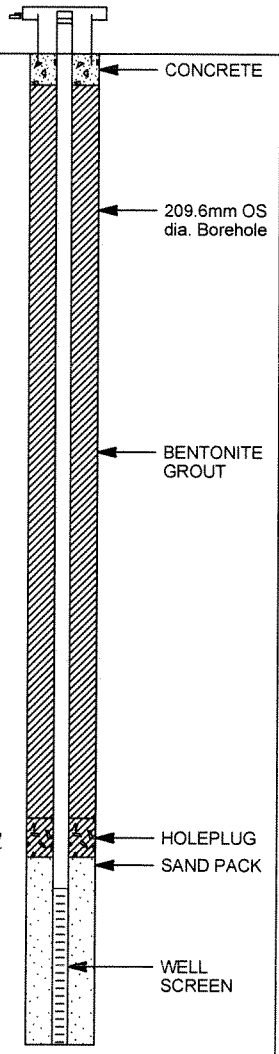
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW1A-06
DATE COMPLETED: November 23, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING	200.38
	TOP OF RISER	200.24
	GROUND SURFACE	199.47
0	SILT LOAM (Topsoil), soft, dark brown, moist, rootlets	199.42
	CI - CLAY, trace SILT, firm, brown, damp, rootlets	
2	- soft	
	- with SILT, trace GRAVEL, firm, mottled, fine grained	
	- CLAY, with SILT, dry to damp	
4		
	CH - CLAY (Varved), trace SILT, firm, dry to damp	194.90
6	- 30cm layer trace GRAVEL, fine grained	
	- 0.25cm layer CLAY, with SILT, with SAND, with GRAVEL, subangular, fine to coarse grained	192.25
8	CH - CLAY (Till), trace SILT, trace GRAVEL, firm, high plasticity, subangular gravel, damp	
	- soft to firm	
10	- soft	
12	- moist, rapid dilatency	
14		
16	- moist to wet	
18		
	GM/GC - SAND, trace GRAVEL, with FINES, dense, fine to medium grained sand, brown, wet	180.88
		180.80
	SHALE (Bedrock), with GYPSUM	180.12
20	END OF BOREHOLE @ 19.35m BGS	
22		
24		
26		

Monitoring Well



WELL DETAILS
Screened interval:
183.16 to 180.12m ASD
16.31 to 19.35m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.86 to 183.93m ASD
0.61 to 15.54m BGS
Material: Bentonite Gravel
Sand Pack:
183.77 to 180.12m ASD
15.70 to 19.35m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	100		0
03	P/S	100		0
04	P/S	100		0
05	P/S	100		0
06	P/S	100		0
07	P/S	100		0
08		100	16	0
09		100	18	0
10		100	12	0
11		100	11	0
12		100	7	0
13		100	6	0
14		100	10	0
15		100	7	0
16		95	6	0
17		95	6	0
18		50	41	0
19		100	>50	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

OVERBURDEN LOG 18235-2006-OVERBURDEN.GPJ CRA_CORP.GDT 7/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW1B-06
DATE COMPLETED: November 23, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.37 200.35 199.47					
0	- Please Refer to Stratigraphy Log OW1A-06.		CONCRETE HOLEPLUG SAND PACK WELL SCREEN 209.6mm OS dia. Borehole				
6	END OF BOREHOLE @ 5.33m BGS		WELL DETAILS Screened interval: 197.18 to 194.14m ASD 2.29 to 5.33m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 198.86 to 197.49m ASD 0.61 to 1.98m BGS Material: Bentonite Gravel Sand Pack: 197.49 to 194.14m ASD 1.98 to 5.33m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

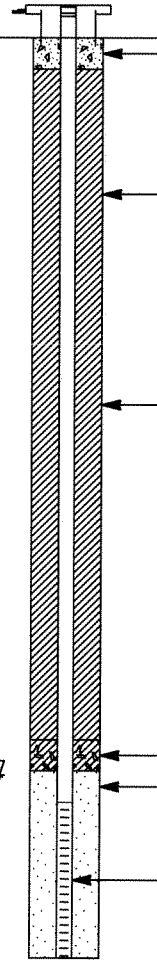
OVERBURDEN LOG 18235-2006-OVERBURDEN.GPJ CRA_CORP.GDT 7/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8A-06
DATE COMPLETED: November 21, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING	199.40
	TOP OF RISER	199.33
	GROUND SURFACE	198.29
0	CH - CLAY (Disturbed), firm, high plasticity, brown, damp to moist	
		196.46
2	CH - CLAY (Native), firm, high plasticity, brown, trace grey colour, damp	
4	- possible 9cm long fracture	
		192.95
6	CH - CLAY (Varved), trace SILT, firm, brown, damp	
	- 2.5cm layer of trace SAND, fine grained, grey	
	- CLAY, trace GRAVEL	191.06
8	CH - CLAY (Till), trace SILT, trace SAND, trace GRAVEL, firm, fine grained subangular gravel, coarse grained sand, damp	
	- possible 12.5cm long fracture	
10	- 7.6cm layer of trace SAND and GRAVEL, fine grained	
	- 2.5cm layer of GRAVEL, fine grained	
	- piece of GRAVEL, coarse grained, subangular	
12	- 7.6cm layer of trace SAND and GRAVEL, medium grained sand, fine grained gravel, sand is yellow in colour, gravel is subangular	186.32
	- soft, moist	
	- piece of GRAVEL, coarse grained, subangular	
14	CH - CLAY (Varved), soft, moist	
	- very soft, rapid dilatency	
	- possible fractures noted at two of the varves	
16	- piece of GRAVEL (Granite), coarse grained	182.28
	GM/GP - GRAVELLY SAND, trace FINES, compact, poorly graded, brown	182.13
	SHALE (Bedrock), brown	181.13
18	END OF BOREHOLE @ 17.98m BGS	
20		
22		
24		
26		



WELL DETAILS
Screened interval:
183.35 to 180.30m ASD
14.94 to 17.98m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
197.68 to 184.27m ASD
0.61 to 14.02m BGS
Material: Bentonite Gravel
Sand Pack:
183.96 to 180.30m ASD
14.33 to 17.98m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	100		0
03	P/S	100		0
04	P/S	100		0
05	P/S	100		0
06	P/S	95		0
07	P/S	100		0
08	P/S	100		0
09	P/S	100		0
10		75	11	0
11		50	40	0
12		100	>50	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 11, 2006

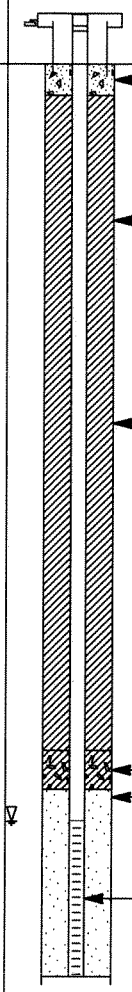
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW5A-06
DATE COMPLETED: November 27, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.84 199.72 198.72
0	CL/CI - CLAY and SILT, firm, low to moderate plasticity, brown, damp, rootlets	
		197.50
2	CI - Clay with SILT, firm, moderate plasticity, brown, damp	
		195.68
4	CH - CLAY (Varved), soft, high plasticity, brown, moist	
	- trace SILT, trace SAND, trace GRAVEL	
6	- 30cm gap in varving	
	- 5cm layer of CLAY and GRAVEL, trace SAND, fine to coarse grained gravel, reddish colour	
	- piece of coarse grained gravel	
8	CH - CLAY (Till), trace SILT, trace SAND, trace GRAVEL, soft, high plasticity, brown, moist	
10		
12		
	- piece of subangular coarse grained gravel	
14		
		182.95
16	GC - SAND and GRAVEL, with CLAY, dense, fine grained subangular gravel, brown, wet	182.87
	SHALE (Weathered Bedrock), brown, wet	
	- SHALE (Bedrock), with GYPSUM	
18	END OF BOREHOLE @ 17.98m BGS	180.59
20		
22		
24		
26		

Monitoring Well



WELL DETAILS
Screened interval:
183.94 to 180.89m ASD
14.78 to 17.83m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.11 to 184.70m ASD
0.61 to 14.02m BGS
Material: Bentonite Gravel
Sand Pack:
184.55 to 180.89m ASD
14.17 to 17.83m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	95		0
03	P/S	100		0
04	P/S	100		0
05	P/S	90		0
06	P/S	100		0
07	P/S	100		0
08	P/S	100		0
09		100	9	0
10		100	5	0
11		100	7	0
12		100	7	0
13		100	7	0
14		25	23	0
15		33	20	0
16		50	30	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW5B-06
DATE COMPLETED: November 27, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.83 199.67 198.72					
	- Please Refer to Stratigraphy Log OW5A-06.		CONCRETE HOLEPLUG SAND PACK WELL SCREEN 209.6mm OS dia. Borehole				
	END OF BOREHOLE @ 4.72m BGS		WELL DETAILS Screened interval: 197.12 to 194.08m ASD 1.60 to 4.65m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 198.11 to 197.43m ASD 0.61 to 1.30m BGS Material: Bentonite Gravel Sand Pack: 197.43 to 194.08m ASD 1.30 to 4.65m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 11, 2006

OVERBURDEN LOG 18235-2006-OVERBURDEN.GPJ CRA_CORP.GDT 7/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8B-06
DATE COMPLETED: November 21, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.44 199.33 198.29					
	- Please Refer to Stratigraphy Log OW8A-06.		CONCRETE HOLEPLUG SAND PACK WELL SCREEN 209.6mm OS dia. Borehole				
	END OF BOREHOLE @ 5.03m BGS		WELL DETAILS Screened interval: 196.30 to 193.26m ASD 1.98 to 5.03m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 197.68 to 195.54m ASD 0.61 to 2.74m BGS Material: Bentonite Gravel Sand Pack: 196.61 to 193.26m ASD 1.68 to 5.03m BGS Material: No.2 SILICA SAND				

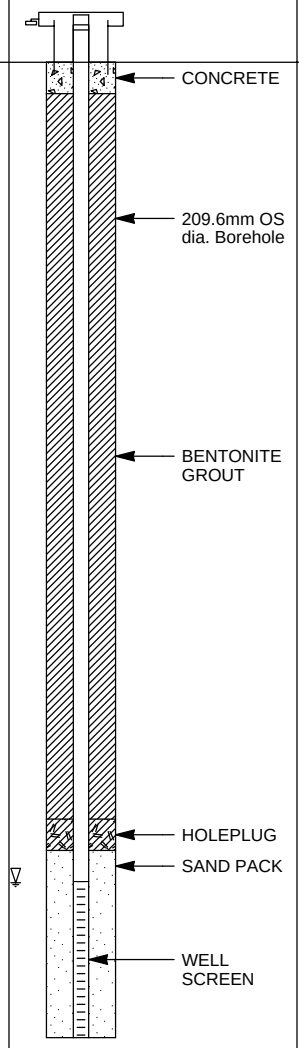
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 11, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW9A-06
DATE COMPLETED: November 29, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF RISER	201.08
	GROUND SURFACE	200.07
0	SILT LOAM (Topsoil), with CLAY, trace SAND, trace GRAVEL, roots, very soft, dark brown, damp	199.84
	CI - CLAY (Native), with SILT, firm, moderate plasticity, brown, trace grey colour, dry to damp	
2	- roots	
	- soft to firm, damp	
	- wet	
4		195.50
	CH - CLAY, soft to firm, high plasticity, slow dilatency, dry to damp	
	- possible 7.6cm long fractures, moist to wet	194.43
6	- soft, damp to moist	
	CH - CLAY (Till), trace GRAVEL, soft, fine grained, subangular, damp to moist	
		192.45
8	CH - CLAY (Varved), soft, high plasticity, damp to moist	
	- trace GRAVEL, fine grained, subangular	
	- trace SILT, oxidised, redish brown colour	
10	- CLAY, trace GRAVEL, not varved	
	- piece of GRAVEL, subrounded, vertical deposition	
	- piece of GRAVEL, subrounded, vertical deposition	
	- CLAY, varved, high plasticity, rapid dilatency	
12	- Piece of COBBLE, subangular, ~10cm diameter	
	- 2.5cm layer of trace SAND	
	- trace SILT, trace SAND, firm/compact, damp, subangular gravel	186.96
14	CH - CLAY (Till), with GRAVEL, firm, damp	
		184.83
	COBBLE/BOULDER, dry, limestone/dolomite	
16		
		182.54
	SM/SC - SAND (Alluvium), trace FINES, loose to compact, coarse grained, dark grey, wet, parent material is predominantly Shale	182.51
18		182.39
	GM/GC - GRAVEL (Alluvium), trace FINES, trace SAND, loose to compact, fine grained, dark grey, wet, parent material is predominantly Shale	181.93
20	SHALE (Bedrock)	
	END OF BOREHOLE @ 19.05m BGS	
22		
24		
26		



WELL DETAILS
Screened interval:
184.07 to 181.02m ASD
16.00 to 19.05m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
199.46 to 184.68m ASD
0.61 to 15.39m BGS
Material: Bentonite Gravel
Sand Pack:
184.68 to 181.02m ASD
15.39 to 19.05m BGS
Material: No.2 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01	P/S	100		0
02	P/S	100		0
03	P/S	100		0
04	P/S	90		0
05	P/S	90		0
06	P/S	90		0
07		100	19	0
09		100	7	0
10		100	7	0
11				
12		100	9	0
13		33	50	0
14		60	28	0
15				
16		20	>50	0
17		20	>50	0
18		25	>50	0
19		50	>50	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSL
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW9B-06
DATE COMPLETED: November 29, 2006
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.18 200.07					
	- Please Refer to Stratigraphy Log OW9A-06.		CONCRETE HOLEPLUG SAND PACK 209.6mm OS dia. Borehole WELL SCREEN				
6	END OF BOREHOLE @ 5.79m BGS		WELL DETAILS Screened interval: 197.33 to 194.28m ASD 2.74 to 5.79m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 199.46 to 197.63m ASD 0.61 to 2.44m BGS Material: Bentonite Gravel Sand Pack: 197.63 to 194.28m ASD 2.44 to 5.79m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Dec 5, 2006

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.22 200.15 199.72					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log MW1A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 18235-2007-BEDROCK.GPJ CRA_CORP.GDT 4/15/16

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5							
11.0							
11.5			BENTONITE PORTLAND				
12.0			51mm Ø SCH 40 PVC RISER				
12.5			102mm Ø STEEL CASING				
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							
16.5							
17.0	END OF OVERBURDEN HOLE @ 16.76m BGS						
17.5							
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
17.0	Weathered Bedrock - Dolomitic Shale, gravel sized fragments, light and dark grey in colour, fine texture, moderately to highly weathered - iron oxidization present	182.96 182.65				
17.5	DOLOSTONE-SHALE BEDROCK (SALINA FORMATION), dolostone shale, light grey/dark grey, thin horizontal laminations to wavy beds, fine grained and micro-crystalline, argillaceous, slightly weathered; occasional to frequent gypsum beds/nodules, occasional selenite crystals - fracture, slightly weathered, suspect open aperture - suspect horizontal fractures with very close aperture; suspect vertical fractures randomly interesecting bedding planes from 17.45 to 17.53 m.bgs - fracture, moderately weathered, iron oxizidization present - gypsum bed (21.5cm), white, micro-crystalline, minor inclusions of dark grey shale		96mm Ø COREHOLE			
18.0						
18.5						
19.0						
19.5						
20.0				4	99	99
20.5						
21.0						
21.5				5	100	100
22.0						
22.5						
23.0			BENTONITE GRAVEL	6	100	100
23.5						
24.0	- gypsum bed (37cm), white, micro-crystalline, <5% dolomitic-shale		NO.2 SILICA SAND			
24.5						
25.0			51mm Ø SCH 40 PVC SCREEN	7	94	94
25.5						
26.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1D-07
DATE COMPLETED: May 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
27.0				8	98	98
27.5						
28.0				9	78	78
28.5			BENTONITE GRAVEL			
29.0						
29.5				10	98	98
30.0	- gypsum bed (5.1cm) - gypsum bed (2.5cm)					
30.5						
	END OF BOREHOLE @ 30.68m BGS	169.04				
31.0			WELL DETAILS Screened interval: 175.95 to 173.51m AMSL 23.77 to 26.21m BGS Length: 2.44m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 173.51 to 169.04m AMSL 26.21 to 30.68m BGS Material: Bentonite Gravel Sand Pack: 176.25 to 173.51m AMSL 23.47 to 26.21m BGS Material: No.2 SILICA SAND ---------- Seal: 177.17 to 176.25m AMSL 22.56 to 23.47m BGS Material: Bentonite Gravel ---------- Seal: 199.11 to 177.17m AMSL 0.61 to 22.56m BGS Material: Cement-Bentonite Grout			
31.5						
32.0						
32.5						
33.0						
33.5						
34.0						
34.5						
35.0						
35.5						
36.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1S-07
DATE COMPLETED: May 17, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.21 200.14 199.65					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log MW1A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING BENTONITE				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1S-07
DATE COMPLETED: May 17, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5			PORTLAND				
11.0							
11.5							
12.0			51mm Ø SCH 40 PVC RISER				
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							
16.5	END OF OVERBURDEN HOLE @ 16.46m BGS						
17.0							
17.5							
18.0							
18.5							
19.0							
19.5							

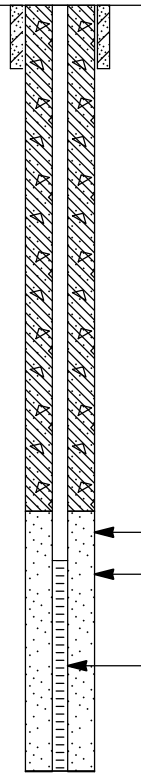
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1S-07
DATE COMPLETED: May 17, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
16.5	Please refer to Bedrock Stratigraphy Log MW1D-07.	183.19				
17.0				1	70	51
17.5						
18.0						
18.5				2	100	100
19.0						
19.5						
20.0						
20.5				3	100	100
21.0						
21.5	END OF BOREHOLE @ 21.54m BGS	178.11				
22.0						
22.5						
23.0						
23.5						
24.0						
24.5						
25.0						
25.5						



WELL DETAILS
Screened interval:
179.63 to 178.11m AMSL
20.02 to 21.54m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:
199.65 to 179.99m AMSL
0.00 to 19.66m BGS
Material: Cement-Bentonite Grout
Sand Pack:
181.21 to 178.11m AMSL
18.44 to 21.54m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	201.21 201.16 200.63					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log MW2A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5							
11.0							
11.5							
12.0							
12.5			BENTONITE PORTLAND				
13.0							
13.5			51mm Ø SCH 40 PVC RISER				
14.0							
14.5							
15.0	END OF OVERBURDEN HOLE @ 14.94m BGS						
15.5							
16.0							
16.5							
17.0							
17.5							
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
15.0	DOLOSTONE-SHALE BEDROCK (SALINA FORMATION), dolomite shale, light grey/dark grey, thin horizontal laminations to wavy beds, fine grained and microcrystalline, argillaceous, gypsiferous, slightly weathered in upper 3 metres, no gypsum apparent in upper 0.7 metres; occasional to frequent gypsum beds/nodules, occasional selenite crystals	185.70		1	64	50
15.5	- highly fractured					
16.0				2	23	0
16.5						
17.0	- fracture, moderately weathered, oxizidization present			3	100	44
17.5	- fracture, moderately weathered, 10 degree angle, apparent oxidization					
18.0	- 5.08cm of conglomerate, mudstone gravel size particles interbedded within dolomitic-shale			4	84	45
18.5	- fractured zone inferred (27cm), weathered sub-angular gravel					
19.0	- fracture inferred			5	100	89
19.5	- gypsum bed (7.5cm), minor shale inclusions		96mm Ø COREHOLE			
20.0	- gypsum/selenite bed (2.5cm), micro to fine crystalline structure; fracture inferred, slight weathering					
20.5	- fracture inferred - gypsum (~75%), intermixed with dolomitic-shale, 11.5cm zone			6	100	86
21.0	- fracture, moderately weathered					
21.5	- gypsum bed (6.4cm), minor shale inclusions			7	100	100
22.0						
22.5	- gypsum bed (19cm), minor shale inclusions					
23.0				8	100	100
23.5						
24.0	- gypsum (60-70%), 7.6cm zone					

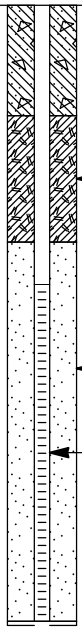
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2D-07
DATE COMPLETED: May 29, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
25.0				9	100	100
25.5						
26.0	- fracture - fracture					
26.5				10	100	100
27.0	- gypsum bed (23cm), minor shale inclusions					
27.5	- gypsum (~50%), 8.9cm zone					
28.0	- gypsum bed (91.5cm), minor shale inclusions			11	100	100
28.5						
29.0	END OF BOREHOLE @ 28.96m BGS	171.68				
29.5						
30.0						
30.5						
31.0						
31.5						
32.0						
32.5						
33.0						
33.5						
34.0						



WELL DETAILS
Screened interval:
173.20 to 171.68m AMSL
27.43 to 28.96m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
175.33 to 174.42m AMSL
25.30 to 26.21m BGS
Material: Bentonite Gravel
Sand Pack:
174.42 to 171.68m AMSL
26.21 to 28.96m BGS
Material: No.2 SILICA SAND

Seal:
200.63 to 174.95m AMSL
0.00 to 25.68m BGS
Material: Cement-Bentonite Grout

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	201.20 201.13 200.49					
0.5	Please refer to Overburden Stratigraphy Log MW2A-01.						
1.0							
1.5							
2.0							
2.5							
3.0							
3.5							
4.0							
4.5							
5.0							
5.5							
6.0			260mm Ø BOREHOLE				
6.5							
7.0							
7.5			PORTLAND BENTONITE				
8.0							
8.5							
9.0			102mm Ø STEEL CASING				
9.5			BENTONITE				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5			PORTLAND 51mm Ø SCH 40 PVC RISER				
11.0							
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0	END OF OVERBURDEN HOLE @ 14.94m BGS						
15.5							
16.0							
16.5							
17.0							
17.5							
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
15.0	Please refer to Bedrock Stratigraphy Log MW2D-07.	185.55				
15.5						
16.0						
16.5						
17.0						
17.5						
18.0						
18.5						
19.0						
19.5						
20.0			96mm Ø COREHOLE			
20.5						
21.0						
21.5			NO.2 SILICA SAND			
22.0						
22.5			51mm Ø SCH 40 PVC SCREEN			
23.0	END OF BOREHOLE @ 22.86m BGS	177.63				
23.5						
24.0						

WELL DETAILS
Screened interval:
179.15 to 177.63m AMSL
21.34 to 22.86m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2S-07
DATE COMPLETED: June 1, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %	
25.0			200.49 to 180.68m AMSL 0.00 to 19.81m BGS Material: Bentonite Gravel Sand Pack: 180.68 to 179.15m AMSL 19.81 to 21.34m BGS Material: No.2 SILICA SAND				
25.5							
26.0							
26.5							
27.0							
27.5							
28.0							
28.5							
29.0							
29.5							
30.0							
30.5							
31.0							
31.5							
32.0							
32.5							
33.0							
33.5							
34.0							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW2B-07
DATE COMPLETED: June 4, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	201.51 201.41 200.50					
1	- Please Refer to Stratigraphy Log MW2A-01.		CONCRETE 51mm Ø SCH 40 PVC RISER PIPE BENTONITE GRAVEL 108mm Ø Borehole #2 Silica Sand 51mm Ø SCH 40 PVC WELL SCREEN				
2							
3							
4	END OF BOREHOLE @ 3.96m BGS						
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

WELL DETAILS
Screened interval:
199.58 to 196.53m ASD
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
200.19 to 199.73m ASD
0.30 to 0.76m BGS
Material: Bentonite Gravel
Sand Pack:
199.73 to 196.53m ASD
0.76 to 3.96m BGS
Material: No.2 SILICA SAND

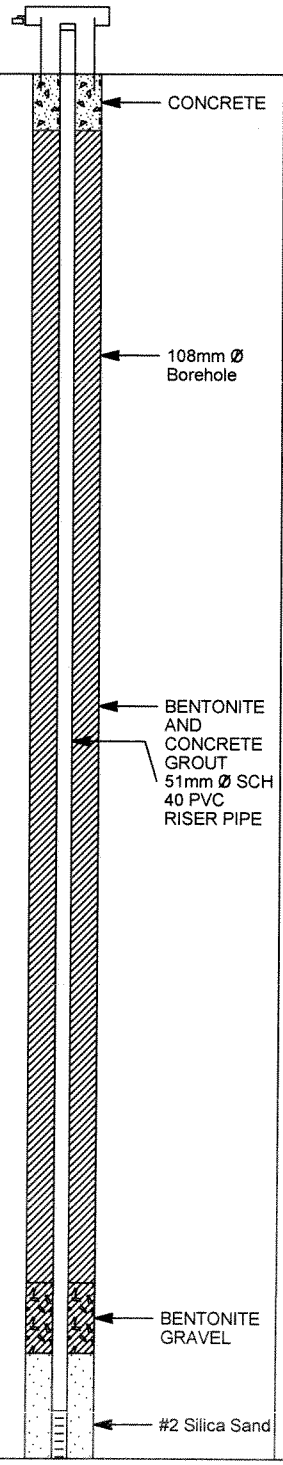
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW3A-07
DATE COMPLETED: May 1, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.13 200.09 199.18
0	FILL - CLAY, with SILT (Disturbed), firm, high plasticity, grey/orange smearing, damp to moist - trace gravel, soft	198.87
1	OL/PT - GRAVELLY SILT LOAM, trace SAND (NATIVE), soft, dark brown, moist, fine grained subangular gravel - 7.5cm gravelly layer	197.96
2	CI - CLAY, with SILT, trace SAND, soft, moderate plasticity, grey, moist - 5cm layer, trace sand and gravel, very soft, dark grey, wet	
3	- firm, moserate plasticity, moderate dilatency - no mottling - possible 5cm long fracture, moist	195.52
4	CH - CLAY, trace SILT (Varved), firm, high plasticity, slow dilatency, reddish brown/grey, damp; silty varves consisting of alternating coloured bands of grey and reddish brown	
5	- soft to firm - 1.25cm piece of gravel, subangular, grey	
6		193.05
7	CH - CLAY, trace SAND and GRAVEL (Till), firm, high plasticity, very slow dilatency, grey, damp; coarse grained sand, fine grained subangular gravels with a predominantly vertical deposition	
8		
9	- piece of subangular gravel/cobble >5cm, broken by split spoon	
10		
11		
12	- trace silt, soft, moist	186.99
13	CH - CLAY, trace SILT (Varved), soft, high plasticity, slow dilatency, reddish brown/grey, damp to moist; silty varves consisting of alternating coloured bands of grey and reddish brown	
14	- 0.25cm piece of subangular gravel	



SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
01		41.5	5	0
02		89.5	6	0
03		58.5	8	0
04		0		0
05		58.5	14	0
06		66.5	16	0
07		62.5	15	0
08		62.5	15	0
09		79	3	0
10		100	8	0
11		8.5	15	0
12		98	20	0
13		33.5	8	0
14		108.5	8	0
15		116.5	6	0
16		108.5	8	0
17		116.5	9	0
18		112.5	7	0
19		100	6	0
20		110.5	14	0
21		114.5	6	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.38 199.32 198.98					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log OW8A-07.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5							
11.0							
11.5							
12.0							
12.5							
13.0							
13.5							
14.0			BENTONITE PORTLAND				
14.5			51mm Ø SCH 40 PVC RISER				
15.0							
15.5							
16.0							
16.5							
17.0							
17.5	END OF OVERBURDEN HOLE @ 17.68m BGS						
18.0							
18.5							
19.0							
19.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
17.5						
18.0	DOLOSTONE-SHALE BEDROCK (SALINA FORMATION), dolostone shale, light grey/dark grey, thin horizontal laminations to wavy beds, fine grained and micro-crystalline, argillaceous, gypsiferous, slightly weathered in upper 3 metres, no gypsum apparent in the first 0.7 metres; occasional to frequent gypsum beds/nodules, occasional selenite crystals; highly fractured to 18.5 m.bgs - mudstone conglomerate bed (40.6cm), gravel size particles interbedded within dolomitic-shale	181.30		1	8	0
18.5						
19.0				2	91	65
19.5						
20.0	- gypsum bed (15.2cm), medium to coarse crystalline, irregular upper and lower contacts		96mm Ø COREHOLE			
20.5	- gypsum bed (14cm) - gypsum (70-80%), fine to medium crystalline structure, shale inclusions, 21.6cm zone			3	83	83
21.0						
21.5	- gypsum (70%), micro to medium crystalline structure, 45.7cm zone					
22.0	- suspect fractured zone (12.8cm), 5 fractures inferred along mudstone beds			4	100	93
22.5						
23.0						
23.5				5	100	95
24.0						
24.5	- fracture					
25.0	- vuggy, partially filled with gypsum, 8.9cm zone			6	100	100
25.5	- vuggy, partially filled with selenite crystals, horizontal, 14cm zone					
26.0	- vuggy					
26.5				7	100	100

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8D-07
DATE COMPLETED: June 14, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader/B.Iotzov

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
27.5	- gypsum bed (25.5cm), medium to coarse crystalline structure - gypsum bed (8.9cm), medium crystalline structure					
28.0				8	100	100
28.5						
29.0	- gypsum bed (78.7cm), wavy upper contact, occasional mudstone seam, medium crystalline structure		NO.2 SILICA SAND			
29.5						
30.0	- gypsum (90%) interbedded with dolostone, 10.2cm zone		51mm Ø SCH 40 PVC SCREEN	9	100	100
30.5	END OF BOREHOLE @ 30.48m BGS	168.50				
31.0						
31.5						
32.0						
32.5						
33.0						
33.5						
34.0						
34.5						
35.0						
35.5						
36.0						
36.5						

WELL DETAILS
Screened interval:
170.02 to 168.50m AMSL
28.96 to 30.48m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:
198.98 to 170.94m AMSL
0.00 to 28.04m BGS
Material: Bentonite Grout Seal
Sand Pack:
170.94 to 168.50m AMSL
28.04 to 30.48m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8S-07
DATE COMPLETED: June 19, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	199.83 199.67 198.98					
0.5 – 9.5	Please refer to Overburden Stratigraphy Log OW8A-06.		260mm Ø BOREHOLE PORTLAND BENTONITE 102mm Ø STEEL CASING				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 18235-2007-BEDROCK.GPJ CRA_CORP.GDT 4/15/16

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8S-07
DATE COMPLETED: June 19, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
10.5			BENTONITE PORTLAND				
11.0							
11.5							
12.0			51mm Ø SCH 40 PVC RISER				
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							
16.5							
17.0							
17.5	END OF OVERBURDEN HOLE @ 17.68m BGS						
18.0							
18.5							
19.0							
19.5							

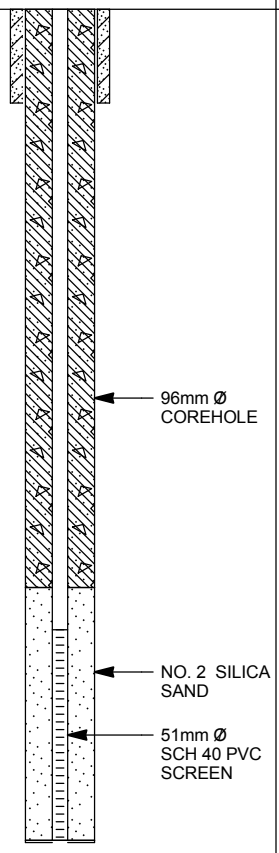
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW8S-07
DATE COMPLETED: June 19, 2007
DRILLING METHOD: 6 1/4" HSA/HQ CORING
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
17.5						
	Please refer to Bedrock Stratigraphy Log OW8D-07.	181.30				
18.0						
18.5						
19.0						
19.5						
20.0						
20.5						
21.0						
21.5						
22.0						
22.5						
23.0	END OF BOREHOLE @ 23.01m BGS	175.97				
23.5						
24.0						
24.5						
25.0						
25.5						
26.0						
26.5						



WELL DETAILS
Screened interval:
177.49 to 175.97m AMSL
21.49 to 23.01m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 20
Material: Sch 40 PVC
Seal:
198.98 to 177.80m AMSL
0.00 to 21.18m BGS
Material: Bentonite Grout Seal
Sand Pack:
177.80 to 175.97m AMSL
21.18 to 23.01m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1A-07
DATE COMPLETED: May 7, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	P.I.D.
	TOP OF CASING 200.80 TOP OF RISER 200.67 GROUND SURFACE 199.67		Concrete					
0	FILL - CLAY, trace SILT (Disturbed), soft to firm, high plasticity, brown, damp		CONCRETE	01		29.2	4	0
1	OL/PT - SILT LOAM, trace CLAY, trace SAND, trace GRAVEL (NATIVE), soft, moderate plasticity, black, moist	198.76 198.15		02		39.6	2	0
2	CL - SILTY CLAY, firm to stiff, low plasticity, brown with grey streaking/mottling, damp; suspect mechanical fracture due to drilling - silt, with clay, stiff - no apparent streaking/mottling			03		45.8	8	0
3	- stiff to very stiff, damp		108mm Ø Borehole	04		85.4	8	0
4				05		106.3	25	0
5	CH - CLAY, trace SILT (Varved), firm, high plasticity, slow dilatency, reddish brown/grey, damp; silty varves consisting of alternating coloured bands of grey and reddish brown - 0.25cm piece of fine grained, subangular gravel, vertical deposition	195.10		06		47.9	26	0
6	- 33cm layer/zone of clay with silt, moderate plasticity, repid dilatency			07		108.3	16	0
7	CH - CLAY, trace SILT, trace GRAVEL (Till), stiff to very stiff, moderate plasticity, grey, damp; fine grained gravel - 10cm layer of fine grained gravel, moist	192.75	BENTONITE AND CONCRETE GROUT 51mm Ø SCH 40 PVC RISER PIPE	08		110.4	8	0
8	- greyish brown in colour			09		120.8	11	0
9				10		70.8	17	0
10	- soft			11		97.9	14	0
11	- 5cm layer of clay and gravel, trace silt			12		110.4	12	0
12	CH - CLAY, trace SILT (Varved), soft, high plasticity, moderate dilatency, reddish brown/grey, wet; silty varves consisting of alternating coloured bands of grey and reddish brown - piece of gravel/cobble >5cm, broken by split spoon	188.24		13		25	9	0
13	- 2.5cm piece of subangular gravel			14		87.5	6	0
14			BENTONITE GRAVEL	15		112.5	10	0
				16		125	8	0
				17		100	8	0
				18		104.2	9	0
				19		108.3	5	0
				20		106.3	8	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1A-07
DATE COMPLETED: May 7, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE P.I.D.
16	- stiff, brown, damp	183.97	#2 Silica Sand	21		108.3	6	0
	CH - SILT, trace CLAY, trace SAND, trace GRAVEL, firm, low plasticity, rapid dilatency, grey, moist		51mm Ø SCH 40 PVC WELL SCREEN					
	- firm, grey, moist	183.15		22		83.3	23	0
17	- silt and gravel, with sand, trace clay, stiff/compact, brown, moist; occasional 5cm piece of gravel	182.91		23		56.3	>50	0
	- firm, grey							
	- stiff, brown	181.96						
18	GM/GC - SAND and GRAVEL, trace FINES, compact, brown, wet; shale fragments throughout							
	Bedrock Inferred							
19	END OF BOREHOLE @ 17.68m BGS							
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								

WELL DETAILS
Screened interval:
185.04 to 181.99m ASD
14.63 to 17.68m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
199.06 to 186.41m ASD
0.61 to 13.26m BGS
Material: Bentonite and Concrete
Sand Pack:
185.65 to 181.99m ASD
14.02 to 17.68m BGS
Material: No.2 SILICA SAND

Seal:
186.41 to 185.65m ASD
13.26 to 14.02m BGS
Material: Bentonite Gravel

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW1B-07
DATE COMPLETED: May 7, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.76 200.68 199.60					
1	- Please Refer to Stratigraphy Log MW1A-07.		CONCRETE 51mm Ø SCH 40 PVC RISER PIPE BENTONITE GRAVEL 108mm Ø Borehole #2 Silica Sand 51mm Ø SCH 40 PVC WELL SCREEN				
2							
3							
4							
5	END OF BOREHOLE @ 4.27m BGS						
6							
7							
8							
9							
10							
11							
12							
13							
14							

WELL DETAILS
Screened interval:
198.38 to 195.33m ASD
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
199.30 to 198.69m ASD
0.30 to 0.91m BGS
Material: Bentonite Gravel
Sand Pack:
198.69 to 195.33m ASD
0.91 to 4.27m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW6A-07
DATE COMPLETED: November 20, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	
			Concrete					
0.5	SILT with GRAVEL (FILL), firm, brown, dry; rootlets		CONCRETE	01		75	19	0
1.0	CL-ML - CLAYEY SILT, trace SAND, stiff, slight plasticity, brown, very damp to dry	0.76		02		38	38	0
1.5	- clay with silt, trace sand, stiff, brown and grey			03		56	26	0
2.0								
2.5				04		35	28	0
3.0	MH - CLAYEY SILT (VARVED), stiff, moderate to high plasticity, slow dilatency, brown and grey, damp	2.74	108mm Ø Borehole					
3.5			51mm Ø SCH 40 PVC RISER PIPE	05		67	20	0
4.0				06		38	21	0
4.5	- trace gravel, firm, sub-rounded gravel, high plasticity, brown							
5.0				07		63	25	0
5.5				08		56	18	0
6.0								
6.5				09		60	17	0
7.0	CH - SILTY CLAY (TILL), trace GRAVEL, firm-stiff, sub-rounded gravel, high plasticity, slow dilatency, brownish grey, damp	7.09	BENTONITE AND CONCRETE GROUT	10		58	19	0
7.5	- soft-firm, damp-moist							
8.0				11		52	26	0
8.5				12		67	20	0
9.0								
9.5				13		73	17	0
10.0				14		65	17	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 22, 2009

OVERBURDEN LOG 18235-2007-NOVEMBER-OVERBURDEN.GPJ CRA_CORP.GDT 2/25/10

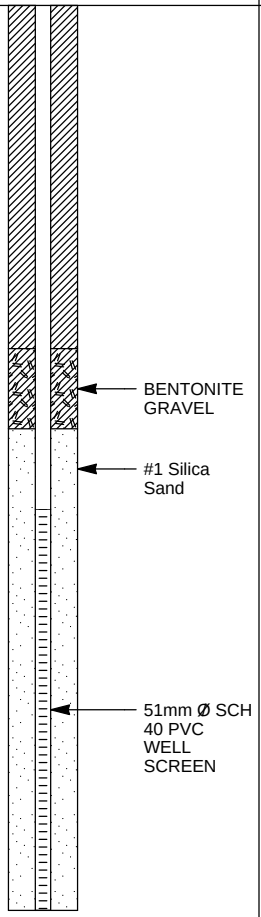
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW6A-07
DATE COMPLETED: November 20, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
		11.99
	CH-MH -CLAY and SILT, trace SAND, trace GRAVEL, soft-firm, moderate dilatency, grey, damp to moist	
		15.57
	GM - CLAYEY GRAVEL, with SAND, compact, poorly graded, subangular, fine to medium grained sand, coarse grained gravel, moist to wet	
	- sand and gravel, trace fines, dense, subangular, wet; some shale and gypsum present	16.26
	BEDROCK - Shale with Gypsum, dark grey	
		17.37
	END OF BOREHOLE @ 17.37m BGS	

Monitoring Well



WELL DETAILS
Screened interval:
14.33 to 17.37m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
12.50 to 13.11m BGS
Material: Bentonite Gravel
Sand Pack:
13.72 to 17.37m BGS
Material: No.1 SILICA SAND

Seal:
0.61 to 13.11m BGS
Material: Bentonite Grout

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	
15			NA	0
16		92	22	0
17		100	19	0
18		100	16	0
19		100	13	0
20		96	11	0
21		100	16	0
22		54	>50	0

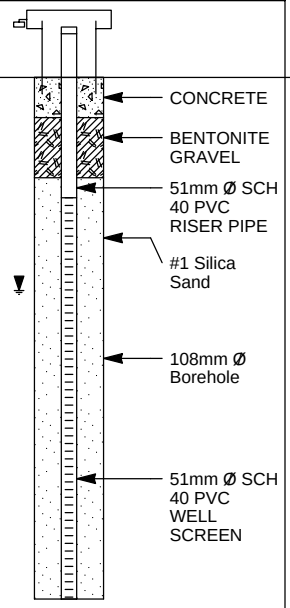
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW6B-07
DATE COMPLETED: November 20, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	Please Refer to Stratigraphy Log MW6A-07.		CONCRETE BENTONITE GRAVEL 51mm Ø SCH 40 PVC RISER PIPE #1 Silica Sand 108mm Ø Borehole 51mm Ø SCH 40 PVC WELL SCREEN				
4.0	END OF BOREHOLE @ 3.96m BGS	3.96					



WELL DETAILS
Screened interval:
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
0.30 to 0.76m BGS
Material: Bentonite Gravel
Sand Pack:
0.76 to 3.96m BGS
Material: No.1 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW3A-07
DATE COMPLETED: May 1, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE P.I.D.
16	- 6.4cm layer of silty clay, moderate plasticity, moderate dilatency - 0.25cm piece of subangular gravel - 0.5cm piece of subangular gravel, vertical deposition	183.12	51mm Ø SCH 40 PVC WELL SCREEN	22		110.5	12	0
17	- 0.25cm piece of subangular gravel GM/GC - SANDY GRAVEL, with FINES, compact, well graded, brown, wet; fine to coarse sand, fine subangular gravel, shale fragments throughout	182.78		23		37.5	>50	0
18	Bedrock Inferred END OF BOREHOLE @ 16.46m BGS	182.72						
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								

WELL DETAILS
Screened interval:
184.70 to 181.65m ASD
14.48 to 17.53m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
198.57 to 186.07m ASD
0.61 to 13.11m BGS
Material: Bentonite and Concrete
Sand Pack:
185.31 to 181.65m ASD
13.87 to 17.53m BGS
Material: No.2 SILICA SAND

Seal:
186.07 to 185.31m ASD
13.11 to 13.87m BGS
Material: Bentonite Gravel

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: OW3B-07
DATE COMPLETED: May 2, 2007
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m ASD	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	200.11 199.99 199.12					
1 2 3 4 5 6 7 8 9 10 11 12 13 14	- Please Refer to Stratigraphy Log OW3A-07. END OF BOREHOLE @ 3.96m BGS		CONCRETE 51mm Ø SCH 40 PVC RISER PIPE BENTONITE GRAVEL 108mm Ø Borehole #2 Silica Sand 51mm Ø SCH 40 PVC WELL SCREEN WELL DETAILS Screened interval: 198.21 to 195.16m ASD 0.91 to 3.96m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: Sch 40 PVC Seal: 198.51 to 198.21m ASD 0.61 to 0.91m BGS Material: Bentonite Gravel Sand Pack: 198.21 to 195.16m ASD 0.91 to 3.96m BGS Material: No.2 SILICA SAND				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW4A-09
DATE COMPLETED: June 23, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
0	FILL - SILTY SAND and GRAVEL, brown, dry; rootlets	
0.5	- silt and clay, firm, moderate to high plasticity, brown with black streaks, damp	0.30
1.0	OL - SILT, trace CLAY (MUCK), soft, low to moderate plasticity, black, damp	0.36
1.5	CL-ML - CLAY and SILT, soft, moderate plasticity, black, damp; occasional rootlets to 2.1 m BGS	
2.0		
2.5		
3.0		
3.5		
4.0		
4.5	MH - CLAYEY SILT, firm to stiff, massive, high plasticity, slow dilatency, brown, damp	4.57
5.0	- 1mm wide closed vertical fracture, infilled with grey clay	
5.5		
6.0		
6.5	CH - SILTY CLAY, trace SAND, trace GRAVEL (TILL), firm, fine to coarse grained sand, subangular fine grained gravel, brown, damp; occasional coarse grained gravel	6.53
7.0		
7.5		
8.0	- 1mm wide closed vertical fracture, infilled with grey clay	
8.5	- cobble	
9.0		
9.5	- 1mm wide closed vertical fracture, infilled with grey clay	
10.0		

Monitoring Well: PROTECTIVE CASING; CONCRETE; 108mm Ø Borehole; 51mm Ø SCH 40 PVC RISER PIPE; BENTONITE GROUT

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
01		58	9
02		90	14
03		100	22
04		100	9
05		100	8
06		92	11
07		100	9

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

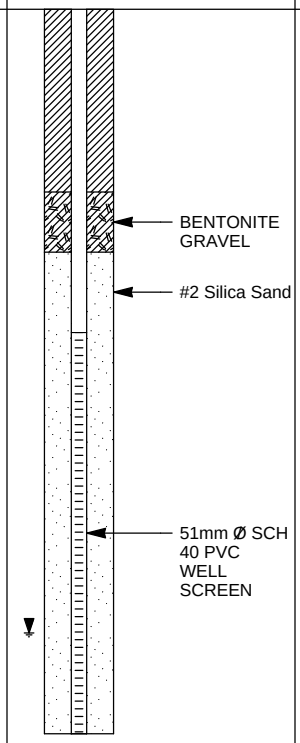
STATIC WATER LEVEL ▼ July 22, 2009

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW4A-09
DATE COMPLETED: June 23, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
		10.72
11.0	CH-MH - CLAY and SILT (VARVED), soft, horizontally stratified, high plasticity, slow dilatency, grey, damp to moist	
11.5		
12.0		
12.5		
13.0		
13.5		
		13.77
14.0	- silt, trace clay, trace sand, trace gravel, firm, massive, fine grained sand, fine to coarse grained gravel, brown, moist - wet; with fine grained sand at 13.9 m BGS	
14.5	GM - GRAVEL with SAND, trace FINES, compact, wet; occasional gypsum fragment	
15.0		
		15.49
15.5	- sand, trace SILT, trace gravel, compact, fine to medium grained, brown, wet	
	Bedrock, dolostone-shale, brown, weathered; gypsiferous	
16.0		16.00
	END OF BOREHOLE @ 16.00m BGS	
16.5		
17.0		
17.5		
18.0		
18.5		
19.0		
19.5		
20.0		
20.5		



WELL DETAILS
Screened interval:
12.95 to 16.00m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
11.89 to 12.34m BGS
Material: Bentonite Gravel
Sand Pack:
12.34 to 16.00m BGS
Material: No.2 SILICA SAND

Seal:
0.91 to 11.89m BGS
Material: Bentonite Grout

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
08		100	3
09		100	4
10		58	54
11		58	>46

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

OVERBURDEN LOG 18235-2009.GPJ CRA_CORP.GDT 3/3/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW5A-09
DATE COMPLETED: June 22, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	OL - SILT, trace CLAY, soft, dark brown, damp; rootlets, detritus	0.09
0.5	MH - SILT with CLAY, trace SAND, soft to firm, massive, high plasticity, fine grained sand, tan to light brown, damp	0.81
1.0	CL-ML - CLAY and SILT, trace SAND, firm, horizontally stratified, moderate to high plasticity, fine grained sand, dark brown, dry - damp	
1.5	- silt with clay, trace sand, firm, brown; occasional rootlets	
2.0		
2.5		
3.0		
3.5		
4.0		
4.5	MH - CLAYEY SILT (VARVED), soft - firm, high plasticity, slow dilatency, damp	4.57
5.0		
5.5		
6.0		6.15
6.5	CH - SILTY CLAY, trace SAND, trace GRAVEL (TILL), firm, fine to coarse grained sand, subangular fine grained gravel, brown, damp	
7.0		
7.5		
8.0		
8.5		
9.0		
9.5		
10.0		

Monitoring Well: PROTECTIVE CASING; CONCRETE; 108mm Ø Borehole; 51mm Ø SCH 40 PVC RISER PIPE; BENTONITE GROUT

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
01			5
02		77	22
03		100	23
04		100	16
05		100	16
06		100	21
07		100	9
08		100	9
09		100	12
10		100	12
11		100	16

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 22, 2009

OVERBURDEN LOG 18235-2009.GPJ CRA_CORP.GDT 3/3/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW5A-09
DATE COMPLETED: June 22, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
11.0	- becoming grey in colour, damp - moist			12		100	8
11.5							
12.0							
12.5				13		33	13
13.0							
13.5							
	MH-CH - CLAY and SILT (VARVED), soft - firm, high plasticity, moderate dilatency, alternating reddish brown and grey layers, damp - moist	13.72	BENTONITE GRAVEL				
14.0				14		100	6
14.5							
15.0	- wet		#2 Silica Sand				
15.5	- silt with sand and gravel, trace clay, firm/compact, fine to coarse grained, subangular, grey, wet; occasional gypsum fragment	15.54		15		100	7
16.0	GM - SAND and GRAVEL, trace FINES, compact, grey, wet		51mm Ø SCH 40 PVC WELL SCREEN				
16.5							
17.0	- gravel with sand, trace fines, compact, brown, wet - silt with sand and gravel, trace clay, firm/compact, well graded, fine to coarse grained, grey, wet			16		75	32
17.5							
	- refusal on assumed bedrock	17.78		17		56	>100
18.0	END OF BOREHOLE @ 17.78m BGS						
18.5							
19.0							
19.5							
20.0							
20.5							

WELL DETAILS
Screened interval:
14.73 to 17.78m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
0.61 to 13.26m BGS
Material: Bentonite and Concrete
Sand Pack:
14.02 to 17.68m BGS
Material: No.2 SILICA SAND

Seal:
13.26 to 14.02m BGS
Material: Bentonite Grout

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 22, 2009

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EDWARDS LANDFILL
PROJECT NUMBER: 18235
CLIENT: HNSLI
LOCATION: 160 Brooks Rd., Haldimand County, Ontario

HOLE DESIGNATION: MW5B-09
DATE COMPLETED: June 22, 2009
DRILLING METHOD: 108mm ID HSA
FIELD PERSONNEL: J.Leader

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0.5	Please Refer to Stratigraphy Log MW5A-09.		CONCRETE; BENTONITE GRAVEL; 108mm Ø Borehole; 51mm Ø SCH 40 PVC RISER PIPE; #2 Silica Sand; 51mm Ø SCH 40 PVC WELL SCREEN				
6.0	END OF BOREHOLE @ 6.02m BGS	6.02					

WELL DETAILS
Screened interval:
1.22 to 6.02m BGS
Length: 4.8m
Diameter: 51mm
Slot Size: 10
Material: Sch 40 PVC
Seal:
0.30 to 0.91m BGS
Material: Bentonite Gravel
Sand Pack:
0.91 to 6.02m BGS
Material: No.2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1A-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	200.42 199.64					
0.5	GP-GRAVEL (FILL), with clay, loose, medium to well graded	199.18	CONCRETE	1		20	5
	CL-CLAY (FILL), with silt, soft, low plasticity, brown, moist	199.03					
1.0	CL-SILTY CLAY, trace gravel, trace sand, firm, low plasticity, brown, dry, grey bands		2" PVC RISER				
1.5			BENTONITE				
2.0				2		100	21
2.5							
3.0	- moist at 3.05m BGS						
3.5				3		75	18
4.0							
4.5	CI-SILTY CLAY, firm, medium to high plasticity, brown, with grey, moist	195.07					
5.0				4		80	12
5.5							
6.0							
6.5				5		80	14

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1A-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
7.5	- trace gravel 3cm Ø at 7.62m BGS			6		100	19
8.0							
8.5							
9.0				7		75	17
9.5							
10.0							
10.5							
11.0	CI-GRAVELLY CLAY, with silt, soft, medium plasticity, brown, wet	188.67		8		70	33
11.5							
12.0	CH-CLAY, trace silt, soft, high plasticity, grey, moist	187.45					
12.5				9		80	11
13.0							
13.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1A-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	ML-SILT, with sand, with clay, some gravel, soft, low plasticity, grey, moist	185.62	BENTONITE CHIPS	10		60	39
14.5							
15.0							
15.5			2" PVC SCREEN	11		50	25
16.0							
16.5			SAND PACK				
17.0	- bedrock inferred at 17.07m BGS			12		50	16
17.5							
18.0	END OF BOREHOLE @ 18.14m BGS	181.50					
18.5							
19.0							
19.5							
20.0							
20.5							

WELL DETAILS
Screened interval:
184.55 to 183.03m
15.09 to 16.61m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
185.77 to 185.16m
13.87 to 14.48m BGS
Material: BENTONITE CHIPS
Sand Pack:
185.16 to 181.50m
14.48 to 18.14m BGS
Material: SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW1B-13
DATE COMPLETED: June 27, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	200.50 199.70					
0.5	GP-GRAVEL (FILL), with clay, loose, medium to well graded	199.24	CONCRETE 2" PVC WELL CASING				
	CL-CLAY (FILL), with silt, soft, low plasticity, brown, moist	199.09					
1.0	CL-SILTY CLAY, trace gravel, trace sand, firm, low plasticity, brown, dry, grey bands		BENTONITE				
1.5			2" PVC WELL SCREEN				
2.0			SAND PACK				
2.5							
3.0	- moist at 3.05m BGS						
3.5							
4.0	END OF BOREHOLE @ 3.96m BGS	195.74					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
198.79 to 195.74m
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
199.55 to 198.94m
0.15 to 0.76m BGS
Material: BENTONITE
Sand Pack:
198.94 to 195.74m
0.76 to 3.96m BGS
Material: SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.22 200.51					
0.0	CL-CLAY (FILL), with silt, firm, medium to high plasticity, brown to grey, moist	200.36	CONCRETE	1		40	11
	TOPSOIL	200.21					
0.5	GP/CL-GRAVEL AND CLAY, intermixed, dense, well graded, grey, dry	199.90					
	CL-CLAY, with silt, very firm, high plasticity, brown to grey, moist to wet		2" PVC WELL CASING				
1.0							
1.5			BENTONITE GROUT				
2.0				2		100	7
2.5							
3.0							
3.5				3		90	20
4.0							
4.5		195.94					
	CL-CLAY, trace silt, trace gravel, very firm, high plasticity, grey with brown and reddish brown streaks, moist			4		60	14
5.0	- silt with sand seam from 4.88 to 5.18m BGS						
5.5							
6.0		194.41					
	CL-CLAY, with silt, trace gravel, very firm, high plasticity, brown to grey, with reddish streaks, moist			5		95	11
6.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
7.5							
8.0				6		50	17
8.5							
9.0							
9.5				7		0	19
		190.76					
10.0	CL-CLAY, trace silt, trace gravel, firm, very high plasticity, grey, moist						
10.5							
11.0				8		55	11
11.5							
12.0							
12.5				9		90	10
13.0							
13.5	- clay, with sand and gravel from 13.72 to 14.33m BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
14.5				10		30	13
15.0			BENTONITE				
15.5				11		100	7
16.0							
16.5			2" PVC WELL SCREEN				
17.0				12		30	5
17.5			SAND PACK				
18.0	- bedrock inferred at 17.98m BGS						
18.5							
19.0							
	END OF BOREHOLE @ 19.20m BGS	181.31					
19.5							
20.0							
20.5							

WELL DETAILS
Screened interval:
184.36 to 181.31m
16.15 to 19.20m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
185.57 to 184.97m
14.94 to 15.54m BGS
Material: BENTONITE
Sand Pack:
184.97 to 181.31m
15.54 to 19.20m BGS

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3A-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
21.5			Material: SAND					
22.0								
22.5								
23.0								
23.5								
24.0								
24.5								
25.0								
25.5								
26.0								
26.5								
27.0								
27.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: CAYUGA, HALDIMAND COUNTY, ON

HOLE DESIGNATION: OW3B-13
DATE COMPLETED: June 7, 2013
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: D. TURNER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.22 200.50					
0.0	CL-CLAY (FILL), with silt, firm, medium to high plasticity, brown to grey, moist	200.35	CONCRETE 2" PVC WELL CASING				
	TOPSOIL	200.20					
0.5	GP/CL-GRAVEL AND CLAY, intermixed, dense, well graded, grey, dry	199.89					
	CL-CLAY, with silt, very firm, high plasticity, brown to grey, moist to wet		BENTONITE				
1.0							
1.5			2" PVC WELL SCREEN				
2.0							
2.5			SAND PACK				
3.0							
3.5							
4.0	END OF BOREHOLE @ 3.96m BGS	196.54					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
199.59 to 196.54m
0.91 to 3.96m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
200.35 to 199.74m
0.15 to 0.76m BGS
Material: BENTONITE
Sand Pack:
199.74 to 196.54m
0.76 to 3.96m BGS
Material: SAND

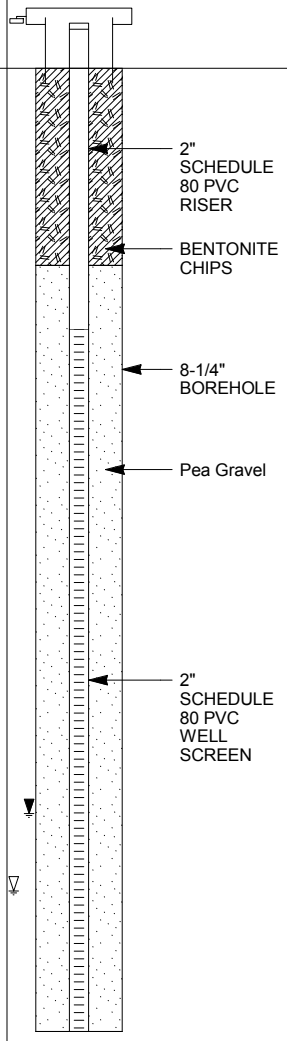
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: LW1-17
DATE COMPLETED: 10 October 2017
DRILLING METHOD: 4-1/4" ID HSA
FIELD PERSONNEL: A. Mailloux

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	LEACHATE WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	209.35 208.45					
	LANDFILL COVER - CLAY, soft to firm, brown changing to black and dark grey; no refuse observed						
	LANDFILLED MATERIAL - CLAY, dark grey to black	206.93					
4	- black clay, firm, wood debris, plastic, small pieces of brick, sulphur odour at 4.27m BGS						
6	- brick, plastics at 6.71m BGS						
8	- hydrogen sulphide reading of 17.0 ppm inside augers at 7.62m BGS						
10	- pieces of plastic, cloth, and metal at 10.67m BGS						
12	- wood, black at 13.11m BGS						
14	- wet at 14.02m BGS						
	END OF BOREHOLE @ 14.63m BGS	193.82					



WELL DETAILS
Screened interval:
204.49 to 193.82m
3.96 to 14.63m BGS
Length: 10.67m
Diameter: 51mm
Slot Size: 0.010
Material: SCH 80 PVC
Seal:
208.45 to 205.45m
0.00 to 3.00m BGS
Material: BENTONITE CHIPS
Sand Pack:
205.45 to 193.82m
3.00 to 14.63m BGS
Material: Pea Gravel

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 10/10/2017 STATIC WATER LEVEL ▼ 12/19/2017

OVERBURDEN LOG 018235-WA-20180423.GPJ CRA_CORP.GDT 24/4/18

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW10A-18
DATE COMPLETED: 27 June 2018
DRILLING METHOD: 4-1/4 ID HSA
FIELD PERSONNEL: A. Mollenhuis

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	202.04 201.13						
0	FILL - SILT AND CLAY, low to medium plasticity, little dilatancy, brown, dry			1				0.0
1			25.4 mm Ø SCHEDULE 40 PVC RISER					
2	- mottled, dark brown to grey, moist at 1.52m BGS			2		22	13	0.0
3				3				0.0
4				4		79	10	0.0
		197.48						
4	CL/ML - SILTY CLAY, dense, moderate plasticity, little dilatancy, blocky/massive, grey, moist			5				0.0
5			209.6 mm Ø BOREHOLE	6		33	14	0.0
		195.65						
6	CH - CLAY, with silt, high plasticity, soft to firm, laminated, grey, moist			7				0.0
7				8		58	9	0.0
				9				0.0
7	- soft at 7.62m BGS		BENTONITE GROUT	10		58	5	0.0
8				11				0.0
9		191.99						
9	CL - CLAY, with to silty (TILL), trace gravel, stiff, moderate plasticity, fine grained gravel, grey, moist			12		58	11	0.0
10				13				0.0
10	- stiff to hard at 10.67m BGS		209.6 mm Ø BOREHOLE	14		63	18	0.0
11				15				0.0
12				16		83	22	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 6/27/2018

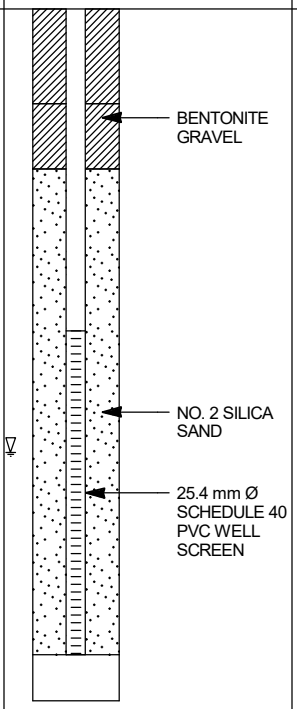
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW10A-18
DATE COMPLETED: 27 June 2018
DRILLING METHOD: 4-1/4 ID HSA
FIELD PERSONNEL: A. Mollenhuis

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
17	ML/SM - SILT/SAND, with gravel (TILL), dense, fine grained sand, fine to medium grained gravel, mottled, brown/grey, dry to moist - wet at 17.37m BGS - cobble at 18.29m BGS	184.06
19	Bedrock END OF BOREHOLE @ 19.08m BGS	182.08 181.63

MONITORING WELL



WELL DETAILS
Screened interval:
185.11 to 182.06m
16.03 to 19.08m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
187.24 to 186.63m
13.89 to 14.50m BGS
Material: BENTONITE GRAVEL
Sand Pack:
186.63 to 182.06m
14.50 to 19.08m BGS
Material: NO. 2 SILICA SAND

Seal:
200.52 to 187.24m
0.61 to 13.89m BGS
Material: BENTONITE GROUT

SAMPLE

NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
17				0.0
18		100	7	0.0
19				0.0
20		100	11	0.0
21				0.0
22		92	55	0.0
23				0.0
24		50	>50	0.0
25				0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 6/27/2018

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON

HOLE DESIGNATION: MW10B-18
DATE COMPLETED: 27 June 2018
DRILLING METHOD: 4-1/4 ID HSA
FIELD PERSONNEL: A. Mollenhuis

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	201.99 201.09					
0	For stratigraphic description please refer to MW10A-18 log.		209.6 mm Ø BOREHOLE 25.4 mm Ø SCHEDULE 40 PVC RISER BENTONITE GRAVEL NO. 2 SILICA SAND 25.4 mm Ø SCHEDULE 40 PVC WELL SCREEN				
8	END OF BOREHOLE @ 8.08m BGS	193.01					

WELL DETAILS
Screened interval:
196.06 to 193.01m
5.03 to 8.08m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
200.48 to 196.06m
0.61 to 5.03m BGS
Material: BENTONITE GRAVEL
Sand Pack:
196.06 to 193.01m
5.03 to 8.08m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW11A-19
DATE COMPLETED: 29 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	FILL - clayey silt, stiff, medium plasticity, grey, moist		CONCRETE				
1				1		0	14
2	- clay, trace sand and gravel, very loose, high plasticity, blackish grey, moist at 1.52m BGS			2		10	4
3				3		15	5
4	- clay, silty, medium plasticity, loose at 3.35m BGS			4		80	4
	- wood debris, bottom of fill at 3.66m BGS	3.81					
4	ML - SILT, trace clay, compact, no to low plasticity, grey and brown, moist			5		10	15
5				6		60	12
6				7		10	26
7				8		85	29
	CH - CLAY, silty to with silt, very stiff, high plasticity, varved, mottled grey/brown, moist; breaks on sub mm silt seams	6.86		9		50	24
8			203mm Ø BOREHOLE	10		50	17
9				11		90	22
	- grey seam, odour present; likely slough at 9.30m BGS		51mm DIA. SCH. 40 PVC RISER PIPE	12		95	21
10				13		80	13
	- grey at 10.67m BGS		BENTONITE GROUT				
11				14		90	13
	- poor recovery (rock from slough) from 11.43 to 12.04m BGS			15		35	9
12	- no to trace silt at 12.19m BGS			16		75	11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW11A-19
DATE COMPLETED: 29 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
14	- poor recovery (rock from slough) from 13.72 to 14.33m BGS			17		100	10
				18		5	11
15	- poor recovery (rock from slough) from 14.48 to 15.09m BGS			19		50	14
	- no recovery (rock from slough) from 15.24 to 15.85m BGS			20		0	8
16				21		100	9
17				22		100	9
18				23		100	7
19				24		100	10
20			#2 SILICA SANDPACK 51mm DIA. SCH. 40 PVC SCREEN	25		100	6
	SW - SILTY, GRAVELLY SAND (BASAL TILL), dense, fine to coarse grained, fine gravel to cobbles, grey, wet; broken rock, dolostone, some gypsum	20.27 20.42		26		100	10
21	DOLOSTONE, very fractured, weathered, microcrystalline, grey, wet	21.34					
	END OF BOREHOLE @ 21.34m BGS						
22							
23							
24							
25							

WELL DETAILS
Screened interval:
19.20 to 22.25m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
0.61 to 17.68m BGS
Material: BENTONITE GRAVEL
Sand Pack:
17.68 to 22.25m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW11B-19
DATE COMPLETED: 29 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	See MW11A-19		CONCRETE BENTONITE GRAVEL 203mm Ø BOREHOLE 51mm DIA. SCH. 40 PVC RISER PIPE #2 SILICA SANDPACK 51mm DIA. SCH. 40 PVC SCREEN	1			
	END OF BOREHOLE @ 11.28m BGS	11.28					

WELL DETAILS
Screened interval:
8.23 to 11.28m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
0.61 to 6.71m BGS
Material: BENTONITE GRAVEL
Sand Pack:
6.71 to 11.28m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW12A-19
DATE COMPLETED: 26 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	Topsoil		CONCRETE				
		0.61					
1	CH - CLAY, with to silty, with sand, compact, high plasticity, varved, light brown, dry; trace rootlets	1.07		1		100	19
	CH - CLAY, with to silty, compact, high plasticity, brownish grey, varved, dry						
2	- grey, dry to moist at 1.52m BGS			2		50	24
	- with to trace silt, grey, moist at 2.44m BGS			3		100	15
3				4		50	17
	- no to trace silt, occasional medium sand and very fine gravel at 3.81m BGS			5		100	14
4			203mm Ø BOREHOLE				
5				6		75	10
				7		100	11
6	- with silt seam at 6.49m BGS			8		90	14
	- trace to no silt at 6.71m BGS			9		25	28
7			51mm DIA. SCH. 40 PVC RISER PIPE				
8				10		50	18
	- grey, saturated with little water at 8.53m BGS			11		100	19
9				12		50	19
10				13		100	20
			BENTONITE GROUT				
11				14		50	16
	- wet at 11.43m BGS			15		100	14
12				16		100	/

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW12A-19
DATE COMPLETED: 26 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
14				17		100	5
				18		100	3
15	- 2.5cm cobble, dark grey, angular at 14.84m BGS	14.78		19		100	24
	SW - SILTY, GRAVELLY SAND (BASAL TILL), dense, fine to coarse grained, fine gravel to cobbles, grey, wet; broken rock, dolostone, some gypsum			20		100	17
16	- poor recovery (rock in spoon) from 15.24 to 15.85m BGS		#2 SILICA SANDPACK	21		50	20
	- weathered rock, with clay and silt at 16.76m BGS		51mm DIA. SCH. 40 PVC SCREEN	22		0	56
17	DOLOSTONE, very fractured, weathered, microcrystalline, grey, wet	17.37					
18	END OF BOREHOLE @ 18.29m BGS	18.29					
19			WELL DETAILS Screened interval: 15.24 to 18.29m BGS Length: 3.05m Diameter: 51mm Slot Size: 10 Material: SCH 40 PVC Seal: 0.61 to 13.72m BGS Material: BENTONITE GRAVEL Sand Pack: 13.72 to 18.29m BGS Material: NO. 2 SILICA SAND				
20							
21							
22							
23							
24							
25							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 018235
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR: Noll Drilling

HOLE DESIGNATION: MW12B-19
DATE COMPLETED: 26 August 2019
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: A. Molenhuis/H.MacEachern

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	See MW12A-19		CONCRETE; 51mm DIA. SCH. 40 PVC RISER PIPE; BENTONITE GRAVEL; 203mm Ø BOREHOLE; #2 SILICA SANDPACK; 51mm DIA. SCH. 40 PVC SCREEN	1			
6	END OF BOREHOLE @ 6.10m BGS	6.10					

WELL DETAILS
Screened interval:
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: SCH 40 PVC
Seal:
0.61 to 2.44m BGS
Material: BENTONITE GRAVEL
Sand Pack:
2.44 to 6.10m BGS
Material: NO. 2 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 12561524
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR:: Aardvark Drilling Inc.

HOLE DESIGNATION: MW13A-22
DATE COMPLETED: 19 April 2022
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: B. Khan

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	
0	FILL - CLAYEY SILT, trace sand and gravel and asphalt, fine grained sand, medium to coarse grained gravel, low to medium plasticity, soft, greysih brown, moist		CONCRETE	1		40	4
	ASPHALT, crushed till	0.76		2		60	12
1	FILL - SILT, with to trace clay and sand, trace asphalt, fine grained sand, medium to coarse grained gravel, low plasticity, firm to stiff, brown (trace grayish), moist	1.37		3		70	6
2	- stiff to very stiff, moist at 2.29m BGS			4		80	18
3	- asphalt not present, moist, greyish mottling at 3.05m BGS			5		90	27
4				6		80	24
			BENTONITE GRAVEL	7		90	20
5	CL/ML - CLAYEY SILT, with to trace sand, fine grained sand, low plasticity, firm to stiff, greyish brown with orange mottling, moist to very moist	5.33		8		90	10
6	- increased clay content, soft to firm, very moist at 6.10m BGS			9		90	12
7	CL - CLAY, with silt, trace sand, trace gravel, fine grained sand, coarse grained gravel, low plasticity, firm to stiff, greyish brown, moist to very moist	6.86		10		90	11
			51mm, PVC RISER	11		10	15
8	- trace silt, no sand, no gravel, moderate to high plasticity, soft to firm, grey with trace brown, very moist at 8.38m BGS			12		90	12
9	- very moist to wet at 9.14m BGS			13		90	10
10	- soft to firm, orange mottling, very moist at 9.91m BGS			14		90	7
	- very moist to wet at 10.67m BGS			15		100	9
11			BENTONITE GROUT				
	- soft to very soft, very moist to wet at 11.43m BGS			16		100	8
12	- soft, high plasticity, grey, very moist to wet at 12.19m BGS			17		100	9

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 12561524
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR:: Aardvark Drilling Inc.

HOLE DESIGNATION: MW13A-22
DATE COMPLETED: 19 April 2022
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: B. Khan

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE
14	- soft, oxidation striations, wet at 13.72m BGS - trace boulder and rock fragments at 14.33m BGS			18		100	8
15				19		100	6
				20		100	6
	CL - CLAY (BASAL TILL?), with to cobbly, with to sandy, soft, grey, wet	15.24	SANDPACK	21		60	>50
16			51mm, 10-slot, PVC SCREEN	22		60	>50
17	BEDROCK - limestone fragments	16.76		23		60	>50
18	END OF BOREHOLE @ 17.98m BGS	17.98		24		5	>50
19							
20							
21							
22							
23							
24							
25							

WELL DETAILS
Screened interval:
14.94 to 17.98m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
8.53 to 13.41m BGS
Material: BENTONITE GROUT
Sand Pack:
13.41 to 17.98m BGS
Material: SILICA SANDPACK

Seal:
0.00 to 8.53m BGS
Material: BENTONITE GRAVEL

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 12561524
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR:: Aardvark Drilling Inc.

HOLE DESIGNATION: MW13B-22
DATE COMPLETED: 19 April 2022
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: B. Khan

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)
0	Please refer to MW13A-22	0	CONCRETE; BENTONITE GRAVEL; 51mm, PVC RISER; SANDPACK; 51mm, 10-slot, PVC SCREEN	1		
7.62	END OF BOREHOLE @ 7.62m BGS	7.62				

WELL DETAILS
Screened interval:
4.57 to 7.62m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 3.96m BGS
Material: BENTONITE GRAVEL
Sand Pack:
3.96 to 7.62m BGS
Material: SILICA SANDPACK

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 12561524
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR:: Aardvark Drilling Inc.

HOLE DESIGNATION: MW14A-22
DATE COMPLETED: 20 April 2022
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: B. Khan

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	
0	FILL - CLAYEY SILT, with to trace sand , trace gravel, trace asphalt, fine grained sand, medium to coarse grained gravel, low plasticity, firm, greyish brown, moist	0.76	CONCRETE	1		10	9
1	CL/ML - CLAYEY SILT, with to trace sand , trace gravel, fine grained sand, fine grained gravel, low plasticity, firm, greyish brown, moist			2		70	10
	- CLAY AND SILT at 1.52m BGS			3		60	18
2	- CLAYEY SILT, brown at 2.29m BGS			4		80	21
3	- firm, brown with orange mottling at 3.05m BGS		BENTONITE GRAVEL	5		100	13
	- increased moisture, greyish mottling at 3.81m BGS			6		100	10
4	- CLAY AND SILT at 4.57m BGS			7		40	13
5	- SILTY CLAY, trace gravel, trace sand at 5.33m BGS			8		80	23
6	CL - SILTY CLAY, with to trace sand, with to trace gravel, fine grained sand, medium grained gravel, low to medium plasticity, firm, brownish grey, moist	6.10		9		70	15
	- moist to very moist at 6.86m BGS		51mm, PVC RISER	10		20	10
7	- becomes CLAY, trace silt, no sand, no gravel at 7.62m BGS			11		80	9
8	- very moist to wet, some orange mottling present at 8.38m BGS			12		80	8
	- moderate to high plasticity, very moist, grey at 9.14m BGS		BENTONITE GROUT	13		100	10
9	- wet at 9.91m BGS			14		90	7
10	- high plasticity, wet patches at 10.67m BGS			15		90	12
11				16		100	7
12	- soft to firm, partially saturated at 12.19m BGS			17		100	8

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 12561524
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR:: Aardvark Drilling Inc.

HOLE DESIGNATION: MW14A-22
DATE COMPLETED: 20 April 2022
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: B. Khan

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	
14	ML - SANDY SILT (BASAL TILL), with rock fragments (cobbles), medium to coarse grained sand, coarse grained rock fragments, low plasticity, soft, brown, moist to very moist	12.95		18		100	14
	BEDROCK - shaley dolostone	14.02	SANDPACK				
15			51mm, 10-slot, PVC SCREEN	19			
16							
	END OF BOREHOLE @ 16.76m BGS	16.76					
17							
18							
19							
20							
21							
22							
23							
24							
25							

WELL DETAILS
Screened interval:
13.72 to 16.76m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
6.10 to 12.19m BGS
Material: BENTONITE GROUT
Sand Pack:
12.19 to 16.76m BGS
Material: SILICA SANDPACK

Seal:
0.00 to 6.10m BGS
Material: BENTONITE GRAVEL

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BROOKS ROAD LANDFILL SITE
PROJECT NUMBER: 12561524
CLIENT: C/O 2270386 ONTARIO LIMITED
LOCATION: HALDIMAND COUNTY, ON
DRILLING SUBCONTRACTOR:: Aardvark Drilling Inc.

HOLE DESIGNATION: MW14B-22
DATE COMPLETED: 21 April 2022
DRILLING METHOD: 4 1/4" ID HSA
FIELD PERSONNEL: B. Khan

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)
			CONCRETE 51mm, PVC RISER BENTONITE GRAVEL SANDPACK 51mm, 10-slot, PVC SCREEN	1		

1
2
3
4
5
6
7
8
9
10
11
12

WELL DETAILS
Screened interval:
4.57 to 7.62m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 3.96m BGS
Material: BENTONITE GRAVEL
Sand Pack:
3.96 to 7.62m BGS
Material: SILICA SANDPACK

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

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The Power of Commitment

Appendix C

Land Use & Socio-Economic Assessment Report

Land Use and Socio-Economic Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

2270386 Ontario Limited

April 1, 2024

→ **The Power of Commitment**

Project name		Brooks Road Landfill Expansion					
Document title		Land Use and Socio-Economic Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524					
File name		Land Use & Socio-Economic Assessment Report - Final.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3		Axita Patel	Janet Oswald		Blair Shoniker		11/23/2023
S4	0	Axita Patel	Janet Oswald		Blair Shoniker		4/1/2024

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Contents

Table index

Figure index

1. Introduction

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent). The location of the Site is shown in Figure 1.1.

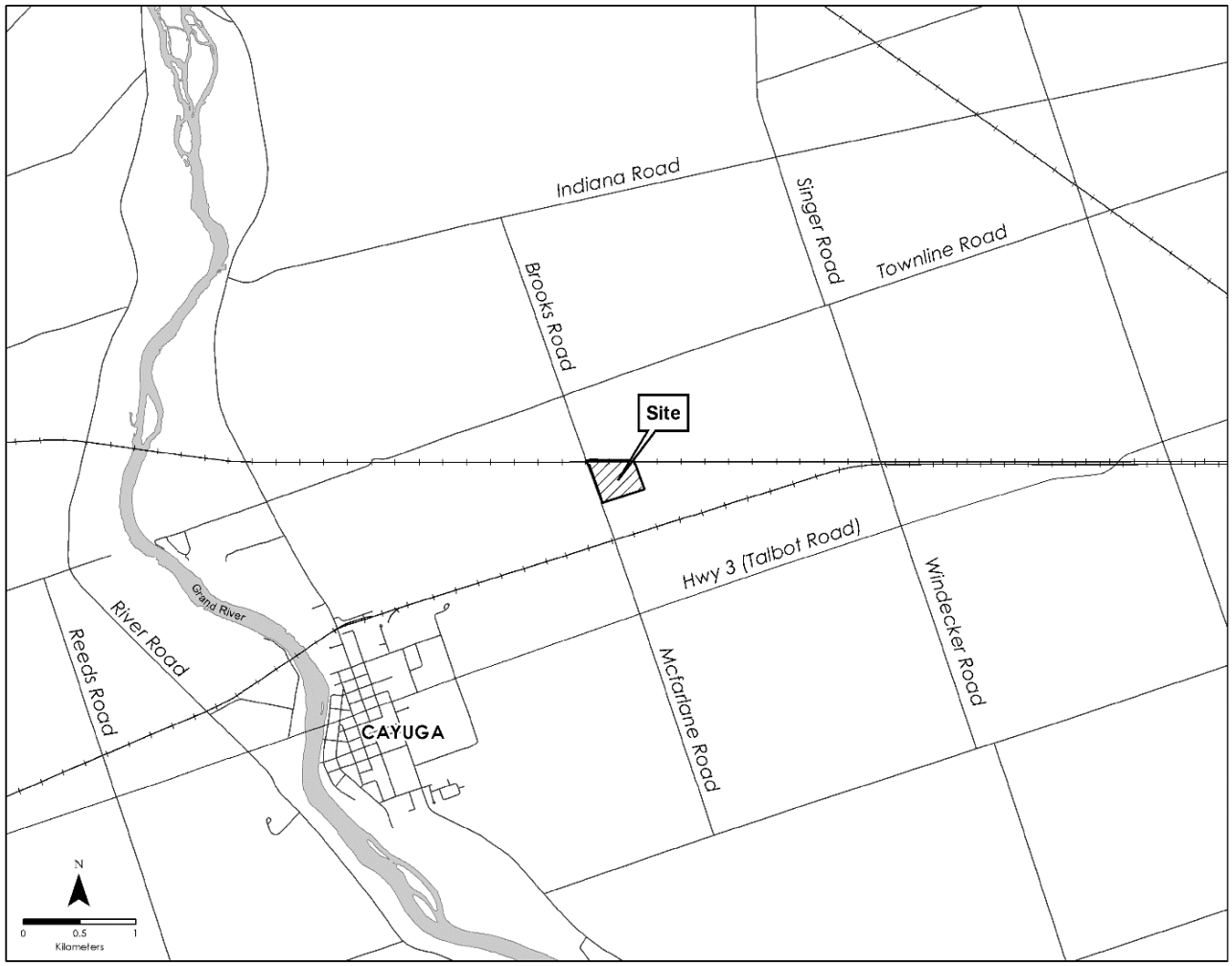


Figure 1.1 Location of the Proposed Undertaking

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302 (Landfill ECA), has an approved annual fill rate of 250,000 tonnes per year and a total capacity of 1,045,065 cubic metres (m^3) (including waste and cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA) and industrial sewage works ECA No. 1122-BKUPSM (Industrial Sewage ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (CofA, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021. Under the current ECA, the Site is licenced to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3-hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the Site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road

Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

In order to meet the growing demand from waste generators and customers for a safe and reliable waste management facility for their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils), Brooks Road Environmental is proposing to expand the capacity of the Brooks Road Landfill by approximately 219,400 m^3, adding capacity equal to approximately two additional years. This expansion would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally, as shown in Figure 1.2.

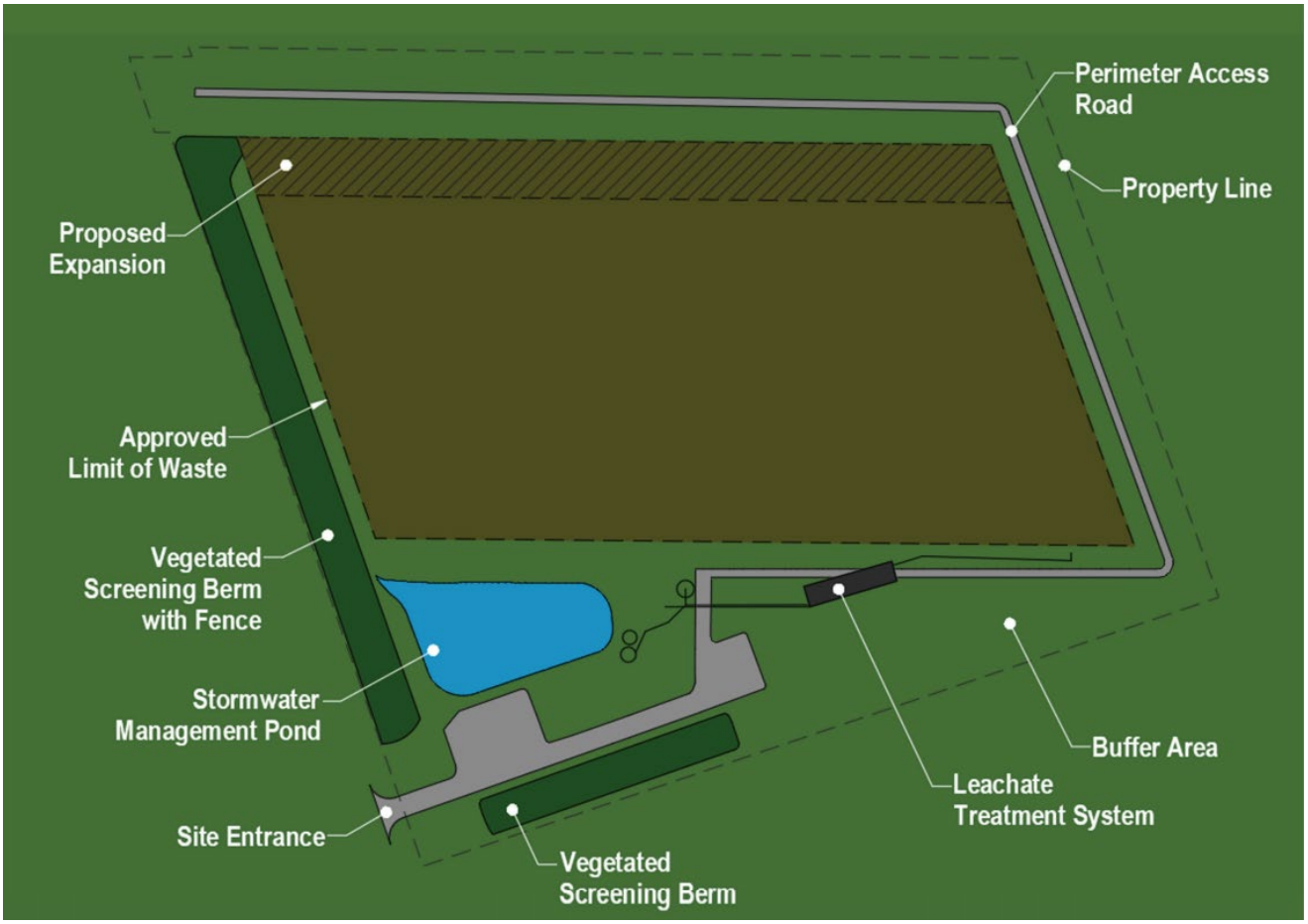


Figure 1.2 Proposed Capacity Expansion Concept

The proposed expansion would amend the approved ECA to allow for landfill volume expansion by approximately 219,400 m^3, allowing for receipt of an approved maximum daily quantity (1,000 tonnes per day) throughout the year, maintaining the approved rate of 250,000 tonnes per year. The proposed change to the total landfill capacity requires additional landfill infrastructure and changes to the currently approved landfill volume, footprint, and final contours.

The proposed Brooks Road Landfill Site capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *EA Act*, as follows:

A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:

1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

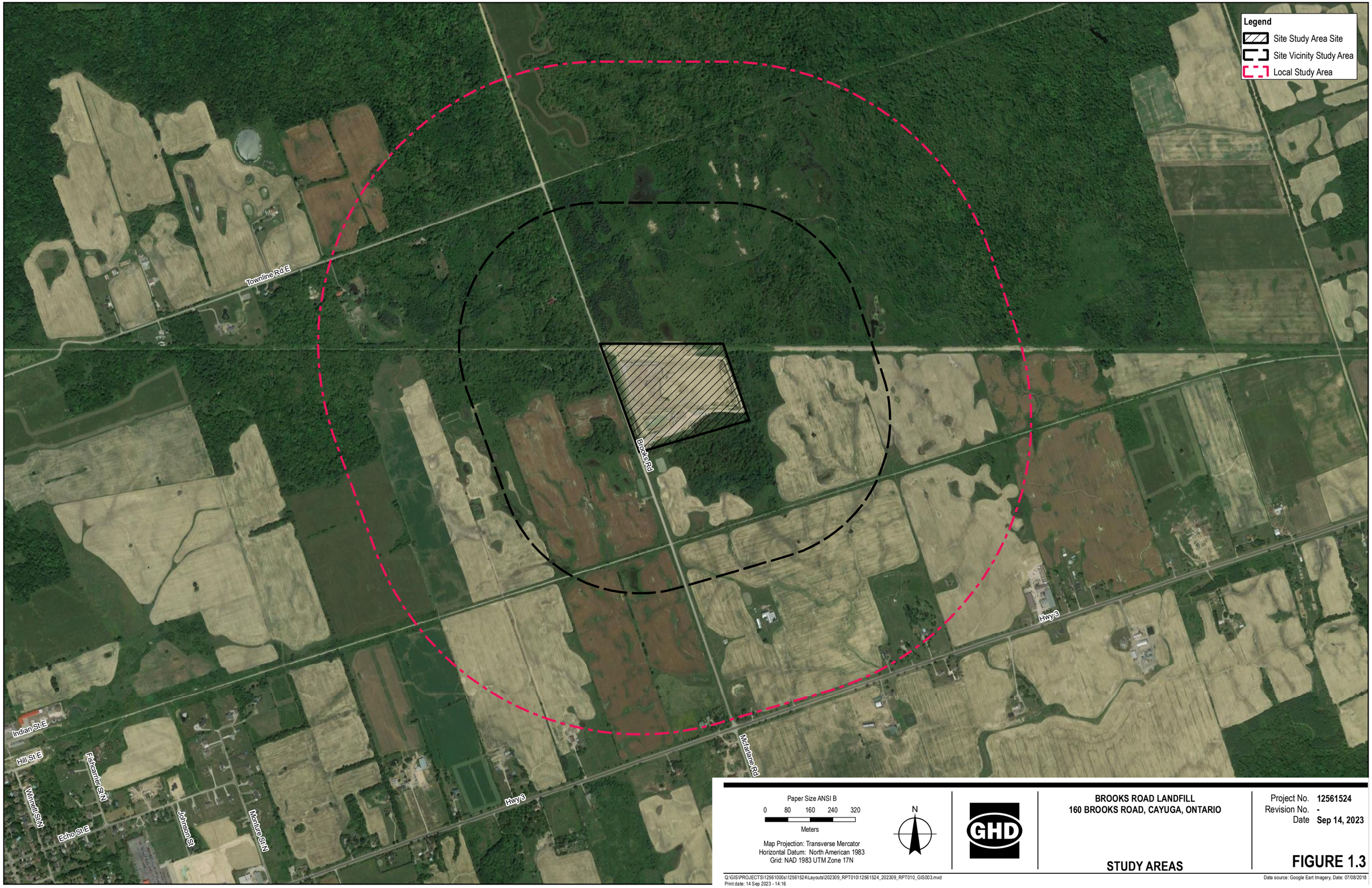
Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening Process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process an application will be made to amend the existing ECA No. A110302.

GHD has prepared a Land Use & Socio-Economic Assessment on behalf of BRE to support the proposed undertaking. This report documents the following as it relates to the land use & socio-economic environment:

– Baseline/existing conditions (i.e., what exists in the absence of the proposed project).
– Potential effects on the environment, mitigation measures, and net effects.
– Future monitoring requirements to be implemented.

The Study Areas reviewed for the Land Use assessment were as follows (see Figure 1.3):

– **Site Study Area (SSA)** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended.
– **Site-Vicinity Study Area** – the area within the vicinity of the Site extending approximately 500 meter (m) in all directions.
– **Local Study Area (LSA)** - the area within the vicinity of the Site extending approximately 1 kilometer (km) in all directions.



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Map Projection: Transverse Mercator
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Grid: NAD 1983 UTM Zone 17N

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Sep 14, 2023**

FIGURE 1.3

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2. Screening Criteria Checklist

At the beginning of the Environmental Screening, the Screening Criteria Checklist (provided as Schedule I, pp 67 – 69, to the "Guide to Environmental Assessment Requirements for Waste Management Projects") is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of "environment" contained in the *Ontario Environmental Assessment Act*

As noted in the Guide:

*The Screening Criteria are presented in the form of a checklist with the option of a "Yes" or "No" response. Mitigation measures **are not** to be considered in concluding whether there is "No" potential environmental effect. That is, the proponent is required to answer "Yes" even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a "Yes" is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required.*

Where a "Yes" has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that no environmental effects are anticipated, it is recommended that additional information is provided in the Environmental Screening Report in order to support the "no effects" conclusion".

Each criterion is based on a question which is prefaced with the phrase, "Might the Project…" The Table 2.1 below was completed as the first step of the Environmental Screening Process and is a summary of the criteria for the Land Use and Socio-Economic disciplines. Further descriptions of the criteria for which a "Yes" response was indicated in the Screening table are discussed in **Section 4.0** of this report.

Table 2.1 Screening Criteria Checklist

	Criterion	YES	NO	Additional Information
	Might the project…			
Land				
2.1	Cause negative effects on residential, commercial, institutional, or other sensitive land uses within 500 metres from the site boundary?		X	The proposed undertaking is a continuation of the existing operation through an expansion within the existing site. No change to land use is being proposed. As such, no negative effects are anticipated on the lands or land uses within 500m the Site as a result of the Project.
2.2	Not be consistent with the Provincial Policy Statement, provincial land use or resource management plans?		X	The proposed landfill expansion would continue to be consistent with the Provincial Policy Statement, provincial land use and/or resource management plans.
2.3	Be inconsistent with municipal land use policies, plans and zoning bylaws (including municipal setbacks)?		X	The proposed landfill expansion would continue to be consistent with municipal land use policies, plans and zoning bylaws (including municipal setbacks). No new lands are required and no changes to existing zoning are required.
2.4	Use lands not zoned as industrial, heavy industrial or waste disposal?		X	The proposed landfill expansion would not require new lands or changes to existing zoning.
2.5	Use hazard lands or unstable lands subject to erosion?	X		The proposed landfill expansion may require the use of hazard lands or GRCA regulated lands.

	Criterion	YES	NO	Additional Information
2.6	Cause negative effects related to the remediation of contaminated land?		X	The proposed landfill expansion would not cause negative effects related to the remediation of contaminated land.
Socio-Economic				
6.1	Cause negative effects on neighborhood or community character?		X	The proposed undertaking is an expansion to an already approved and existing landfill within the existing site. As such, no negative effects on the neighbourhood or community character are anticipated on as a result of the Project.
6.2	Result in aesthetics impacts (e.g., visual and litter impacts)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause aesthetic impacts due to the increase in landfill height in the expansion area.
6.3	Cause negative effects on local businesses, institutions, or public facilities?		X	The proposed undertaking is a continuation of the existing operation through an expansion within the existing site. No change to land use is being proposed. As such, no negative effects are anticipated to local businesses, institutions, or public facilities.
6.4	Cause negative effects on recreation, cottaging or tourism?		X	The proposed landfill expansion would not result in negative effects on recreation, cottaging or tourism as none of the above-mentioned uses have been identified within the Study Areas.
6.5	Cause negative effects related to increases in the demands on community services and infrastructure?		X	The proposed landfill expansion would not cause negative effects related to increases in the demands on community services and infrastructure.
6.6	Cause negative effects on the economic base of a municipality or community?		X	The proposed landfill expansion would not cause negative effects on the economic base of a municipality or community.
6.7	Cause negative effects on local employment and labour supply?		X	The proposed landfill expansion would not cause negative effects on local employment and labour supply. The continued use of the landfill will provide economic benefits to the local community in the form of new employment opportunities in both the construction and day to day operation. There is also the potential for increased employment opportunities in local firms.
6.8	Cause negative effects related to traffic?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects related to traffic through prolonging the life of the Site.
6.9	Be located within 8 km of an aerodrome/airport reference point?	X		Three aerodromes have been identified within 8km of the Site: – Cayuga (Bruce Field), approximately 1.3 km south of the Site – Cayuga East, approximately 3 km southeast of the Site – Grand River Executive, approximately 7.5 km north of the Site

	Criterion	YES	NO	Additional Information
6.10	Interfere with flight paths due to the construction of facilities with height (i.e., stacks)?		X	The proposed landfill expansion would not interfere with flight paths.
6.11	Cause negative effects on public health and safety?		X	The proposed landfill expansion would not cause any negative effects on public health and safety.

3. Existing Conditions

The following subsections describe the existing conditions that are found within the SSA, LSA and Site Vicinity Study Areas of the proposed project.

3.1 Land Use Existing Conditions

3.1.1 Methodology

3.1.1.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Land Use Study Team to determine existing Land Use conditions within the study area(s). The following sources of secondary information were collected and reviewed:

- Review of current zoning plans, definitions, and land use designations
- Ontario Planning Act
- Provincial Policy Statement (2020)
- Provincial Guidelines D-1: Land Use Compatibility (1995)
- Haldimand County Official Plan (2019)
- Haldimand County Zoning By-Law HC 1-2020
- Grand River Conservation Authority
- Statistic Canada (Population Census 2021)
- Land Use Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment report prepared by GHD in December 2016[1]

3.1.2 Description of Existing Conditions

The existing land uses around the Site are primarily agricultural and wetlands. The Site is bordered by Brooks Road to the west, and agricultural and wetland areas to the other three sides. There is an abandoned railways to the north of the Site.

3.1.2.1 Sensitive Uses Within 500 Metres

Sensitive land uses are defined in the Provincial Policy Statement (PPS), 2020 as "*buildings, amenity areas, or outdoor spaces where routine or normal activities occurring at reasonably expected times would experience one or more adverse effects from contaminant discharges generated by a nearby major facility. Sensitive land uses may be a*

[1] Land Use Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment report prepared by GHD in December 2016. Available at: **https://www.brenvironmental.com/_files/ugd/8a04be_52c65748fecb46d481aadbe2e5a33bb7.pdf**

part of the natural or built environment. Examples may include, but are not limited to residences, day care centers, and educational and health facilities."

The existing Site is located at 160 Brooks Road, in Cayuga, Haldimand County, Ontario. The proposed expansion will take place within the site boundaries and will not require the use of any new lands. There are two identified residential properties located within the Site Vicinity Study Area, the closest is approximately 223 m northwest of the site. There are no identified institutional or recreational land uses in a 500 meters radius of the Site boundary.

3.1.2.2 Provincial Policy Statement

The Provincial Policy Statement (PPS), 2020[2] provides clear policy direction on land use planning to promote strong communities, a strong economy, and a clean and healthy environment[3]. In terms of land use compatibility, the PPS 2020 (Section 1.2.6.1) states that "*Major facilities and sensitive land uses shall be planned and developed to avoid, or if avoidance is not possible, minimize and mitigate any potential adverse effects from odour, noise and other contaminants, minimize risk to public health and safety, and to ensure the long-term operational and economic viability of major facilities in accordance with provincial guidelines, standards and procedures*".

The PPS 2020 defines 'major facilities' as facilities which may require separation from sensitive land uses (as defined in Section 3.1.2.1, above), including but not limited to airports, manufacturing uses, transportation infrastructure and corridors, rail facilities, marine facilities, sewage treatment facilities, waste management systems, oil and gas pipelines, industries, energy generation facilities and transmission systems, and resource extraction activities.

Section 1.6.10.1 of the PPS 2020 notes that "*waste management systems need to be provided that are of an appropriate size and type to accommodate present and future requirements, and facilitate, encourage and promote reduction, reuse and recycling objectives… [and that] waste management systems shall be located and designed in accordance with provincial legislation and standards."*

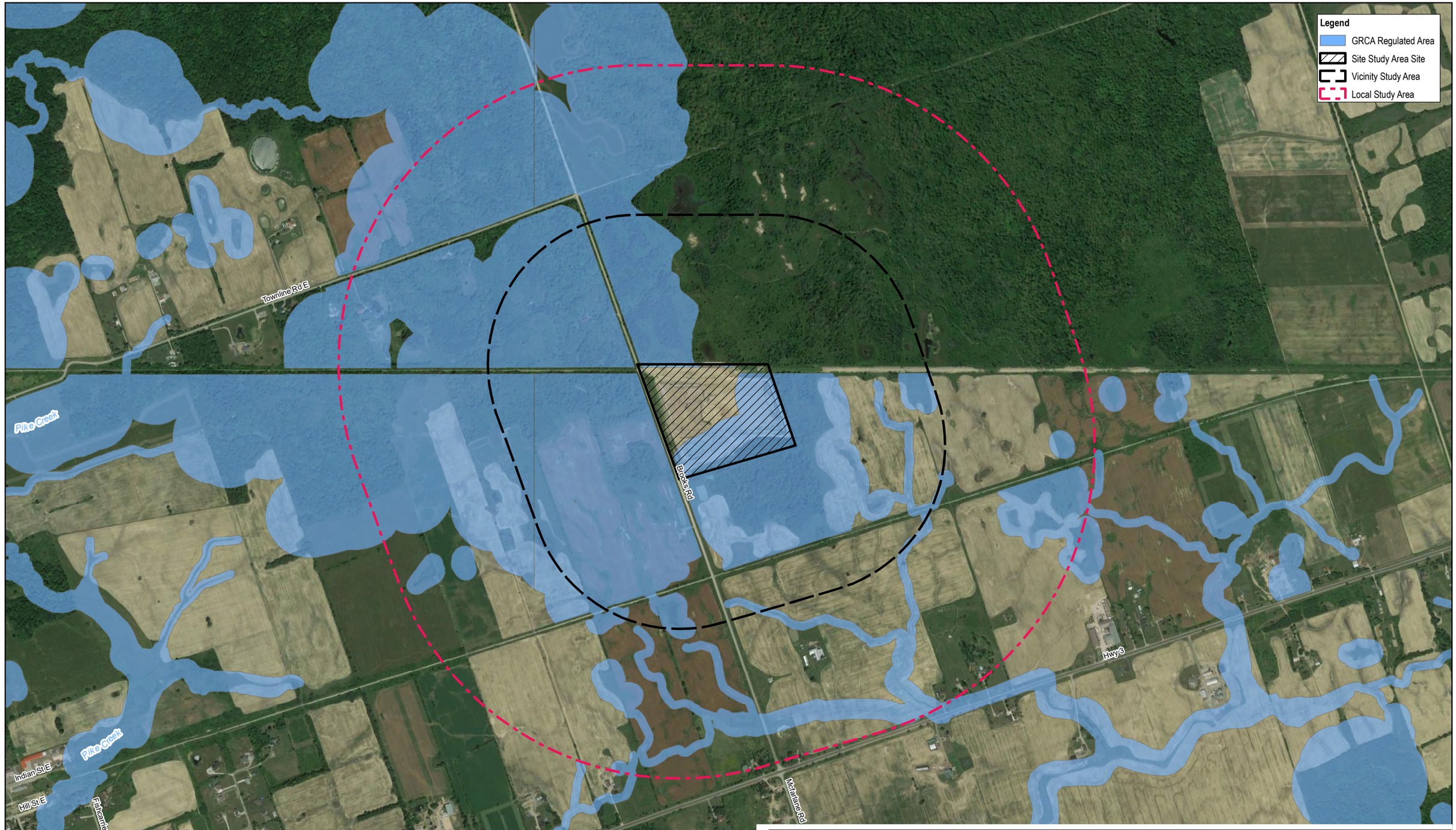
The SSA, Site-Vicinity, and LSA are currently in compliance with the policies contained in the PPS 2020.

3.1.2.3 Grand River Conservation Authority (GRCA) Regulation

In accordance with Ontario Regulation 150/06, GRCA regulates areas where development could be subject to flooding, erosion or dynamic beaches, and where interference with wetlands and alterations to shorelines and watercourses might adversely affect those environmental features. Any of these activities within the Regulated Area may require a permit from the GRCA[4].

A portion of the Site area falls within the GRCA regulated area (Figure 3.1) and may require a permit.

[2] **Provincial Policy Statement, 2020 - Under the Planning Act (ontario.ca)**
[3] It should be noted that the PPS was recently updated, and the proposed changes (PPS, 2023) were out for public consultation until August 4, 2023. The proposed changes do not impact the PPS analysis.
[4] Grand Rover Conservation Authority Website. Available at:
https://www.grandriver.ca/en/Planning-Development/Map-Your-Property.aspx#gsc.tab=0



Paper Size ANSI B

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Map Projection: Transverse Mercator
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Grid: NAD 1983 UTM Zone 17N

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

GRCA REGULATED AREA

Project No. **12561524**
Revision No. **-**
Date **Sep 14, 2023**

FIGURE 3.1

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3.1.2.4 Planned Developments

There are currently no planned or proposed developments surrounding the Site[5].

3.1.2.5 Municipal Land Use Policies, Plans, Zoning Bylaws

The Study Areas are situated within the unincorporated community of Cayuga in Haldimand County. The County's Official Plan and Zoning By-Laws were received to determine how the land in the Study Area is to be used in the future based on municipal planning policy.

The predominance of agriculture as the primary designated land use in the Study Areas is expected to remain for the foreseeable future with very little change based on the current municipal planning policy adopted by the County of Haldimand.

Haldimand County Official Plan (HCOP)

The Study Area is designated as Active Waste Landfill Site and surrounding is Provincially Significant Wetlands and Agriculture.

Provincially Significant Wetlands – There are delineated Provincially Significant Wetlands within the SSA. As per Section 2. A. 1) of the HCOP, certain compatible uses may be permitted through an appropriately scoped Environmental Impact Study resulting in no negative impact on the natural features or ecological functions of wetland or wetland complex.

Agriculture – Majority of the Site Vicinity Study Area is designated agricultural. As per Section 3. A. 1) of the HCOP, the predominant use of lands within the agriculture designation shall be agriculture. Other uses compatible with agriculture such as animal kennels, forestry uses, and conservation related uses may be permitted.

HCOP 34 (Specific policies in Haldimand County) – The abandoned railway, located north of the existing landfill is under the HCOP 34 policy area. A waste disposal site is permitted in addition to the uses permitted in the agricultural designation. The permitted uses under waste disposal site are limited to stockpiling of clean clay, location of ground waste monitoring wells, and a general naturalized buffer area. Waste disposal or landfilling is not permitted in this designation.

Hal 36 (Policies in the former Town of Haldimand) – As per Hal 36, policies in the Official Plan relating to Provincially Significant Wetlands (Section 2. A. 1)), and Natural Environment Areas (Section 2. A. 3)) will not apply to the Brooks Road Landfill (formerly known as Edwards Landfill Site).

Haldimand County Zoning By-Law HC 1-2020

The Haldimand County zones the subject site as Disposal Industrial (MD) and Wetland (W). The land in the LSA is zoned as Agricultural (A) and Wetland (W). (see Figure 3.2).

Disposal Industrial

The SSA is zoned as Disposal Industrial. The permitted uses include waste disposal site, waste transfer site, and waste processing facility along with other compatible uses.

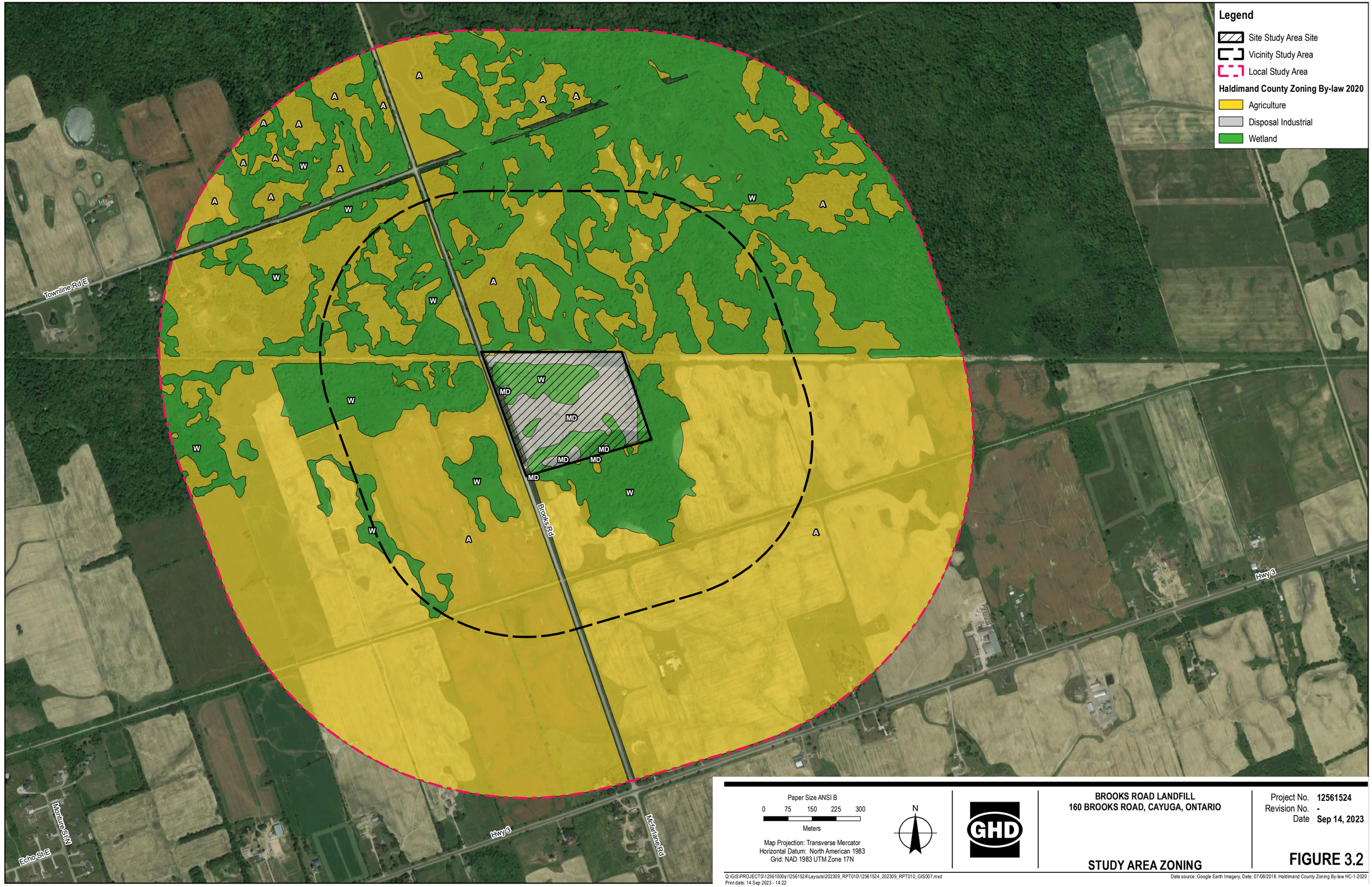
Wetland

A portion of the SSA and majority of the Site Vicinity and LSA is zoned as Wetland (W). The permitted uses include parks, woodlot management, conservation area, and tent and trailer park. Under Section 12.2, Hal 36.325 (Zone Exceptions) of the zoning by-law, the minimum setbacks from the wetland zone shall not apply to the commercial buildings existing on the date of passing of the by-law.

[5] Haldimand County Planning Applications. Available at: **https://haldimand.maps.arcgis.com/apps/dashboards/945e90b55d484fd0a01253953129dc0f**

Agricultural

A larger portion of the Site-Vicinity and the LSA is zoned Agricultural. Permitted uses in the Agricultural Zone include residential (bed and breakfast establishments, single detached dwellings, and several accessory uses), agricultural, and commercial (animal hospital, animal kennel, commercial greenhouse) uses.



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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

STUDY AREA ZONING

Project No. **12561524**
Revision No. **-**
Date **Sep 14, 2023**

FIGURE 3.2

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Data source: Google Earth Imagery, Date: 07/08/2018. Haldimand County Zoning By-law HC-1-2020

3.2 Socio-Economic Existing Conditions

3.2.1 Methodology

3.2.1.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Socio-Economic Study Team to determine existing Socio-Economic conditions within the study area(s). The following sources of secondary information were collected and reviewed:

– Review of current zoning plans, definitions, and land use designations
– Statistics Canada
– Haldimand County Community Profile
– Review of results from other discipline investigations (e.g., noise, air quality, surface water and traffic)
– Socio-Economic Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment report prepared by GHD in December 2016[6]

3.2.2 Description of Existing Conditions

3.2.2.1 Neighbourhood & Community Character

The proposed facility expansion site is located within the community of Cayuga in Haldimand County. The proposed site is designated as Active Waste Disposal Site within the Haldimand County Official Plan and zoned Disposal Industrial (MD) and Wetlands (W) in the Haldimand County Zoning By-law.

Haldimand County is located in the Golden Horseshoe region of Ontario. The community has a rural landscape of 1,251 km², including 83 km of shoreline along Lake Erie.

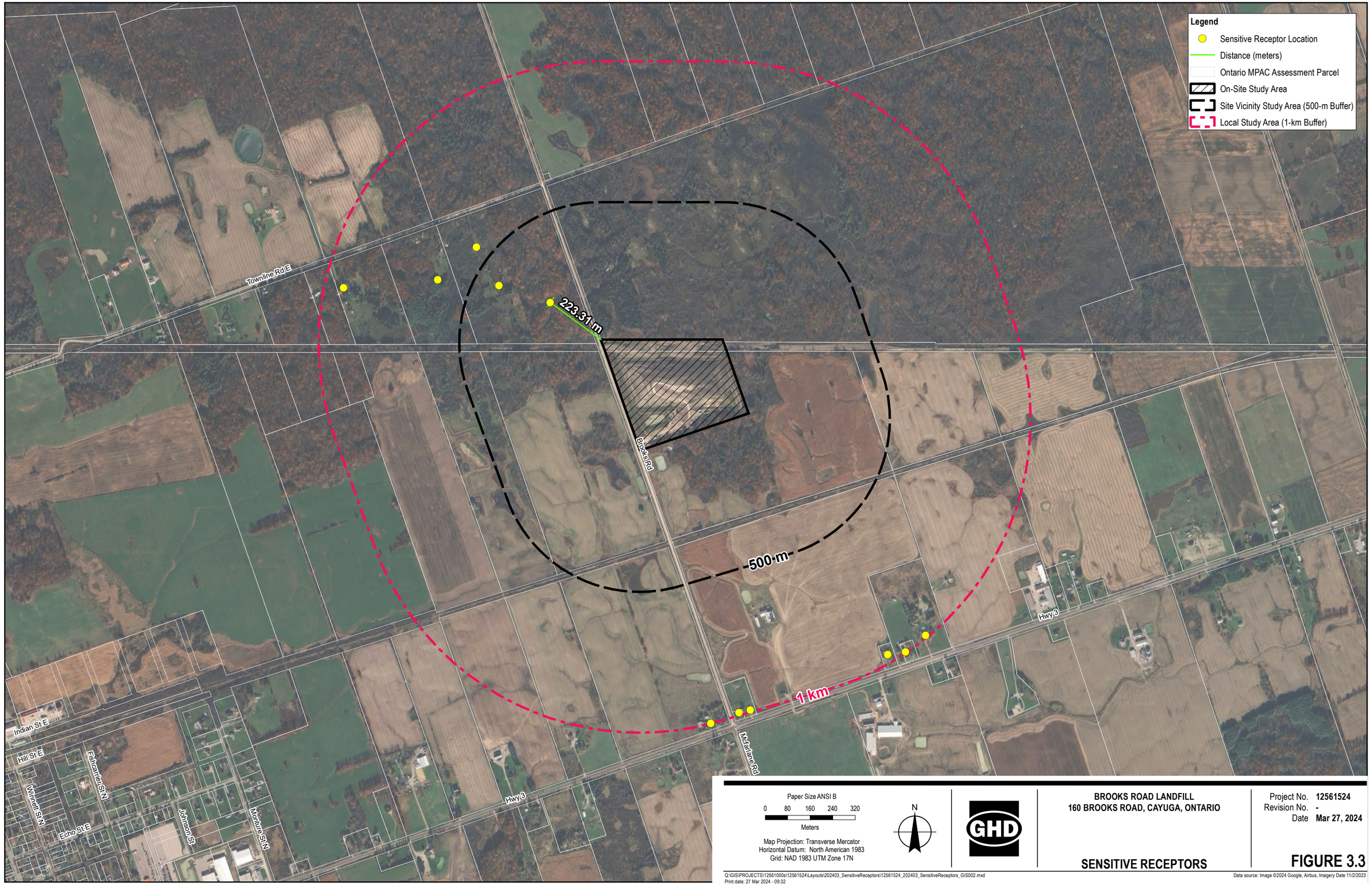
According to the 2021 Census[7], the County recorded a population of 49,216 in 2021, which is projected to increase to between 67,000 and 68,000 by 2041[8]. The age groups with the largest representation are the 55-59 and 60-64 cohorts. There is an equal distribution of males and females throughout the age groups and a greater part of the households falls within the income brackets of $150k and above. About 4% of total population is Indigenous, largely First Nations and Métis, and 3% are visible minorities, with South Asian and Black visible minority groups more represented than other groups.

Almost half of the total population has completed high school and college education. Common fields of study include engineering, business management, and health related fields. A major part of the labour force is employed in manufacturing, health care, and construction industries. The employment rate was about 56% in 2021 with 8.3% of unemployment rate in the same year.

Eighty-five percent of the residents own their home and 15% are renters. The new housing construction project has increased from 2020[9]. Forty-nine projects under construction and 101 completed projects were reported in the fourth quarter of 2022.

The closest residential dwelling is located approximately 223 m northwest of the Site (see Figure 3.3).

[6] Socio-Economic Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment report prepared by GHD in December 2016. Available at: **https://www.brenvironmental.com/_files/ugd/8a04be_282fd2938aca49d9ae4778c671605ca2.pdf**
[7] Haldimand County, 2024. Haldimand County Website – Community Profiles. Available at: **https://www.haldimandcounty.ca/community-profile/**
[8] Haldimand County Revised Growth Analysis to 2051 Memo prepared by Watson & Associates Economists Ltd. Available at: **https://www.haldimandcounty.ca/wp-content/uploads/2021/01/Revised-Watson-forecasts-2020-VERSION-2.pdf**
[9] Canada Mortgage and Housing Corporation Website. Last accessed November 12, 2023. Available here: **https://www03.cmhc-schl.gc.ca/hmip-pimh/en/TableMapChart/#Profile/6175/3/Haldimand%20County%20CY%20**



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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO

SENSITIVE RECEPTORS

Project No. **12561524**
Revision No. **-**
Date **Mar 27, 2024**

FIGURE 3.3

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3.2.2.2 Visual

The existing visual landscape within the SSA, Site-Vicinity Study Area, and LSA can be described as rural, agricultural, and includes regional roads. There is a wire fence around the perimeter of the site. The western part of the existing Site located on Books Road has a visual berm which includes a chain link fence with visual screen as mitigation to visual impact, providing a visual barrier to passersby.

3.2.2.3 Local Businesses, Institutions or Public Facilities

In addition to farming, the only other business operating within the LSA is the Brooks Road Landfill Site, which employs six full-time and one part-time staff. The are no other businesses, institutions or public facilities located within the LSA.

3.2.2.4 Local Employment & Labor Supply

According to the 2021 Census, there are total 24,335 residents in the labour force, of which 20,645 are employees and 3,675 are self-employed. Majority of the employed are in trade and transport occupations (26%), sales and services (22%), business and finance (14%), education, law, and government (10%), and healthcare (8%). The employment rate in 2021 was 56.6% and participation rate was 61.8%. The unemployment rate was recorded to be 8.3% in the same year.

A major part of the labour force is into manufacturing, health care, and construction industry. The employment rate was about 56% in 2021 with 8.3% of unemployment rate in the same year.

The Brooks Road Landfill Site employs six full-time and one part-time staff.

3.2.2.5 Traffic

Highway 3 and Brooks Road are the two major roads providing access to the existing Brooks Landfill. Traffic on Brooks Road is predominantly truck traffic specific to the landfill operation. Traffic on Highway 3 is a mix of both commuter and truck traffic. The capacity analysis under peak operations confirms no current capacity constraints in the LSA road network. Further details on traffic (existing conditions and potential effects) are included in the Traffic Assessment Report, prepared concurrently with this report by GHD.

3.2.2.6 Social

The LSA is located within the boundaries of Haldimand County, Ontario, approximately 2 km northeast the Village of Cayuga. There are 39 property parcels within the LSA (not including the Site) and 11 residential dwellings. Of these 39 properties, 19 were Farm Tax Rated for the 2022 tax year[10]. The closest residential dwelling is located approximately 223 m northwest of the Site.

No static recreational resources (e.g., picnic areas, trailer parks), churches, or cemeteries are located within the LSA; however, Brooks Road as well as the abandoned railway to south of the Site (parallel to Highway 3) are identified in the Official Plan as trail locations and in the Haldimand County Trails Master Plan 2009 as “Proposed Special Use Routes” (Brooks Road as a “Proposed Signed Route” and the abandoned railway as a Proposed Multi-Use Trail”) for implementation in the short-term (0 to 5 years from the publication date). There is presently no indication of the implementation of the proposed trails along either of these routes.

The topography across the LSA from north to south ranges from approximately 202 m AMSL to approximately 196 m AMSL. As such, the land within the LSA can be considered to be relatively flat. The majority of the lands within the LSA immediately adjacent to the Site are forested, thus obscuring the view of the Site. The exception is the parcel of land immediately west of the Site, which includes an open field, from which the Site is visible; however, the existing berm along the western perimeter of the Site obscures most views of the landfilling operations from this parcel. The

[10] Government of Ontario. (2022). *AgMaps – Agricultural Information Atlas*. Source: **AgMaps (gov.on.ca)**

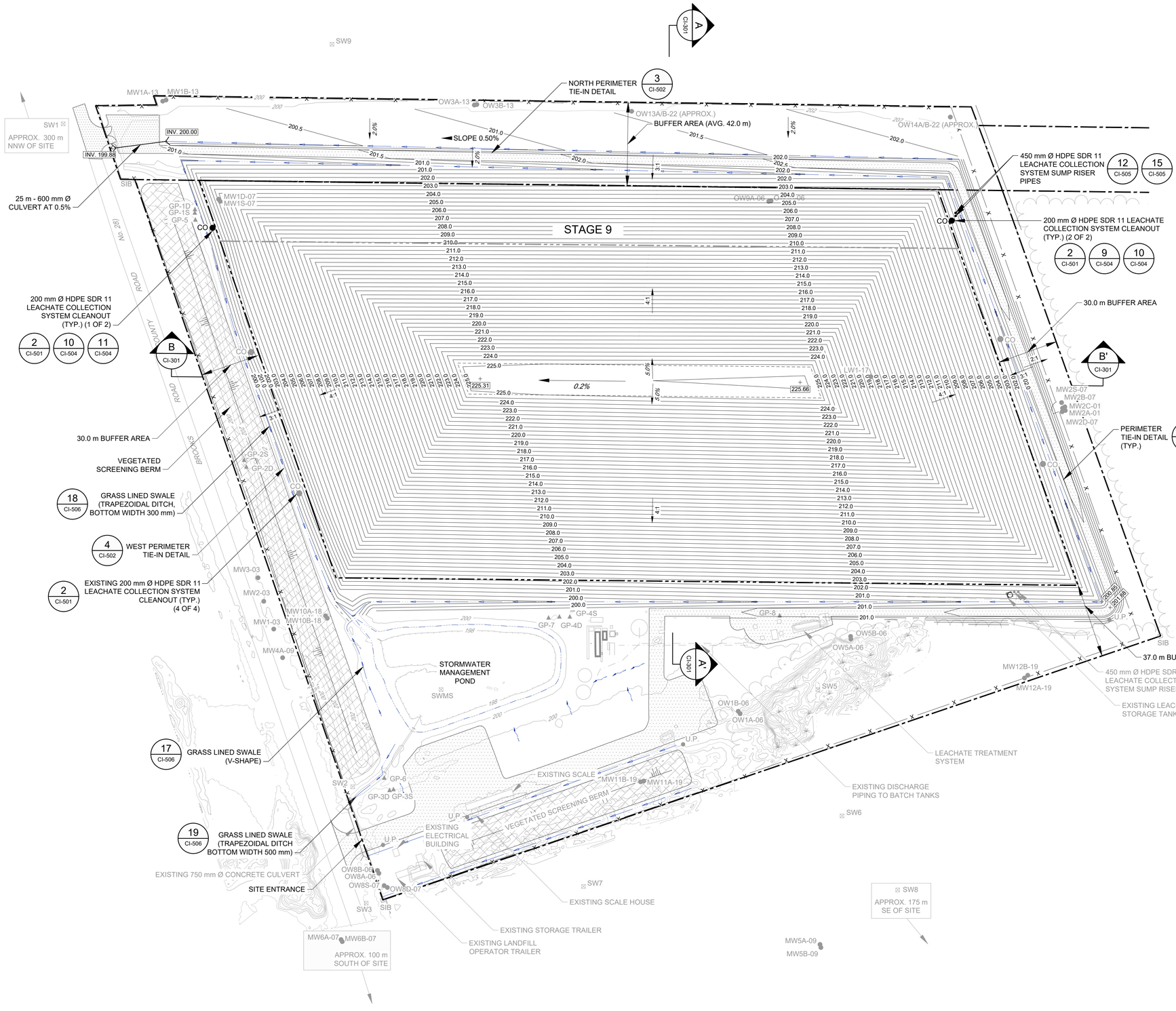
existing visual berm includes a chain link fence with visual screen as mitigation to visual impact, providing a visual barrier to passersby from Brooks Road.

3.2.2.7 Airport

There are three private airfields within the 8 km radius of the Site: the Cayuga (Bruce Field) Airport, approximately 1.5 km south; the Cayuga East Airport, approximately 3 km southeast; and the Grand River Executive Airport (also referred to as the York Airport) approximately 7.5 km north of the Site.

4. Description of Project Components and Activities

A Project Description, which includes a Site Plan, was prepared so that potential environmental effects and mitigation measures could be identified. Figure 4.1 is provided as the Site Plan and the following subsections provide a general summary of the proposed undertaking.



LEGEND:

- 192.0 — TOP OF FINAL COVER CONTOUR (1.0 m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5 m INTERVAL (m AMSL))
- 202 — EXISTING CONTOUR (2.0 m INTERVAL)
- EXISTING CONTOUR (1.0 m INTERVAL)
- PROPERTY LINE
- FENCE LINE
- DRAINAGE DITCH
- EXISTING FORCEMAIN
- APPROVED LIMIT OF WASTE
- EXISTING LOW AREA
- GRANULAR SURFACE / ACCESS ROADS
- SCREENING BERM
- EXISTING TREELINE
- OW1B-06 — EXISTING OBSERVATION WELL
- MW2A-01 — EXISTING MONITORING WELL
- CO — EXISTING CLEANOUT
- CO — CLEANOUT
- SW6 — EXISTING SURFACE WATER MONITORING LOCATION
- GP-3S — EXISTING GAS PROBE
- U.P. — EXISTING UTILITY POLE
- LW1-17 — EXISTING LEACHATE WELL
- EXISTING CULVERT
- CULVERT
- EXISTING DOUBLE GATE
- EXISTING SINGLE GATE
- S.I.B. — EXISTING STANDARD IRON BAR
- DOUBLE GATE

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HIGHWAY No. 3, APPROXIMATELY 550 m EAST OF THE INTERSECTION OF BROOKS ROAD AND HIGHWAY No. 3.
3. EXISTING NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY 17, 2013.
4. FOR STAGE 1 THOUGHT STAGE 3 LANDFILL BASE DESIGN, REFER TO DESIGN AND OPERATION PLAN, EDWARDS LANDFILL, GHD 2003.

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56 m AMSL.

SOURCE:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.

EXISTING WASTE CONTOURS SURVEYED DECEMBER 21, 2022, BY GHD.

DRAFT

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Bar is 25mm on original size sheet
0 25mm

Figure 4.1

No.	Issue	Checked	Approved	Date
P03.	ISSUED FOR CLIENT REVIEW	R.L.	D.B.	10-27-2023
P02.	ISSUED FOR CLIENT REVIEW	R.L.	D.B.	04-26-2023
P01.	ISSUED FOR REVIEW	R.L.	D.B.	09-19-2022

Author	S. HOLLAND	Designer	D. BARTON
Drafting Check	M. WOLFER	Design Check	D. GATRELL
Project Manager	R. LOVEDAY	Project Director	D. BARTON

Client
BROOKS ROAD LANDFILL SITE HALDIMAND COUNTY, ONTARIO

Project
DESIGN AND OPERATIONS REPORT LANDFILL EXPANSION

Date	Scale
OCTOBER 20, 2023	1:1000

Project No.
12561524

Title
FINAL CONTOUR PLAN (TOP OF TOPSOIL)

Size
ANSI D

Sheet No.
CI-103

Plot Date: 14 November 2023 - 9:54 AM Plotted By: Spencer Holland Path and Filename: N:\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Sheets\REPORT 1\CI\12561524-GHD-00-00-CGP-CI-003.dwg

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This would be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours. The former railway property would continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved landfill is provided in Table 4.1.

Table 4.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted by 30 m. East and west ditches will extend to maintain full perimeter ditch.
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

5. Potential Effects, Mitigation Measures & Net Effects

There is no significant impact to the predominantly agricultural land uses within the Study Areas as the proposed undertaking will not be acquiring any new lands.

5.1 Methodology and Investigations

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2** of this report.

The land use and socio-economic existing conditions characterized for each criterion identified in the Screening Criteria Checklist were assessed, taking into consideration the Project Description and Site Plan in order to identify potential effects that may result from the proposed undertaking. Following the determination of potential effects, measures required to mitigate any potential effects were developed and the resulting net effects (with the application of mitigation measures) were determined.

5.2 Land Use Net Effects

This Section provides an assessment of the potential negative environmental effects for those Land Use criteria which might be affected by the project (i.e., those for which a “Yes” answer was given in the Screening Criteria Checklist) as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Area(s) would change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2**, a “Yes” was applied to the following Land Use criteria:

Land Use				
	Criterion	YES	NO	Additional Information
2.5	Use hazard lands or unstable lands subject to erosion?	X		The proposed landfill expansion may require the use of hazard lands or GRCA regulated lands.

5.2.1 Potential Effects on Land Use Environment

The proposed undertaking is compatible with planning and by-law documents for the area and would continue to be consistent with the Provincial Policy Statement. Expansion of the landfill will not affect land uses within 500 m as all operations will continue to take place within the existing site boundaries. BMPs will be implemented by BRE to manage nuisance related effects during construction and operation.

The proposed expansion may require the use of hazard lands or lands subject to erosion such as GRCA-regulated lands. On-site operations may cause potential negative effects on the geology and hydrogeology as well as on the natural habitat and wildlife in this area.

As identified in the Screening Criteria Checklist and **Section 3.1.2.3** above, portions of the SSA, Site Vicinity, and LSA are GRCA regulated areas and zoned as Wetlands. The proposed expansion will require GRCA permit to expand within the regulated lands.

5.2.2 Mitigation Measures

Potential negative effects on the natural environment and wildlife will be mitigated through BMPs such as the final cover system, leachate collection system, and liner system. In addition to these engineered controls, the Site is also situated within a fine grained (clay rich) stratigraphic sequence with significant vertical thickness. This natural feature provides additional protection of the underlying aquifer as well as some beneficial attenuation capacity. A silt fence is also installed in areas of possible sediment migration.

Detailed mitigation measures are outlined in the Natural Environment Assessment Report and Geology and Hydrogeology Assessment Report prepared by GHD in March 2024.

5.2.3 Net Effects

There are no net negative environmental effects anticipated with respect to Land Use associated with the operation of the proposed landfill expansion.

Potential negative environmental effects during construction related to dust, odour, noise, and traffic will be mitigated through the use of best management practices.

5.3 Socio-Economic Net Effects

This Section provides an assessment of the potential negative environmental effects for those Socio-Economic criteria which might be affected by the project (i.e., those for which a “Yes” answer was given in the Screening Criteria Checklist) as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Area(s) would change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2**, a “Yes” was applied to the following Socio-Economic Criteria:

Socio-Economic				
	Criterion	YES	NO	Additional Information
6.2	Result in aesthetics impacts (e.g., visual and litter impacts)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause aesthetic impacts due to the increase in landfill height in the expansion area.
6.8	Cause negative effects related to traffic?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects related to traffic through prolonging the life of the Site.
6.9	Be located within 8 km of an aerodrome/airport reference point?	X		Three aerodromes have been identified within 8km of the Site: – Cayuga (Bruce Field), approximately 1.3 km south of the Site – Cayuga East, approximately 3 km southeast of the Site – Grand River Executive, approximately 7.5 km north of the Site

5.3.1 Potential Effects on Socio-Economic Environment

As identified in **Section 2**, there are no potential effects anticipated to neighborhood or community character as the Site of the proposed expansion is located within an area currently zoned as Disposal Industrial. No negative effects on local businesses, institutions, or public facilities are anticipated. There will be no negative impacts on recreation,

cottaging, and tourism as no such land uses have been identified in the SSA and LSA. There will be no increase in the demand for community services and/or infrastructure as a result of the proposed expansion and no change in the economic base of the surrounding community, local employment, or labour supply.

The proposed undertaking is a horizontal and vertical expansion of the existing landfill which will cause an increase in the landfill height and may cause negative visual and aesthetic impact in the absence of mitigation measures. However, this will not exceed currently approved peak contours and can be mitigated.

The results of the Traffic Assessment Report conducted as part of this Environmental Screening Process concluded that the truck traffic associated with the proposed capacity expansion will not contribute any additional traffic within the study area due to maintaining the maximum approved fill rates. With no additional traffic being generated by the Site, minimal impact is expected on traffic safety and traffic operations. No potential road improvements are required or recommended.

Three local airfields, Cayuga (Bruce Field) Airport, Cayuga East Airport, and Grand River Executive (York) Airport, are located within 8 km of the Site. However, the proposed expansion will not cause negative impacts to the airports and will not interfere with the flight paths as no tall structures, such as stacks, exist or are proposed at the Site.

5.3.2 Mitigation Measures

With no additional truck traffic generated by the proposed capacity expansion, no mitigation measures are recommended in order to avoid or minimize impacts on transportation.

There is a wire fence around the perimeter of the site. The western part of the existing Site located on Books Road has a visual berm which includes a chain link fence with visual screen as mitigation to visual impact, providing a visual barrier to passersby. The visual screen will be augmented in response to the increased landfill height as a visual and aesthetic mitigation measure.

5.3.3 Net Effects

The results of the Socio-Economic Assessment indicate that there will be a change to the current visual scenario as a result of the proposed expansion. However, this can be mitigated by increasing the height of the existing visual screen, vegetating the screening berm and/or introducing additional plantings on the Site. This would minimize views of the Site from surrounding areas.

6. Monitoring Requirements and Additional Approvals

6.1 Monitoring Requirements

There are no requirements for monitoring specifically related to land use or the socio-economic environment for the proposed landfill expansion.

6.2 Additional Approvals

The proposed expansion will require a permit from the GRCA. No other approvals are required for land use or the socio-economic environment for the proposed landfill expansion.

7. Conclusion

Application of the Screening Criteria Checklist identified the potential for negative effects related to traffic. The results of the Traffic Assessment Report conducted as part of this Environmental Screening Process concluded that the truck traffic associated with the proposed capacity expansion will not contribute any additional traffic within the study area due to maintaining the maximum approved fill rates. With no additional traffic being generated by the Site, there is an expected minimal impact on traffic safety, and traffic operations, and no potential road improvements are required or recommended. Therefore, there are no anticipated potential negative impacts on the socio-economic environment related to traffic.

Application of the Screening Criteria Checklist identified the potential for negative effects on the aesthetics in the absence of mitigation measures. An increase in the height of the existing fence is proposed to provide a visual barrier to the increased landfill height and it should be noted that the expansion will not exceed currently approved peak contours. Therefore, there are no anticipated potential negative impacts on the socio-economic environment related to aesthetics.

Application of the Screening Criteria Checklist identified that the Site is located within 8km of an aerodrome or airport reference point but will not interfere with flight paths as no tall structures exist or are proposed at the Site.

Application of the Screening Criteria Checklist identified that the Site may require the use of hazard lands such as GRCA regulated wetlands. Any potential impacts to these lands will be mitigated through the application of BMPs.

In conclusion, the results of the Land Use and Socio-Economic Assessment indicate that there are no net effects anticipated for land use or the socio-economic environment.

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The Power of Commitment

Appendix D

Air Quality Assessment Report

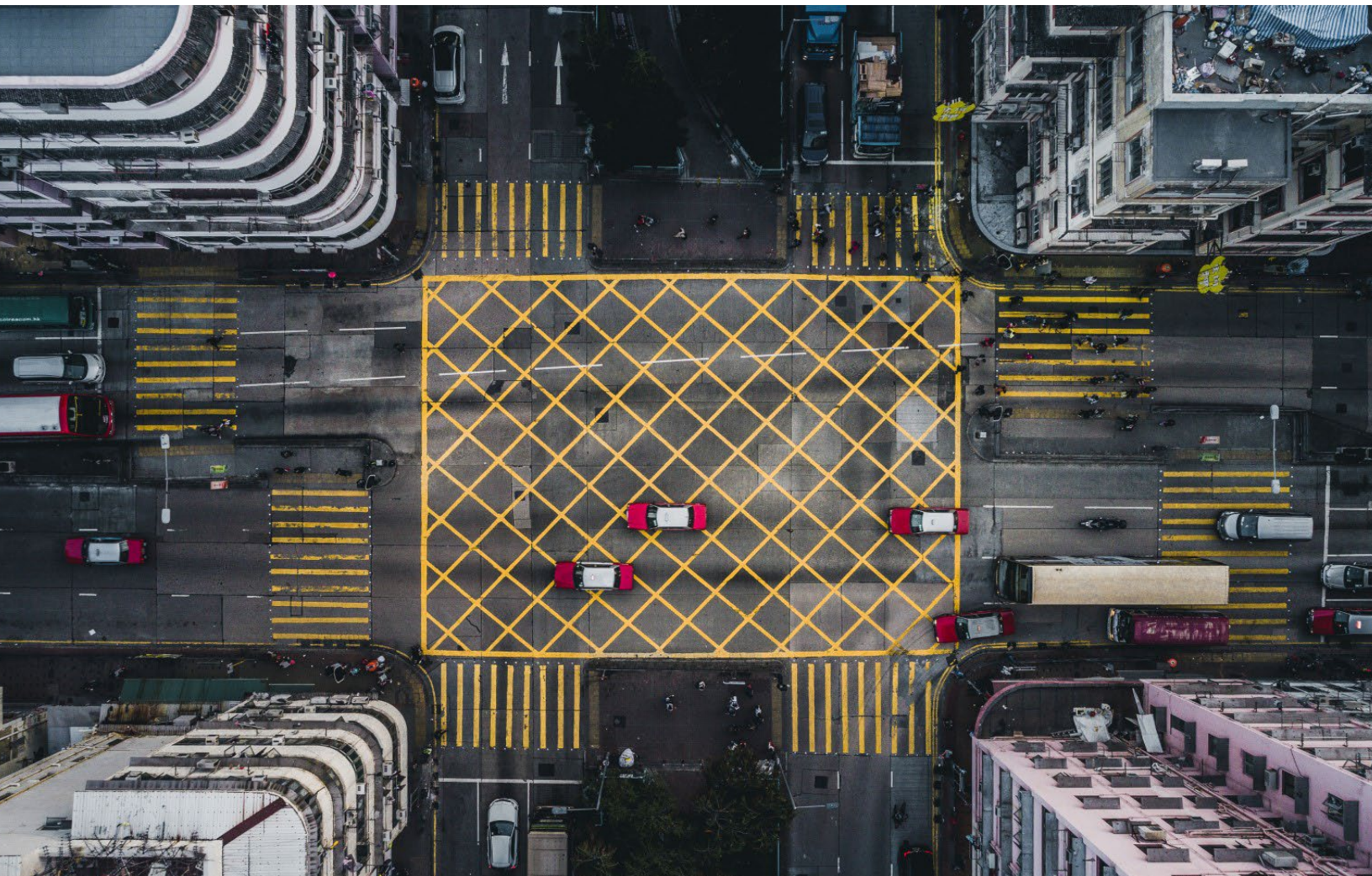
Air Quality & Odour Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

Brooks Road Environmental

March 28, 2024

→ The Power of Commitment



Project name		Brooks Road Landfill Expansion					
Document title		Air Quality & Odour Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524-RPT-10					
File name		12561524-RPT-10-Environmental Screening Air Quality and Odour Assessment Report					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S0	DRAFT	Punith Dev Nallathamby	Matthew Griffin				11/24/2023
S4	FINAL	Amin Costas	Matthew Griffin		Blair Shoniker		Mar.28/24

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Contents

Figure index

Table index

Appendix index

1. Introduction

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent). The location of the Site is shown in Figure 1.1.

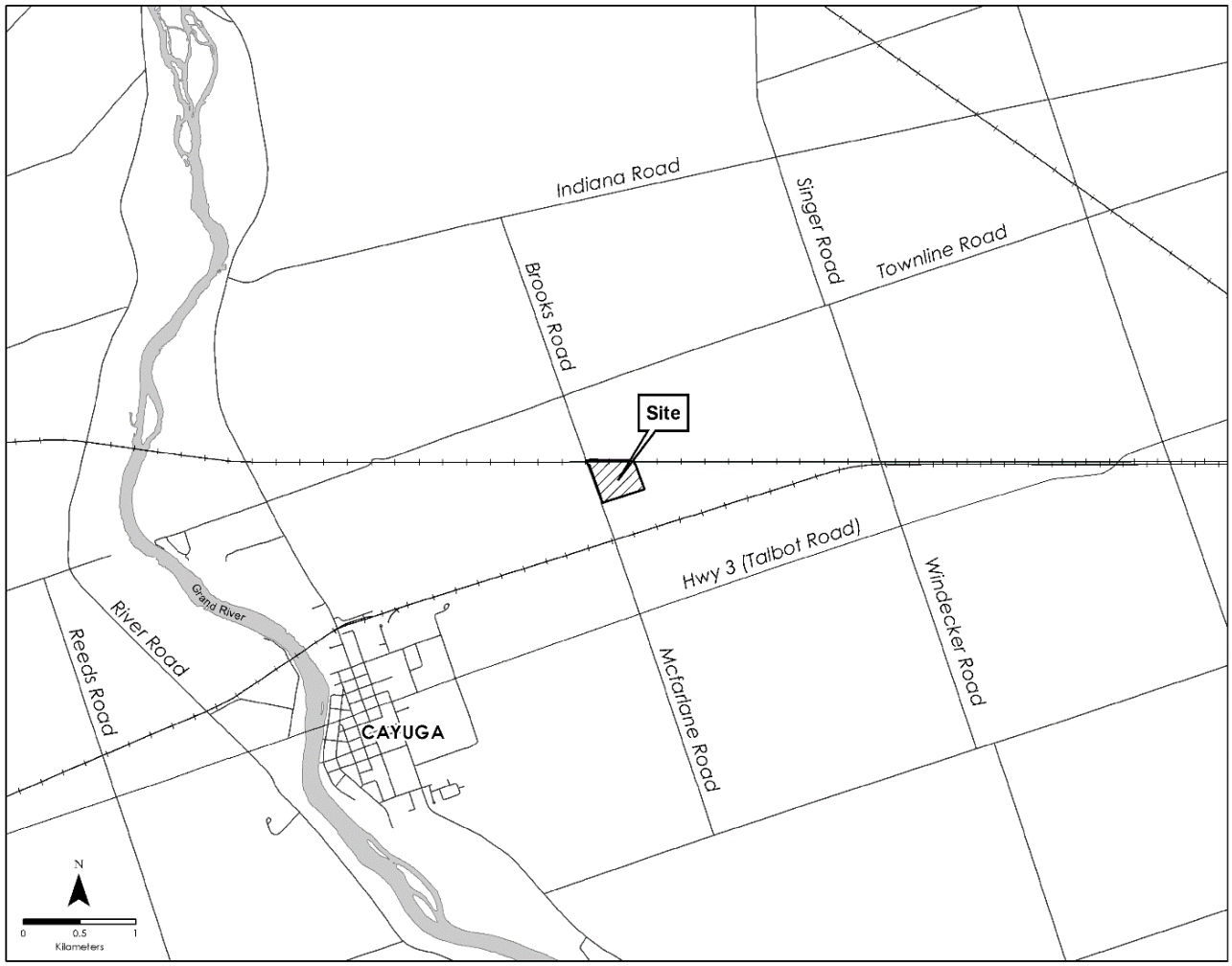

Figure 1.1 Location of the Proposed Undertaking

The Site, which operates under Environmental Compliance Approval (Landfill ECA) No. A110302, has an approved annual fill rate of 250,000 tonnes per year and a total capacity of 1,045,065 cubic metres (m^3) (including waste and cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA) and industrial sewage works ECA No. 1122-BKUPSM (Industrial Sewage ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (CofA, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021. Under the current ECA, the Site is licenced to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3-hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road

Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151, 000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

In order to meet the growing demand from waste generators and customers for a safe and reliable waste management facility for their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils), Brooks Road Environmental is proposing to expand the capacity of the Brooks Road Landfill by approximately 219,400 m^3, adding capacity equal to approximately two additional years. This expansion would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally, as shown in Figure 1.2.

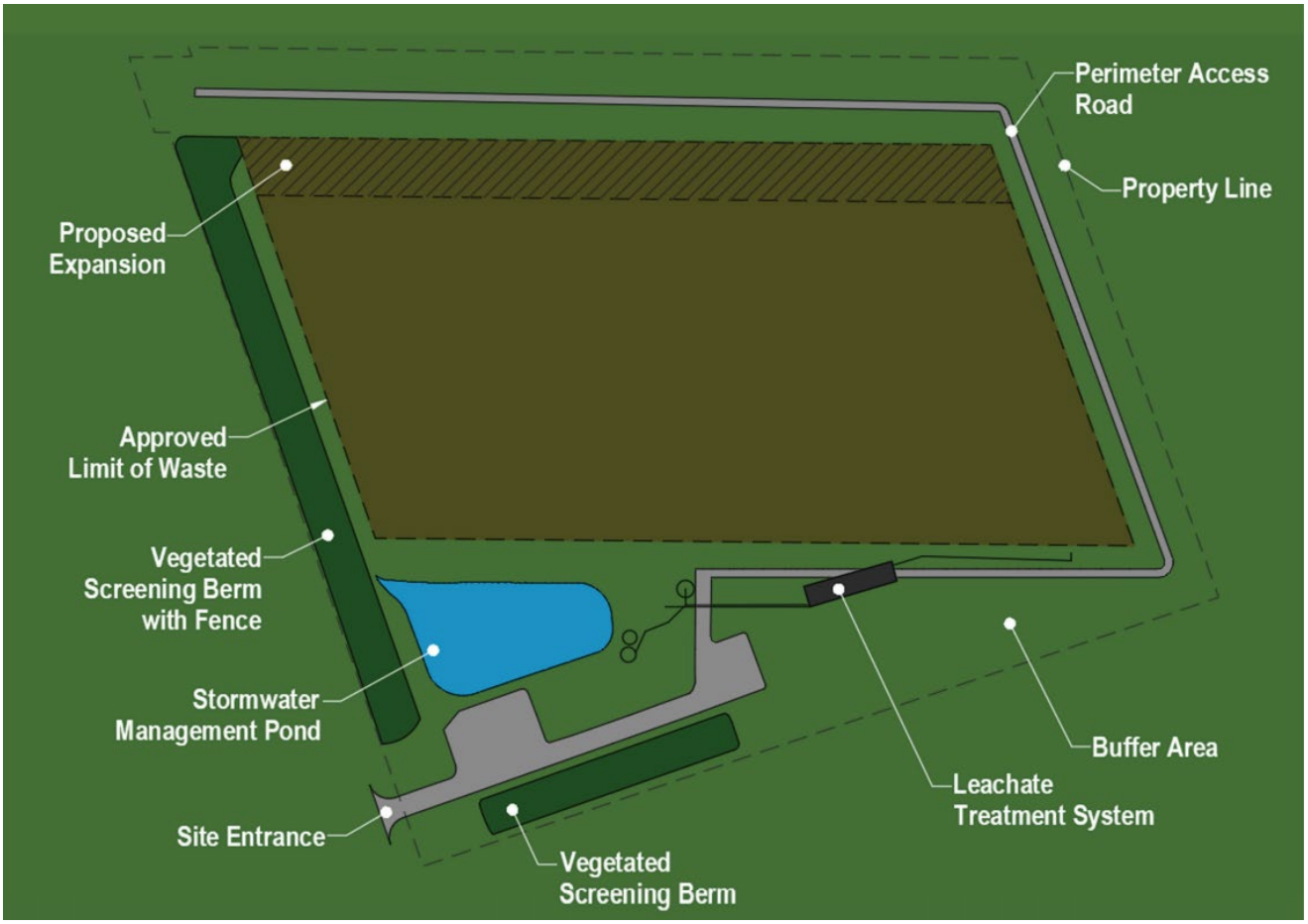

Figure 1.2 Proposed Capacity Expansion Concept

The proposed expansion would amend the approved ECA to allow for landfill volume expansion by approximately 219,400 m^3, allowing for receipt of an approved maximum daily quantity (1,000 tonnes per day) throughout the year, maintaining the approved rate of 250,000 tonnes per year. The proposed change to the total landfill capacity requires additional landfill infrastructure and changes to the currently approved landfill volume, footprint, and final contours.

The proposed Brooks Road Landfill Site capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *EA Act*, as follows:

> *A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:*
>
> 1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
> 2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
> 3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process, an application will be made to amend the existing ECA No. A110302.

GHD has prepared an Air Quality and Odour Assessment on behalf of BRE for the proposed undertaking. This report documents the following as it relates to Air Quality and Odour:

– Baseline/existing conditions (i.e., what exists in the absence of the proposed project)
– Potential effects on the environment, mitigation measures, and net effects
– Future monitoring requirements to be implemented

The Study Areas reviewed for the Air Quality and Odour assessment were as follows (see **Figure 1.3**):

– **Site Study Area (SSA)** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
– **Local Study Area (LSA)** – the area within the vicinity of the Site extending approximately 1 kilometre (km) in all directions from the Site Study Area boundaries.

Figure 1.3 Air Quality and Odour Study Areas

2. Screening Criteria Checklist

At the beginning of the Environmental Screening, the Screening Criteria Checklist (provided as Schedule I, pp 67 – 69, to the "Guide to Environmental Assessment Requirements for Waste Management Projects") is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of "environment" contained in the *Ontario Environmental Assessment Act.*

As noted in the Guide:

"*The Screening Criteria are presented in the form of a checklist with the option of a "Yes" or "No" response. Mitigation measures **are not** to be considered in concluding whether there is "No" potential environmental effect. That is, the proponent is required to answer "Yes" even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a "Yes" is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required. Where a "yes' has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that no environmental effects are anticipated, it is recommended that additional information is provided in the Environmental Screening Report in order to support the "no effects" conclusion*."

Each criterion is based on a question which is prefaced with the phrase, "*Might the Project*…" Table 2.1 was completed as the first step of the Environmental Screening Process and is a summary of the criteria for the Air Quality and Odour discipline. Further descriptions of the criteria for which a "Yes" response was indicated in the Screening table are discussed in Section 4 of this report.

Table 2.1 Screening Criteria Checklist – Air Quality and Odour

	Criterion	YES	NO	Additional Information
	Might the project…			
3. Air and Noise				
3.1	Cause negative effects on air quality due to emissions (for parameters such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other contaminants)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on air quality due to emissions.
3.2	Cause negative effects from the emission of greenhouse gases (e.g., carbon dioxide, carbon monoxide, methane)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in emission of greenhouse gases associated with continued operation of the Site.
3.3	Cause negative effects from the emission of dust or odour?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in dust and odour emissions associated with continued operation of the Site.

3. Existing Conditions

The following subsections describe the existing conditions that are found within the On-Site and Site Vicinity Study Areas of the proposed project.

3.1 Methodology

3.1.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Air Quality and Odour Study Team to determine existing Air Quality and Odour conditions within the Study Area(s). The following sources of secondary information were collected and reviewed:

- Environment Canada Climate data (2017 to 2021).
- Ambient air quality data obtained from the Hamilton Air Monitoring Network (HAMN) (2019 to 2021). Note that the $PM_{2.5}$ data available from the closest monitoring station #29102 at Hamilton was used in the net effects assessment for a cumulative particulate evaluation.
- Existing Facility Emission Summary and Dispersion Modelling Report, prepared for Brooks Road Environmental by Conestoga-Rovers & Associates (September 14, 2015 and updated September 2022).
- Odour Monitoring Program, prepared for Brooks Road Environmental by Conestoga-Rovers & Associates (July 28, 2014).
- Odour Monitoring Program, prepared for Brooks Road Environmental by Conestoga-Rovers & Associates (November 3, 2014).
- Odour Monitoring Program, prepared for Brooks Road Environmental by GHD (2016,2017, 2019 and 2022).

3.1.2 Process Undertaken

On-site and off-site odour investigations were completed by GHD in 2014, 2016, 2017, 2019 and 2022. These studies indicated that there was no measurable odour off-site. GHD completed odour measurements during daytime and night-time periods to try and observe odours in the surrounding community. During all the odour monitoring events, no odours that could be attributed to the Site were detected off-site.

The GHD Team completed a walk-through of the Site, with focused observations at the location of the proposed horizontal expansion to the north and the leachate system. GHD did not identify any fugitive emissions during the walkthrough other than minor particulate emissions generated by small vehicles moving throughout the landfill. The GHD Team also observed the area surrounding the Site to confirm the locations of the nearest sensitive receptors to the Facility.

3.2 Description of Existing Conditions

The following conditions are currently present at the Site, as described in Table 3.1.

Table 3.1 Existing Conditions Relevant to Air Quality and Odour

Attribute	Existing Landfill
General Description	Expanding the current capacity by 219,400 m^3
Footprint Area (ha)	6.07
Peak Elevation – top of waste (mAMSL)	220.75
Maximum Daily Truck Traffic	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day

3.3 Climate, Air Quality and Odour

3.3.1 Hamilton Climate Station

The Hamilton Climate Station is a weather station located at Hamilton's John C. Munro International Airport (43.1N, 79.5W, elevation 237.7 m). The station has been operating since January 15, 1970 under World Meteorological Organization (WMO) ID 71263. The Hamilton Climate Station was selected as it is the closest representative station to the Site that has hourly documented climate data since 2010. Data from this station is published online at Environment Canada's National Climate Data and Information Archive. Hourly data from the station was analyzed to determine prevalent atmospheric conditions that are considered representative of the Site.

Figure 3.1 presents a five-year wind rose for the Hamilton Climate Station for the period between 2017 and 2021 and Figure 3.2 presents the wind class frequency distribution. The dominant wind directions, as shown on Figure 3.1, are from the southwest, and northeast.

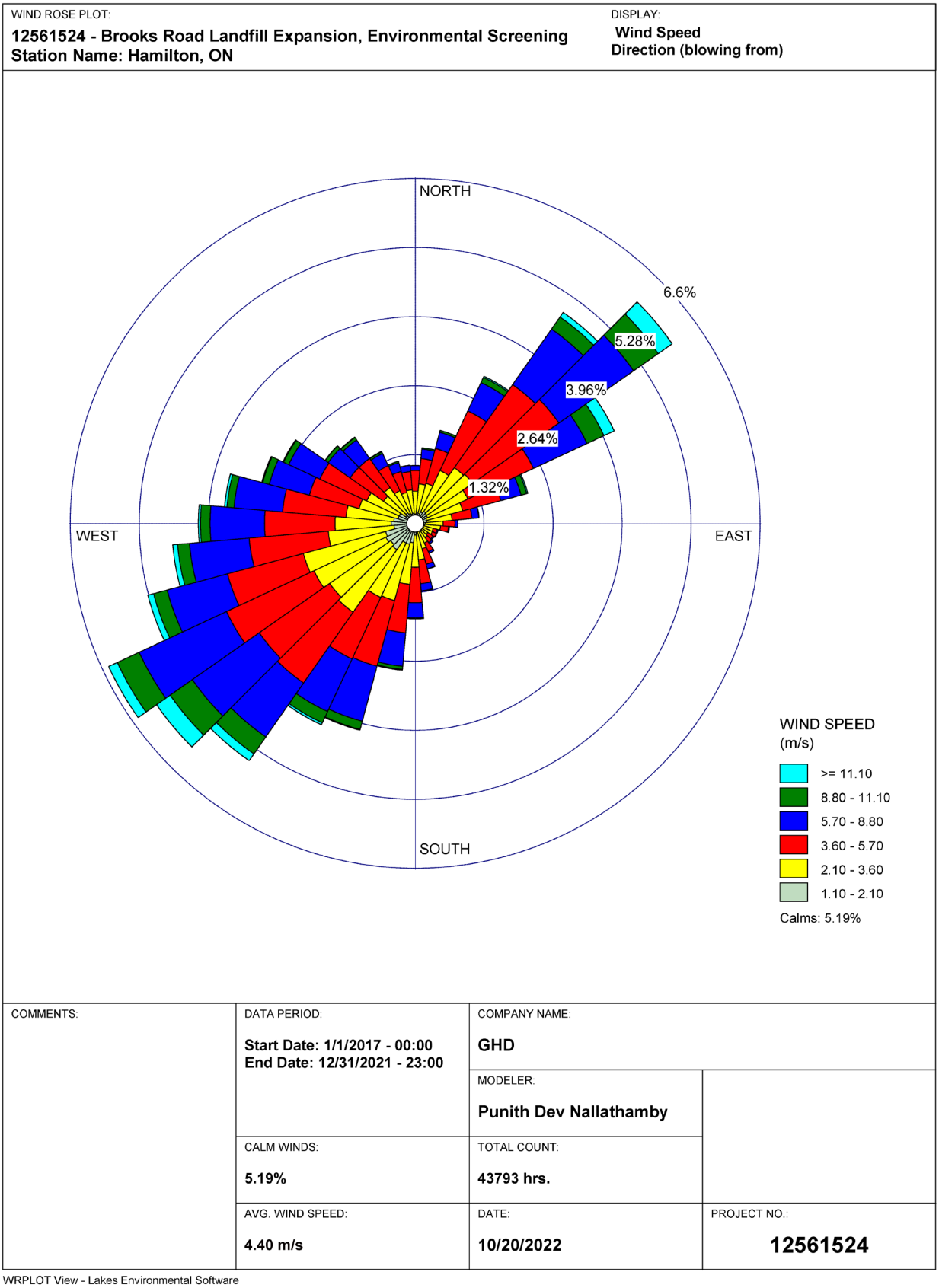

Figure 3.1 Wind Rose, Hamilton AP (2017 – 2021)

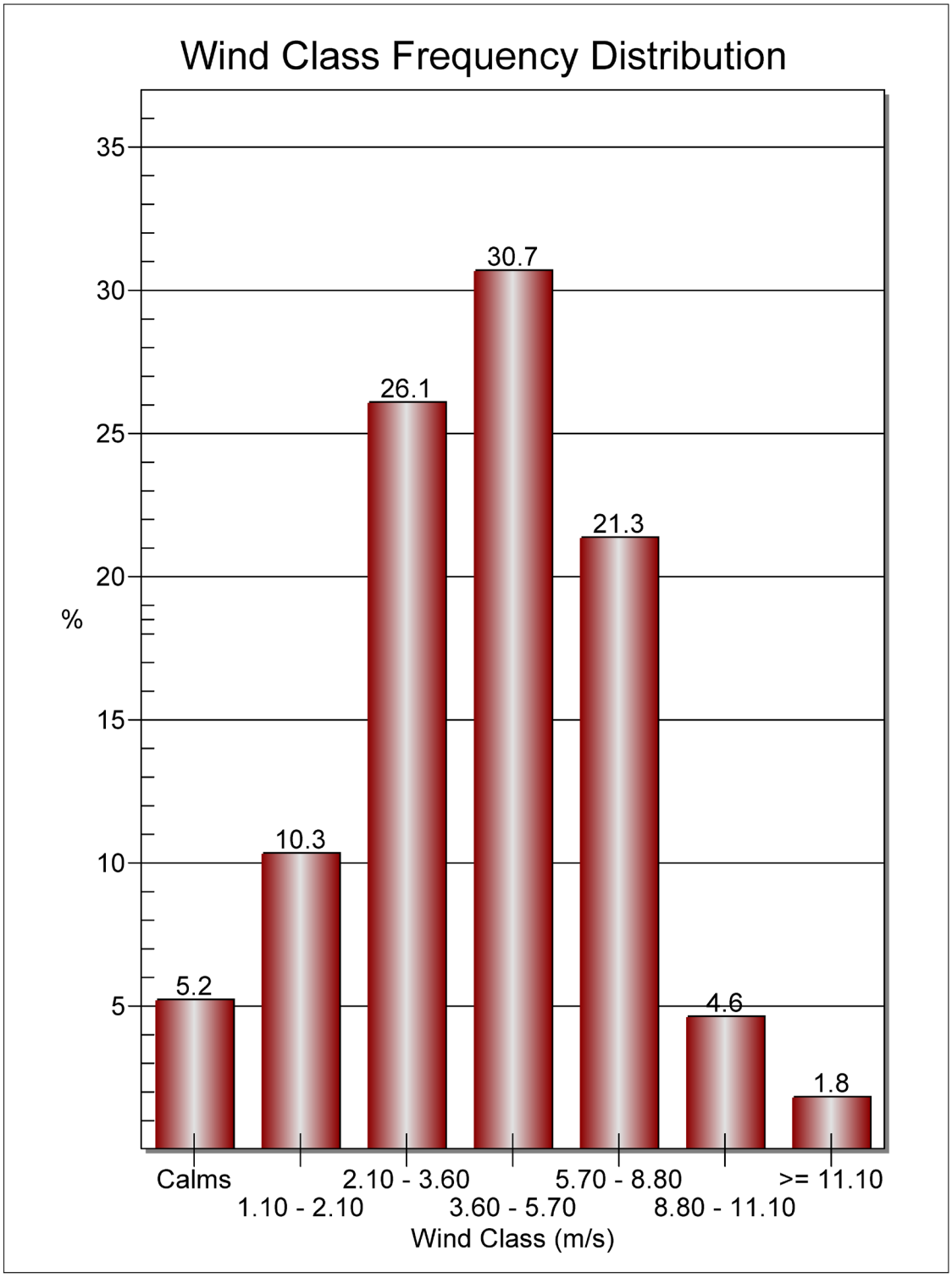

Figure 3.2 *Wind Class Frequency Distribution*

3.3.2 Air Quality

The Site is located approximately 2.8 km northeast of Cayuga and 25 km south of Hamilton and is surrounded by agricultural land. The closest receptor (as per the August 2024 Odour Management Plan) is approximately 223 m from the Site and there are no major industrial sources within the Study Area. The Site has a berm that runs along the west side of the Site and a clay stockpile located along the north side that reduces the line of sight and fugitive particulate matter emissions when the Site is in operation.

3.3.2.1 Vehicle Emissions

Particulate emissions related to vehicles operating at the landfill are the primary emissions of concern at the Site. Particulate may be defined in various particle size categories; including total suspended particulate (TSP), particulate less than 10 microns (PM_{10}) and particulate less than 2.5 microns ($PM_{2.5}$). All fractions of particulate were previously assessed for the potential landfill emissions. There is no change in the TSP, PM_{10}, or $PM_{2.5}$ emissions from the previous assessment as the proposed operations were assessed and fugitive dust management plans implemented.

3.3.2.2 Indicator Compounds

As identified above, TSP, PM_{10}, and $PM_{2.5}$ were previously included in the assessment as they are the primary emissions of concern at the landfill. Potential TSP, PM_{10}, and $PM_{2.5}$ emissions from vehicle exhaust and break and tire wear for the on-Site vehicles was concluded to be insignificant based on results from previous assessments and were not included in this assessment.

Other tailpipe/combustion emissions, such as nitrogen oxides (NO_x) and carbon monoxide (CO), can also be concluded to be insignificant based on the small volume of daily traffic at the landfill, and the significant distances to sensitive receptors. The potential concentrations of NOx and CO that a person might be expected to be exposed to near a municipal road would far exceed the concentrations of these compounds at the landfill boundary. Therefore, it may be concluded that NO_x and CO emissions from the vehicles at the landfill continue to be insignificant contributors to the background concentrations of these compounds as the traffic volumes have remained the same.

Landfill gases, such as hydrogen sulfide (H2S) and vinyl chloride, can also be concluded to be insignificant based on the operations at the landfill. GHD completed a theoretical landfill gas generation rate for the Site. Based on the existing and proposed waste to be disposed at the Site, it was determined that the maximum amount of landfill gas that will be generated is less than approximately 200 cubic feet per minute (in 2026). This would be distributed over an area of approximately 7.09 hectares or 70,900 square metres, resulting in a landfill gas exit velocity of only 0.00007 metre per second. This amount of landfill gas generation is anticipated to be insignificant from an overall Site profile and therefore landfill gases are not included in any further assessment.

Odours from the operations have not been further assessed. Due to the nature of the material being landfilled and the previous assessment that evaluated the proposed conditions there is no change in the odour profile for the Site.

3.3.2.3 MECP Air Monitoring Data

The MECP has ambient air monitoring stations across Ontario that measure a variety of pollutant concentrations. Typically, the stations monitor criteria air contaminants, such as nitrogen oxides, carbon monoxide, sulphur dioxide, and particulate matter, with the exception of some specialized monitors that measure speciated volatile organic compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAH). There are no active monitoring stations within the Study Area, therefore, the monitor located in Hamilton (29102), Ontario was chosen as the closest monitor to the Site.

The Hamilton station monitors nitrogen oxides, ground-level ozone, and $PM_{2.5}$. The Hamilton station is located towards the north in Hamilton and is expected to be influenced by the industry within the City of Hamilton. The focus of this assessment is on the various size fractions of particulate matter. Although the Hamilton Station is not representative of the Site, the data from this location has been included for completeness. The focus of this assessment is on the TSP, PM_{10}, and $PM_{2.5}$. These fractions of particulate matter are the main containments that will be released at the Site.

Hourly readings and 24-hour average values are provided as part of the Hamilton air monitoring data set for $PM_{2.5}$. The Hamilton monitor is located in a predominantly urban area. Therefore, the $PM_{2.5}$ concentrations around the Site are expected to be much lower compared to the monitoring station.

As shown in Table 3.2, the concentration for $PM_{2.5}$ for the 24 hour averaging period is below its respective Canada Ambient Air Quality Standard (CAAQS). The Annual average of the monitoring data indicates $PM_{2.5}$ levels are slowly increasing over time. However, this is a result of an increase in industry in the vicinity of the Hamilton monitoring station and is not expected to be the trend for the Site and its surrounding area. Based on the monitored data, the $PM_{2.5}$ background concentrations in the vicinity of the Site are expected to be well below the CAAQS. It is expected that the levels at the Site are significantly lower as they are not influenced by the industrial and populated areas of Hamilton.

As part of BRE's continuing commitment to ensuring that particulate matter emissions from the Site are minimized from amended operations the standard operating procedure (SOP) will continue to be deployed. The purpose of the SOP is to ensure Best Management Practices (BPMs) are implemented at the Site to reduce the potential generation of particulate matter results. This includes, but is not limited to, the watering and sweeping of roads that equipment uses to travel the Site.

Table 3.2 $PM_{2.5}$ Concentration ($\mu g/m^3$) reported from the Hamilton Monitoring Station (STN29102)

	Monitoring Period					
Averaging Time	**2019**	**2020**	**2021**	**Average**	**CAAQS**	**Statistical Form**
24 hour	22.0	22.4	27.5	23.9	27	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
Annual	9.1	10.1	10.7	10.0	8.8	The 3-year average of the annual average of the daily 24-hour average concentrations

3.3.3 Odour Quality

The Site has a functional leachate treatment facility to minimize the generation of odours at the Site. The most recent odour monitoring was completed by GHD at the Site in 2022 and also confirmed that the leachate treatment system has reduced the potential for odour impacts. Faint odours were detected throughout the Site during the most recent odour monitoring, however, no odour that would be attributed to the Site was detected at any off-Site monitoring locations.

In addition to the on-Site and off-Site odour monitoring that was completed by BRE, GHD completed a theoretical landfill gas generation rate for the Site. Based on the existing and proposed waste to be disposed at the Site, it was determined that the maximum amount of landfill gas that will be generated is less than 200 cubic feet per minute (in 2026). This would be distributed over an area of approximately 7.09 hectares or 70,900 square metres, resulting in a landfill gas exit velocity of only 0.00007 metre per second. This amount of landfill gas generation is anticipated to be insignificant from an overall odour Site profile.

As part of BRE's commitment to ensuring that odour complaints are minimized from the existing and proposed operations a standard operating procedure (SOP) was developed. The purpose of the SOP is to include odour mitigation measures that would be implemented to ensure that odour complaints are investigated and the condition that resulted in the odour complaint is mitigated.

4. Potential Effects, Mitigation Measures & Net Effects

A Project Description, which includes proposed engineering design figures, was prepared so that potential environmental effects and mitigation measures could be identified. The following subsections provide a general summary of the proposed undertaking.

4.1 Description of Project Components and Activities

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This would be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours, as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours. The former railway property would continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in Table 4.1.

Table 4.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted by 30 m. East and west ditches will extend to maintain full perimeter ditch.

Design Component	Existing Landfill	Proposed Capacity Expansion
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Methodology and Investigations

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in Section 2 of this report.

4.2.1 Potential Odour Effects

Ontario does not have an odour standard. However, a value of one odour unit (OU) is sometimes used by the MECP as a limit for odour impacts at sensitive receptors such as residences. Based on the existing conditions odour studies, it has been shown that the frequency of exceedances of the odour levels at the nearest sensitive receptors will not exceed than 0.5% for any modelled year.

As discussed previously, the estimated landfill gas production for the Site is extremely small and is not expected to result in any off-Site odour impacts.

Additionally, GHD conducted numerous odour analyses in 2014, 2016, 2017, 2019 and 2022 and concluded that there were high on-Site odour levels near the leachate tank and the working face in the earlier studies but were lower in the 2019 studies after the installation of the leachate treatment system. Odours at the concentration currently observed at the Site typically do not result in complaints at off-Site sensitive receptor locations. This has been investigated through numerous odour monitoring programs that did not identify any on-Site odours being observed at off-Site locations.

Lastly, the Site currently implements several operational measures in order to reduce and/or mitigate odour impacts from the Site and will continue to implement these operational measures. These include:

– Continuing with the daily odour monitoring program carried out by the Site Operator.
– If odours are evident on the property boundary, increase the amount of daily cover applied on the waste.
– Minimize the active working face. Apply interim cover at a minimum thickness of 300 mm on areas of the landfill where landfilling has ceased for 6 months or more.
– Continue with the use of odour control granules for odour mitigation. Assess areas of placement and their effect on odour mitigation.

4.2.2 Potential Air Quality Effects

The air contaminant of concern for this Site is particulate matter. Other air contaminants are expected to be insignificant. As previously discussed, potential tailpipe and brake and tire wear emissions from vehicles operating at

the landfill are insignificant. Also, the estimated landfill gas production of only 200 cfm confirms that any potential off-Site impacts of compounds in the gas, such as methane, would be insignificant.

Particulate is primarily produced by vehicle traffic on the landfill roads. The particulate matter that is of concern is based on the re-suspension of particulate matter from traffic on the roads. The tailpipe and brake and tire wear has been determined to be insignificant sources of particulate matter. The Ontario ambient air quality criterion for TSP is 120 µg/m^3 on a 24-hour basis. There are other particulate provincial and federal criteria for PM_{10} and $PM_{2.5}$. These particulate emissions would also occur from vehicle traffic on the landfill roads.

It is GHD's experience that if one can show compliance with the TSP standard, a site with road traffic being the major source, then the PM_{10} and $PM_{2.5}$ concentrations will also be below criteria.

However, for completeness, GHD has modeled the TSP, PM_{10} and $PM_{2.5}$ emissions in the assessment of the alternatives.

The TSP, PM_{10} and $PM_{2.5}$ emissions from the on-Site roads were estimated based on truck traffic and emissions factors from the United States Environmental Protection Agency (USEPA).

Particulate off-site concentrations were estimated using the AERMOD air dispersion model which is an approved dispersion model under Ontario Regulation 419/05. The AERMOD model incorporates 5 years of meteorological data to determine the worst-case air concentration. Therefore, the modeling results can be considered to be conservative.

The on-Site haul roads were previously modelled for 50 trucks per day. This is the same amount of daily trucks proposed in this amendment. The Site has paved the on-Site roadway from the Site entrance to the landfill as was identified in the previous study.

TSP, PM_{10} and $PM_{2.5}$ from the Site were previously evaluated at the property boundary and all residential dwellings. The predicted worst case particulate impact at the property boundary is as follows:

– TSP – 50 trucks per day - 122.4 µg/m^3
– PM10 – 50 trucks per day – 64.18 µg/m^3
– PM2.5 – 50 trucks per day – 8.8 µg/m^3

The predicted maximum worst case particulate impact at the sensitive receptors is as follows:

– TSP – 50 trucks per day – 5.78 µg/m^3
– PM10 – 50 trucks per day – 4.56 µg/m^3
– PM2.5 – 50 trucks per day – 0.61 µg/m^3

MECP AAQC for TSP is 120 µg/m^3, 50 µg/m^3 for PM_{10}, and 27 µg/m^3 for $PM_{2.5}$. The modelled concentration at the sensitive receptors are well below the MECP AAQC for all particulate matter fractions. The modelled concentration at the property boundary is right at the AAQC for TSP and PM10 and the concentration of PM2.5 remains well below the MECP AAQC. There have been no changes to the modelled impacts from the previous application.

4.3 Air Quality & Odour Net Effects

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a "Yes" answer was given in the Screening Criteria Checklist) for those Air Quality and Odour criteria which might be affected by the project as identified in Section 2. The effects assessment describes how existing environmental conditions in the Study Area(s) would change as a result of the construction and operation of the proposed undertaking.

As described in Section 2, a "Yes" was applied to the following Air Quality and Odour criteria:

– Cause negative effects on air quality due to emissions (for parameters such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other contaminants)?

– Cause negative effects from the emission of greenhouse gases (e.g., carbon dioxide, carbon monoxide, methane)?
– Cause negative effects from the emission of dust or odour?

With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.3.1 Potential Effects on Air Quality and Odour

As previously mentioned, the previous application was completed assuming the proposed parameters and there are no changes to the Air Quality and Odour Environment.

4.3.2 Mitigation Measures

The Site has completed numerous mitigation measures since the previous application such as the introduction of SOPs for odour and dust and operation of a leachate treatment system. The Air Quality and Odour were assessed for the proposed conditions in the previous assessment and the identified mitigation measures were implemented. The Site is committed to continuing the mitigation measures.

4.3.3 Net Effects

No change to the net effects from the existing landfill operation are anticipated as a result of the proposed capacity change, based on the continued implementation of the mitigation measures.

5. Monitoring Requirements and Additional Approvals

To ensure that the mitigation measures identified in **Section 4.0** are implemented as envisioned, a strategy and schedule was developed for monitoring environmental effects. With these mitigation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the proposed undertaking.

5.1 Monitoring Requirements

There are no additional monitoring requirements at this time.

6. Conclusion

There has not been a change in the Air Quality or Odour environment since the previous amendment. The previous amendment was assessed based on the proposed conditions in this amendment. The previous assessment showed that the concentrations of TSP, PM_{10} and $PM_{2.5}$ were all well below the AAQC at the sensitive receptors and will continue to be so with the proposed amendment. The cumulative effect for $PM_{2.5}$ was below the $PM_{2.5}$ AAQC at the sensitive receptors as well. The Site has implemented the control measures that were identified in the previous

assessment and will continue with these controls to minimize the Air Quality and Odour impacts from the Site operations.

The Site previously completed an Odour Management Plan based on the proposed conditions and sources. The proposed capacity expansion is not expected to change the odour profile of the Site or the management of odour. The Site will continue to strive for zero odour complaints from the Site operations. The Odour Management Plan will be updated and submitted as part of the ECA process.

The change in the predicted gas generation rate for the Site is negligible compared to previous assessments and is not expected to have an impact on the air emissions from the site. The Site is in the process of updating the Emission Summary and Dispersion Modelling (ESDM) Report for this negligible change for submission and review by the Ministry of Environment, Conservation, and Parks (MECP) as part of the ECA process.

Appendix A

Odour Management Plan

Odour Management Plan

Brooks Road Landfill Site
Haldimand County

2270386 Ontario Limited

18 March 2024

→ The Power of Commitment

Project name		Brooks Road Landfill Stage 9					
Document title		Odour Management Plan | Brooks Road Landfill Site					
Project number		12561524-RPT-13					
File name		12561524-RPT-13-Odour Management Plan					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
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Contents

Figure index

Table index

Appendices

Version Control History

Date	Description of Changes	Author/Reviewer Initials
September 2022	Original Document	PN/MG
October 2023	Updated gas volumes	AC/MG
March 2024	Updated gas volumes	MG/DB

1. Introduction

GHD was retained by Brooks Road Environmental (BRE) to prepare an Odour Management Plan (OMP) for the Brooks Road Landfill Site (Site) located in Cayuga, Ontario. The Site is located at 160 Brooks Road in Cayuga, Ontario approximately one kilometre north of Kings Highway No. 3 (Talbot Road). A Site location plan is provided as Figure 1. The Site operates under Waste amended Environmental Compliance Approval (ECA) number A110302 (Waste ECA), Industrial Sewage amended ECA number 1122-BKUPSM (Industrial Sewage ECA), and Air ECA number 7323-C6EJUM (Air ECA).

The purpose of this OMP is for persons engaging in activities at the Site to be aware of all odorous sources at the Site, potential causes of odourous emissions and to implement best practices and procedures to minimize odours.

This report contains the following:

– A description of the Site infrastructure
– Approval requirements related to odour
– Potential on-Site sources and causes of odour
– An Emissions Summary and Dispersion Model (ESDM) for the Site
– Inspection, maintenance and monitoring procedures
– Mitigation measures
– Contingency measures
– Complaint response procedures
– Training
– Recording keeping
– Landfill gas mitigation plan

As required, this document will be reviewed on an annual basis in accordance with ECA A110302 and updated as necessary to reflect applicable changes.

1.1 Change Log

The following changes were made in the October 2023 document:

– Updated based Stage 9 and 219,400 m^3 of additional airspace for a total landfill capacity of 1,264,465 m^3 and associated revisions to the ESDM in Appendix A.

1.2 Scope and Limitations

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

2. Facility Description

The Site operates as a landfill. The total Site area is 14.3 hectares (ha) (35.3 acres) of which 6 ha (15 acres) is approved for landfilling. The Site is bounded to the north by a rural property consisting of undeveloped fields (i.e., long-term inactive agricultural crop production lands) and forested areas. To the south and east of the Site is undeveloped rural property consisting of a combination of fields and forested areas. The Site is bounded to the west by Brooks Road. On the west side of Brooks Road is an undeveloped rural property which is characterized primarily by undeveloped fields with occasional bush lots.

The Site has an approved fill rate of up to 1,000 tonnes per day, with a proposed maximum of 250,000 tonnes per year and a capacity of 1,264,465 cubic metres (m^3) (including waste and daily cover). The Site is approved to accept solid non-hazardous Industrial, Commercial, and Institutional (ICI) waste, including contaminated soils and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), generated from within the geographic boundaries of the Province of Ontario. Waste is brought to the Site by truck, inspected and weighed at the weigh scale located in the Site entrance, and then transported to the active tip face for disposal. The active tip face location varies over time as the landfill is filled. All exposed waste is covered by daily cover at the end of the work day. Any areas of the landfill where waste will not be placed for a period of 6 months or more is covered by a layer of interim cover a minimum of 300 mm thick. As the landfill reaches final waste contours, it will be progressively closed by installing final cover, which consists of 600 mm of compacted clay and 150 mm of topsoil.

The Site operates a leachate treatment system (LTS) that treats leachate generated in the landfill. Leachate is collected in the leachate collection system (LCS) and conveyed to a sump in the southeast corner of the landfill. From the sump, it is pumped to the LTS. The LTS consists of a treatment system and an effluent discharge system. The treatment system consists of a primary settling tank located adjacent to the landfill sump, an aeration system including two, below-grade, concrete tanks and a dissolved air flotation (DAF) unit, a membrane biofiltration reactor (MBR), ultraviolet (UV) disinfection, a sludge storage tank, and chemical feed systems. The treatment system has a rated capacity of 200 m^3/day. The effluent discharge system consists of an effluent transfer tank, three effluent discharge holding tanks, and discharge piping from the effluent discharge holding tanks to the Brooks Road roadside ditch. The discharge to the Brooks Road roadside ditch has a rated capacity of 45 m^3/day on average and 60 m^3/day at peak and discharges continuously. Treated effluent from the treatment system generated in excess of the rated capacity of the discharge to the roadside ditch is stored in the effluent discharge holding tanks prior to removal from the Site by tanker trucks to a licensed facility.

3. Approval Requirements

3.1 Environmental Compliance Approval

The Site is required to prepare an OMP based on Condition 3(1) outlined in the Site's Air ECA. This OMP is subject to an annual review and to be included in the annual report in accordance with Condition 12(7)(e) of the Site's Waste ECA.

The OMP details the method of monitoring Site-originating fugitive odours, provides mitigation measures to prevent nuisance odour complaints, provides contingency measures to address potential ongoing odour issues, and the respective scenarios in which the contingency measures are to be implemented. These monitoring methods,

mitigation measures, and contingency measures are provided to detail the efforts to be taken in accordance with Conditions 2(2), 2(3), and 2(4) of the Air ECA.

4. Potential Odour Sources

The sources identified below are considered the main sources of potential odour at the landfill. The potential causes of odour impacts for each source are also discussed below. Mitigation measures are discussed in Section 7.0 of this report. The location of the potential odour sources are provided in Figure 2. The sensitive receptors that were included in the ESDM Report are provided in Figure 3.

4.1 Waste Receiving

The Site receives non-hazardous ICI waste including contaminated soils and process organic waste (e.g. de-watered sewage sludge from the Caledonia Sewage Treatment Plant). The waste material is transported to Site using trucks. The Site can currently receive a maximum of 1,000 tonnes of waste per day.

Waste receiving may generate odour through the queuing of trucks transporting waste to the Site.

The potential for odours during waste receiving activities depend on:

– Queue time for waste transport trucks
– Characteristics and/or composition of the waste material
– Truck cover or container type
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from waste receiving operations include:

– Ensure all trucks bringing waste to the Site maintain tarps and keep contents enclosed until they reach the active face.
– Schedule arrival of waste trucks such that trucks do not need to queue at the entrance while waiting to be inspected and weighed.
– Once a truck has completed tipping, close or tarp the truck prior to leaving the active face.

4.2 Landfill Working Face

Trucks transporting waste to the Site complete an incoming weigh-in and then travel to the landfill working face to unload. Heavy equipment, including excavators and landfill dozers/compactors handle the waste and compact it within the working face. At the end of the day, the working face is covered by daily cover in accordance with Condition 3(24a). This daily cover may consist of soil, compost, wood chips, or other approved daily cover.

The potential for odours during landfilling activities depend on:

– The footprint size of the active face
– The location of the active face
– The location of previously-placed, odour-generating waste
– Characteristics and/or composition of the waste
– Type and amount of daily cover used to cover the working face
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from the landfill working face include:

– If any particularly odourous waste arrives on Site, ensure that it is covered immediately after placement and/or consider placement in a location furthest from the receptors noted on Figure 3. Place in a location and depth so as to prevent accumulation of water that could increase the landfill gas generation from this waste. All waste has the potential to generate odour but waste that may be particularly odourous include but are not limited to:
  - Waste with organics
  - Processed organic waste (dewatered sewage sludge from the Caledonia Sewage Treatment Plant)
  - Waste that is high in sulphur content
– If waste from a particular source or of a particular composition is identified to be odourous, Site staff will make note of when this material is being delivered to the Site and the weigh scale attendant will notify the landfill attendant to plan for appropriate placement of the material.
– Apply daily cover at the end of each working day.
– Keep the active face as small as reasonable for operations.

4.3 Leachate Collection System and Leachate Treatment System

Leachate is collected from the landfill by the LCS and conveyed through a primary settling tank, to the LTS for treatment and disposal. Treated effluent is stored in effluent holding tanks. Treated effluent is periodically loaded into tanker trucks for shipment to facilities licensed to accept the treated effluent. Leachate may occasionally be loaded into tanker trucks from the LCS or from temporary storage tanks. Potential odour generation from leachate management may include exposed locations of the LCS granular drainage blanket, the LCS cleanout or sump riser pipes, and LTS tanks.

The potential for odours from leachate collection and storage depends on:

– Volume of leachate stored in temporary tanks
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from the leachate collection and treatment systems include:

– Reduce storage of leachate in tanks
– Keep all LCS cleanout pipes and riser pipes sealed with a blind flange
– Keep the granular drainage blanket of the LCS at the top of slope covered

4.4 Covered Portions of the Landfill

Covered portions of the landfill include areas completed with interim cover or final cover. Odour may originate from the emission of landfill gas from cracks, or seeps in interim or final cover.

The potential for odours from covered portions of the landfill depends on:

– Condition of the cover
– The location of previously-placed, odour-generating waste
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from covered portions of the landfill include:

– Apply interim and final cover over portions of the landfill that are temporarily not to receive waste or are completed to final grades
– Maintain vegetation on final cover
– Inspect covered portions of the landfill quarterly

The above potential odour sources were identified during the on-going operations. If other sources of odour are present the OMP will be updated to account for them.

5. Emissions Summary and Dispersion Modelling

GHD has prepared an ESDM Report attached as Appendix A. The ESDM Report was prepared in accordance with s.26 of Ontario Regulation (O. Reg.) 419/05 and considers potential sources of contaminants, including odour. Dispersion modeling was used to determine maximum potential Point of Impingement (POI) concentrations at potential receptors with all sources operating at maximum potential emission rates. The resulting POI concentrations are compared to criteria published in the MECP Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants. The ESDM Report indicates that the Site can operate in compliance with O. Reg. 419/05.

6. Inspection, Maintenance and Monitoring Procedures

Regular inspections allow Site operators to identify odours and initiate responsive actions to prevent the odours from having negative effects off-Site. Daily Site inspections are required per Condition 12 of the Waste ECA. The Site is inspected on a daily basis by shift supervisors and includes inspection for fugitive odours. A daily inspection ensures that potential issues are addressed immediately. All inspections should be documented in the Inspections Log, which is provided as Appendix B.

The entire Site will be inspected on a daily basis in accordance with Condition 12 of the Waste ECA and emphasis should be placed on the following areas of the Site, with respect to the potential for odour generation:

– Waste receiving area
– Landfill working faces
– Closed areas
– Leachate collection system, storage tanks

Other activities that should occur during the inspection include:

– Evaluate the waste receiving area and truck queue times to ensure that waste is landfilled in timely fashion.
– Evaluate the size of the working face. The size of the working face should not be oversized.
– Check that a daily cover is applied to the working face at the end of each working day.
– Evaluate the interim and final cover in closed/decommissioned areas of the landfill for cracks, fissures and/or erosion and evaluate the coverage and health of vegetation.

– Inspect the leachate collection system, storage tanks for exposed areas, leaks and spills.
– Determine and document weather conditions including wind speed, direction, humidity, precipitation, and temperature.

If an odour is confirmed to be coming from an on-Site source and can be detected at the property boundary, mitigation measures should be implemented and documented in the daily log. Subsequent daily inspections must include inspection of the source area and mitigation measures implemented to determine if effective odour prevention and control is being accomplished.

The Site Supervisor is responsible to ensure this OMP is followed by landfill operators.

7. Mitigation Measures

The following section lists mitigation measures to reduce the potential for fugitive odours to migrate to off-Site receptors. These mitigation measures are intended to be implemented within one working day in response to the detection of odour during daily inspections or in response to an odour complaint confirmed to be as a result of Site operations.

7.1 Waste Receiving

If odour is determined to be emanating from the waste receiving operations, such as the trucks entering the Site for inbound or outbound weighing, the following are potential mitigation measures to implement:

– Discuss with waste generators if efforts can be made to minimize odours from waste prior to coming to the Site.
– Investigate if trucks are removing tarps/covers prior to reaching the active face or failing to reinstate tarps/covers prior to leaving the active face and direct haulers to maintain covers in accordance with Section 4.1.

7.2 Landfill Working Face

If odour is determined to be emanating from the landfill working face, the following are potential mitigation measures to implement:

– Apply daily cover to portions of the working face to limit its size for the remainder of the day
– Apply additional daily cover material
– Apply odour control granules to the daily cover
– Operate the odour control misting system if climatic conditions are appropriate

7.3 Leachate Collection System and Storage Tank

If odour is determined to be emanating from the leachate collection system or storage tanks, the following are potential mitigation measures to implement:

– If an area of the leachate collection system granular drainage blanket is identified to be exposed, place cover material over the exposed area and apply odour control granules.
– If a blind flange is determined to have been removed from a leachate collection system cleanout or sump riser pipe, reinstall the blind flange(s).

– If any raw leachate is being temporarily stored in an above ground tank and odour is determined to be emanating from the tank, if applicable, drain the tank back to the landfill.
– If odour is determined to be coming from loading of a tanker truck with raw leachate and climatic conditions are appropriate, operate the odour control misting system. Consider if tanker loading can be postponed if climatic conditions are increasing the odour migration.

7.4 Covered Portions of Landfill

If odour is determined to be emanating from a covered portion of the Landfill, such as from a crack in interim or final cover, the following are potential mitigation measures to implement:

– Apply odour control granules to the crack.
– For interim cover, wet the area, scarify, apply additional cover soil, and compact the soil to repair erosion or cracking due to desiccation. Evaluate if additional repair work is necessary.
– For final cover, initiate a repair in accordance with the final cover repair contingency measure noted in Section 8.

8. Contingency Measures

Contingency measures represent actions that may be required if odour is confirmed to be coming from the Site and the implementation of preventative and mitigation measures described in Sections 4 and 7, respectively, are deemed to be ineffective. Contingency measures are intended to be actions that would take longer than a day to implement and may warrant additional investigation activities.

In accordance with Condition 2(3) of the Air ECA, if odour is not mitigated through implementation of mitigation measures, the MECP District Manager may provide written notice to conduct an investigation as to why the odour was not mitigated and assess the need for implementation of contingency measures.

To evaluate a mitigation measure, the area or practice identified to be contributing to the detected odour will be inspected as part of subsequent daily inspections. Where mitigation measures are implemented, the inspection will also include evaluation of the observed effectiveness. If the odour source is determined to continue to be resulting in off-Site impacts and the mitigation measures are observed to be ineffective, or if the MECP District Manager issues notification requiring the implementation of additional measures, then an investigation will be conducted per Condition 2(3) and include assessment of potentially effective contingency measures. Such an investigation will be provided to the MECP District Manager within the time frame identified in the notice pursuant to Condition 2(3).

Prior to implementation of contingency measures, the applicability of the proposed contingency measures will be assessed based on the confirmed source of odour. Potential contingency measures are identified in the sections below.

8.1 Application of Interim Cover

If an area of the landfill will not have waste placed for 6 months or more, interim cover should be applied.

Interim cover should be applied at a minimum thickness of 300 mm and should consist of low permeability soil in accordance with Condition 3(24) of the Waste ECA. Interim cover can be sourced from the on-Site clay stockpile. Heavy equipment including an excavator, rock trucks, a bulldozer, and a compactor would be required to move and place interim cover soil. The on-Site clay may require the addition of moisture if it is noted to be dry during placement.

Application of interim cover is expected to take approximately 4 weeks to implement and could take longer depending on the size of the targeted interim cover area.

8.2 Application of Final Cover

If an area of the Landfill has reached final waste grades as shown in the D&O Report, final cover may be applied.

Final cover consists of a minimum 600 mm thick low permeability soil with 150 mm of vegetated topsoil and must comply with Condition 3(24) of the Waste ECA. The additional thickness and use of a vegetated topsoil layer helps prevent desiccation of the cover, which may result in cracks that could release odour. On-Site clay may only be used for final cover if it can be tested to indicate a construction methodology that allows a minimum 150 mm of infiltration per year. Therefore, material may need to be sourced from off-Site. Topsoil would also require procurement. Heavy equipment including an excavator, rock trucks, a bulldozer, and a compactor would be required to install final cover.

Application of final cover is expected to take approximately 2 months to implement and could take longer depending on the size of the targeted final cover area.

8.3 Repair or Re-Vegetation of Cover

Interim or final cover may dry over time and begin to desiccate. This could lead to the development of cracks where odour can escape.

Cracks in interim or final cover can be repaired through:

– Removal of any vegetation and topsoil around the crack
– Application of moisture
– Scarification of the low permeability soil
– Placement of additional low permeability soil
– Compaction of the repaired area

If the repair is on final cover, the repaired area also requires the placement of 150 mm of topsoil and re-vegetation.

Areas of final cover observed to have poor vegetation are susceptible to crack development. If poor vegetation coverage is noted on final cover, the area can be re-vegetated through placement of additional topsoil and hydroseed.

Though not required for interim cover, if interim cover is observed to continually develop cracks, placement of topsoil and hydroseed can minimize this concern.

The implementation timeline for repair and revegetation of cover materials varies depending on the area requiring repair and may take between 2 weeks and 2 months.

8.4 Application of Odour Suppressing Material

If the active waste face is producing odour that can’t be mitigated through application of daily cover, reduction in size or odour control granules, additional odour suppressing material may be warranted. There are various landfill odour suppression materials available that include:

– Foams
– Sprays
– Biological covers

These materials may require bench-scale testing to determine appropriate usage. Application of odour suppressing material does not eliminate the requirements for application of cover materials in accordance with Condition 3(24) of the Waste ECA.

Odour suppressing materials will take approximately 3 weeks to source and up to 8 weeks to adjust formulation/application. Once conditions and materials have been determined, subsequent applications can be completed within 1-week.

8.5 Relocation of the Active Face

During the progressive landfilling at the Site, the active waste face will change locations frequently. The location of the active waste face and seasonal climatic conditions may result in an increased potential for odour generation and migration. If seasonal climatic conditions are determined to increase odour levels at the active waste face and the location is conducive to the potential for off-Site impacts, the active waste face may require relocation.

Relocating the active waste face may require removal of interim cover at another location and preparation of landfill access roads. Implementation of a relocated active waste face may take approximately 2 weeks. If the active waste face is relocated, daily cover must be maintained on the former active waste face. Interim cover application on the former active waste face may also be warranted, though not strictly required if landfilling will recommence in that area within 6 months.

8.6 Reduction in Incoming Waste Volumes

If the size of the active waste face is determined to be contributing to generation of odours and the waste face can not be reduced due to the volume of material to be managed in a day, the size of the active waste face may be reduced through rescheduling to reduce daily incoming waste volumes. If a portion of the incoming waste has a high odour potential, rescheduling waste shipments can reduce daily incoming rates of this waste.

Furthermore, receipt of odourous waste may be restricted.

Incoming waste rescheduling may take 2 weeks to achieve to work with generators and haulers to reschedule shipments.

8.7 Installation of Odour Control System on Piping or Tanks

If odour is determined to be coming from tank vents associated with the leachate collection and treatment systems under normal operating conditions, odour control may be required on the venting systems.

All tank vents are passive, in that there is no collection system. Therefore, if odour control on passive tank vents is considered necessary, a carbon filtration system may prove effective. Prior to implementation, the tank vent odour control system should be designed based on potential flow rates, odour-causing parameters, and connection details.

Installation of odour control systems on piping or tanks requires minor design effort and procurement, therefore implementation is expected to take approximately 2 months.

8.8 Surface Emissions Monitoring

If odour is determined to be emanating from the closed portions of the landfill and obvious cracks are not visible upon inspection, surface emissions monitoring may be conducted to identify “hot spots” where odour may be escaping from cover material. The identification of “hot spots” may be used in conjunction with other contingency measures to address the odour migration.

As there are no established guidelines in Canada for landfill surface emissions monitoring, the general intent of the surface emissions monitoring procedures outlined in the United States Environmental Protection Agency’s (US EPA’s) New Source Performance Standards (NSPS) Method 21 Guidelines per the Code of Federal Regulations (CFR) 40, Part 60, Subpart WWW would be used.

In general accordance with the NSPS Method 21 Guidelines, observed areas with methane concentration readings in exceedance of 500 ppm will require re-monitoring and/or cover repairs/re-monitoring to ensure the corrective actions have successfully mitigated the emissions.

Other surface scanning methods to identify areas of concern may be considered, including thermal imagery through the use of aerial imaging equipment.

9. Complaint Response Protocol

The Site is committed to minimizing odour generation, as much as possible. On occasion there may be complaints regarding odour from the Site. Site workers are be trained on facility protocol for handling and recording complaints. The Site has a Complaint Protocol prepared in May 2020 that may be revised occasionally. The Complaint Protocol outlines the procedures to be implemented in response to receipt of a complaint either through the MECP or directly to the Site. The source of odour resulting in a complaint is investigated when the complaint is received in a timely manner.

The Complaint Protocol also includes a complaint form to be filled out by Site staff. The complaint form will identify any mitigation measures or contingency measures taken as a result of the complaint. The Complaint Protocol is provided as Appendix C. Currently the closest source of weather condition information is the Environment Canada – Hamilton A station. This station will be used during complaint investigation as a consistent source of weather condition information. If another source of weather condition information becomes available, the OMP and the Complaint Protocol will be revised.

10. Training

All employees at the Site are required to receive training on the contents of this OMP. Refresher training for all employees is recommended on an annual basis. Training requirements for management and non-management staff are identified below.

The non-management training should include the following topics:

– Approval requirements
– Potential sources of odour at the Site
– Preventative measures outlined in Section 4
– How to report findings of potential odour sources
– Odour complaint response procedures

The management training should include the following topics:

– All topics covered under non-management training
– Site inspection requirements
– Implementation of mitigation measures
– Initiation of investigations requested by MECP District Manager
– Implementation of contingency measures
– Recordkeeping and annual reporting requirements

All employees who receive training need to fill out the Training Log. The Training Log is provided in Appendix D.

11. Record Keeping

The following records should be kept on Site:

– Daily Inspection Sheets
– Complaint Response Sheet
– Training Signature Page
– A copy of this OMP for review or inspection by the MECP

In addition, this OMP will be reviewed on an annual basis through the annual report prepared in accordance with the Waste ECA. Any recommended changes to this OMP require revision to the report and submission to the MECP District Manager.

12. Landfill Gas Mitigation Plan

Landfill gas (LFG) is produced by the biological decomposition of wastes placed in a landfill. LFG composition is highly variable and depends upon a number of Site-specific conditions including solid waste composition, density, moisture content, and age. The specific composition of LFG varies significantly from landfill to landfill and even from place to place within a single landfill. However, LFG is typically comprised of methane (approximately 50 percent by volume) and carbon dioxide (approximately 50 percent by volume). LFG may also contain nitrogen (N2), oxygen (O2), and trace quantities of other gases (such as hydrogen sulfide (H2S), mercaptans, etc.). In addition to the above methane-related LFG constituents, non-methane organic compounds (NMOCs) such as vinyl chloride, may also be generated and emitted at a landfill.

As noted in the D&O Report, Ontario Regulation (O. Reg.) 232/98 requires the mandatory collection of LFG for sites with a total waste disposal volume greater than 1.5 million m^3. Given that the total landfill capacity including Stage 9 will be approximately 1,264,465 m^3, LFG collection is not required as per O. Reg. 232/98. Also based on the significantly low estimated LFG production rates, a LFG collection and control system is not considered feasible for the Site.

However, the landfill does produce LFG, which is a potential source of odour. LFG generation is affected by the composition of waste and the physical, chemical, and biological properties of the waste mound. Factors that may increase LFG generation or the odour in landfill gas include:

– Moisture in the landfill
– Methane generation potential of waste

Leachate management will reduce LFG generation rate through limiting the moisture content of the waste. The leachate management plan for the Site is described in the D&O, the Waste ECA, and the Leachate Removal Plan (LRP). The D&O describes the methodology of minimizing leachate generation through progressive closure and installation of interim and final cover to separate surface water from waste. The LRP describes the methods to reduce the leachate volume within the landfill to an average depth measured on the base liner of 0.3 m over a five-year period prior to landfill closure. The implementation of the leachate management plan serves to reduce the moisture content within the waste and reduce LFG generation. Compliance with the LRP is evaluated annually within the annual report required by the Waste ECA.

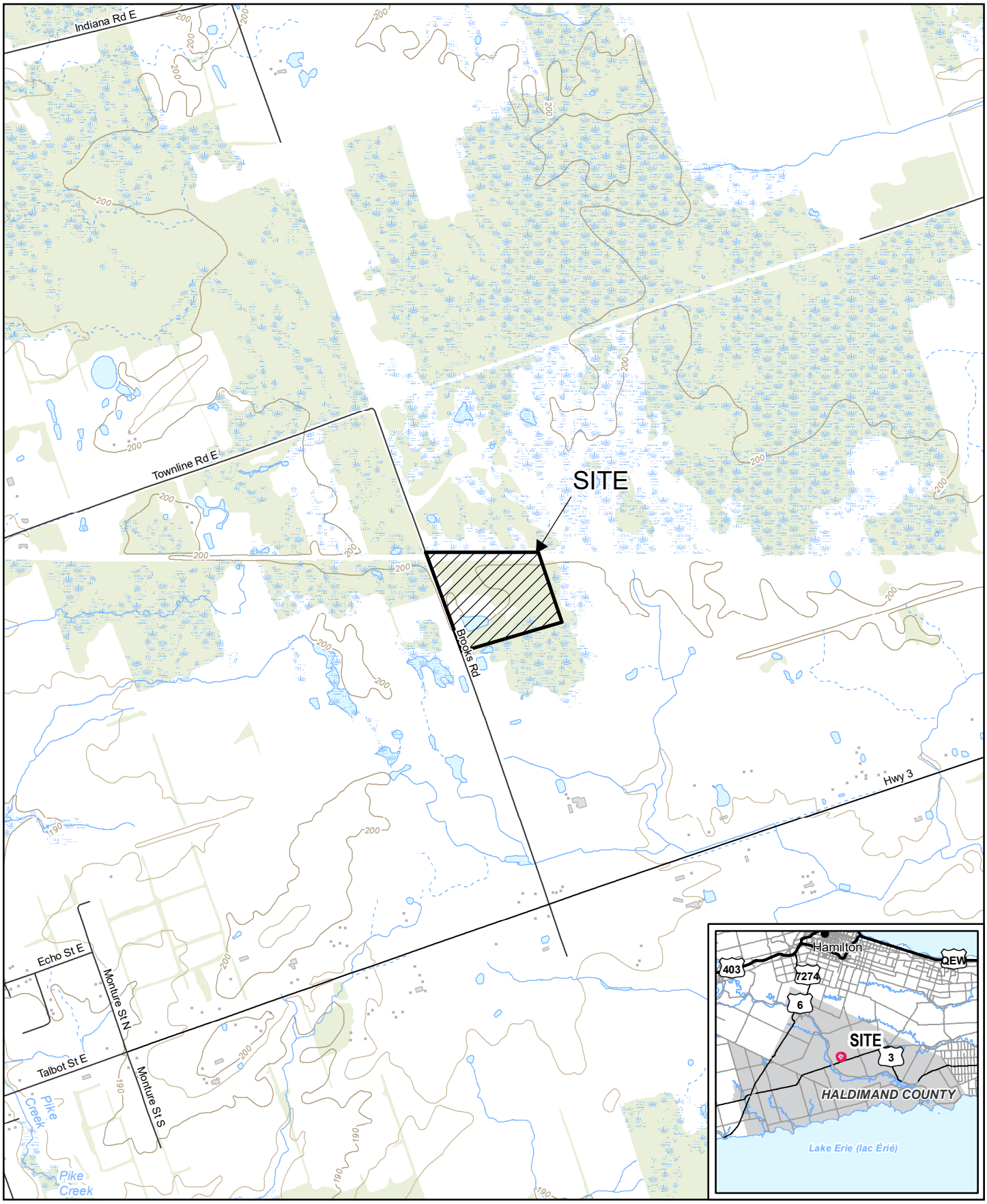
The LFG production assessment contained in the D&O report identified a waste composition based on data from 2009 through 2020. The assumed waste composition is provided below:

Table 1 Assumed Waste Composition by Type

Waste Type	Percent of Total	Waste Description	Total LFG Generated (tonnes per year)
Bulk Waste	5.7	Residential Rolloffs	2,856
C&D Waste	27.3	C&D from transfer stations, contractor demolition wastes, roofing/shingles	13,768
Sewage Sludge	0	Dewatered sludge from sewage treatment facilities	0
Garden Waste	0.6	Leaf and yard waste	313
Food Waste	1.9	Organics	952
Inert Waste	64.6	Glass, contaminated soil, ash	32,594

Mitigation measures to reduce LFG generation include continued compliance with ongoing leachate management activities, and alteration to the waste composition brought to the Site. To measure the results of LFG mitigation measures the following is proposed:

1. Identify compliance status with LRP.
2. Compare annual waste composition to modeled waste composition in Table 1 and identify reduction in LFG generation potential of actual waste composition compared to modeled waste composition.
3. Include findings from 1 and 2 in Annual Report.



Paper Size ANSI A

0 130 260 390 520

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
ODOUR MANAGEMENT PLAN

SITE LOCATION MAP

Project No. **12561524**
Revision No. **-**
Date **Aug 3, 2022**

FIGURE 1

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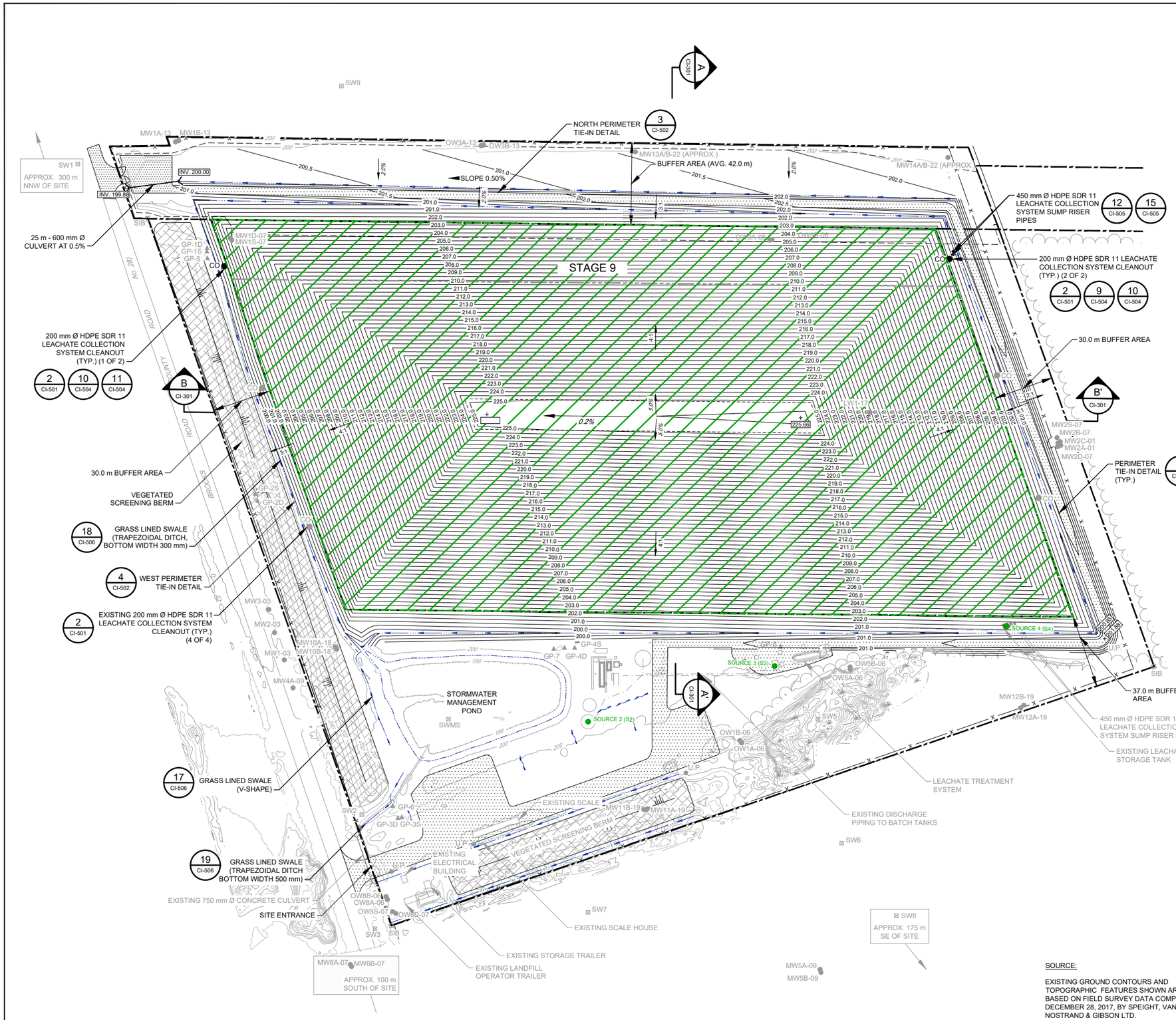

LEGEND:

- TOP OF FINAL COVER CONTOUR (1.0 m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5 m INTERVAL (m AMSL))
- EXISTING CONTOUR (2.0 m INTERVAL)
- EXISTING CONTOUR (1.0 m INTERVAL)
- PROPERTY LINE
- FENCE LINE
- EXISTING CLAY STOCKPILE AREA
- DRAINAGE DITCH
- EXISTING FORCEMAIN
- APPROVED LIMIT OF WASTE
- EXISTING LOW AREA
- GRANULAR SURFACE / ACCESS ROADS
- SCREENING BERM
- EXISTING TREELINE
- EXISTING OBSERVATION WELL
- EXISTING MONITORING WELL
- EXISTING CLEANOUT
- CLEANOUT
- EXISTING SURFACE WATER MONITORING LOCATION
- EXISTING GAS PROBE
- EXISTING UTILITY POLE
- EXISTING LEACHATE WELL
- EXISTING CULVERT
- CULVERT
- EXISTING DOUBLE GATE
- EXISTING SINGLE GATE
- EXISTING STANDARD IRON BAR
- DOUBLE GATE
- AREA SOURCE (SOURCE 1)
- EMISSION SOURCE LOCATION

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HIGHWAY No. 3, APPROXIMATELY 550 m EAST OF THE INTERSECTION OF BROOKS ROAD AND HIGHWAY No. 3.
3. EXISTING NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY 17, 2013.
4. FOR STAGE 1 THOUGHT STAGE 3 LANDFILL BASE DESIGN, REFER TO DESIGN AND OPERATION PLAN, EDWARDS LANDFILL, GHD 2003.

SOURCE:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.

EXISTING WASTE CONTOURS SURVEYED DECEMBER 21, 2022, BY GHD.

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56 m AMSL.

GHD Ltd.
455 Phillip Street
Waterloo, Ontario N2L 3X2 Canada
T 1 519 884 0510 F 1 519 884 0525
www.ghd.com

Bar is 25mm on original size sheet
0 25mm

No.	Issue	Author	Checked	Approved	Date
C01	STAGE 9 APPROVAL	D.B.	R.L.		02-26-2024

Designer
Drafting
Design
Check
Check
Project Manager
Project Director

Client
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Project
ODOUR MANAGEMENT PLAN

Date: **FEBRUARY 26, 2024**
Scale: **AS SHOWN**
Project No.: **12561524**
Size: **ANSI D**

Title
SOURCE LOCATION PLAN

Sheet No.
FIGURE 2

Plot Date: 18 March 2024 - 3:12 PM
Plotted By: Spencer Holland
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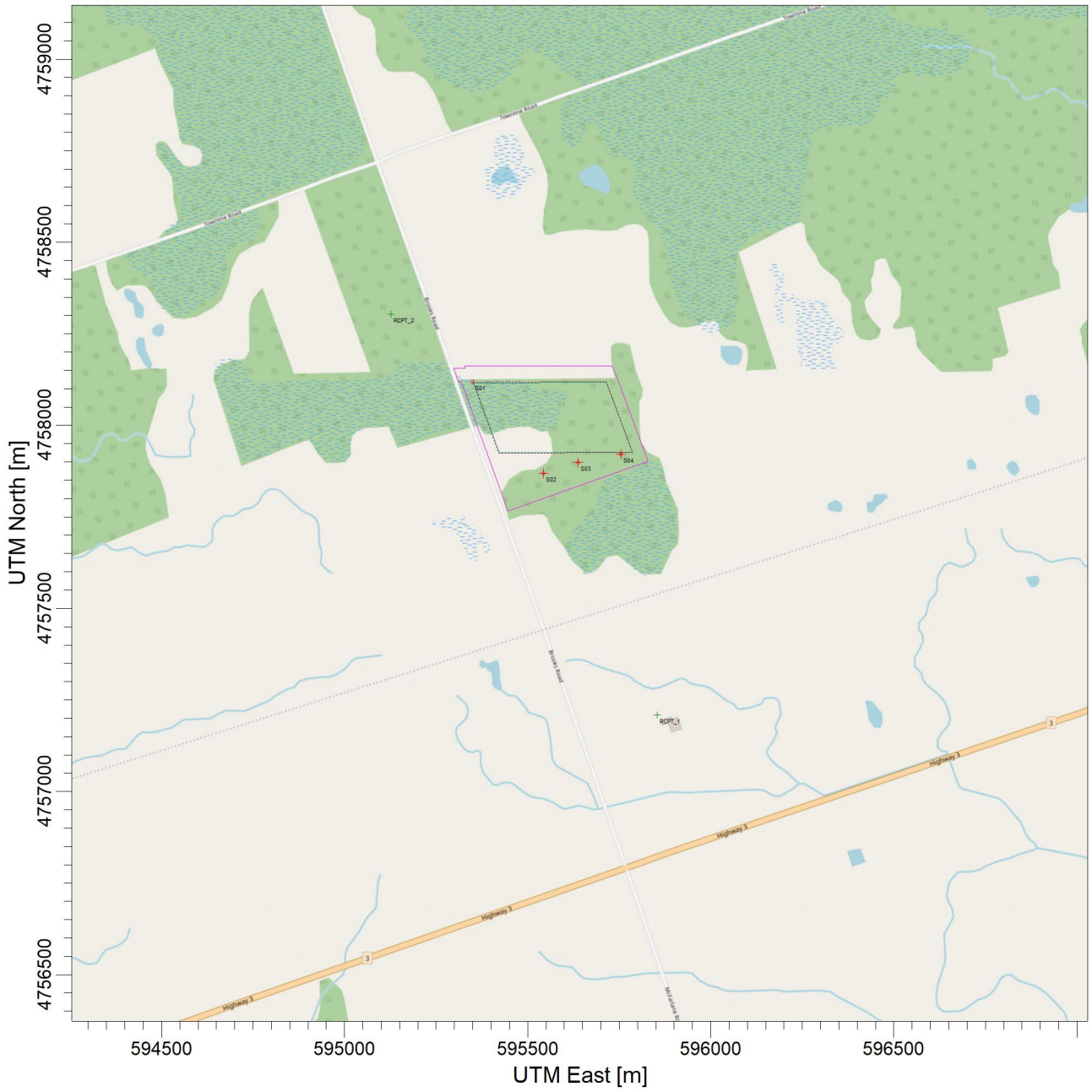
PROJECT TITLE:

Brooks Road Landfill
Sensitive Receptor Locations



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	RECEPTORS: **2**	MODELER:	**Figure 3**
	OUTPUT TYPE:	SCALE: 1:17,451 0 0.5 km	
	MAX:	DATE: **4/1/2024**	PROJECT NO.: **12561524**

Appendices

Appendix A

Emissions Summary and Dispersion Modelling Report

Emission Summary and Dispersion Modelling Report

Brooks Road Landfill
Haldimand County

2270386 Ontario Limited

18 March 2024

→ The Power of Commitment

Ontario

Ministry of the Environment, Conservation and Parks

Emission Summary and Dispersion Modelling Report Checklist

Company Name

2270386 Ontario Limited

Company Address

Unit Number	Street Number	Street Name	PO Box
	162	Cumberland Street	

City/Town	Province	Postal Code
Toronto	Ontario	M5R 3N5

Location of Facility

160 Brooks Rd North, Cayuga, Haldimand County, Ontario

The attached Emission Summary and Dispersion Modeling Report was prepared in accordance with s. 26 of O. Reg. 419/05 and the guidance in the MECP document "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 and "Air Dispersion Modelling Guideline for Ontario" dated March 2009 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact

Company Contact

Company Contact Name

Last Name	First Name	Middle Initial

Title	Telephone Number

Signature	Date (yyyy/mm/dd)
	2024/03/14

Technical Contact

Technical Contact

Matthew Griffin

Technical Contact Name

Last Name	First Name	Middle Initial
Griffin	Matthew	

Representing	Telephone Number
GHD	519-340-3794

Signature	Date (yyyy/mm/dd)
	2024/03/18

Disponible en français

* This checklist is taken from the document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009.

Emission Summary and Dispersion Modelling Report Checklist

	Required Information	Submitted	Explanation/Reference
	Executive Summary and Emission Summary Table		
	1.1 Overview of ESDM Report	☑ Yes	Executive Summary
	1.2 Emission Summary Table	☑ Yes	Executive Summary, Table 4
1.0	**Introduction and Facility Description**		
	1.1 Purpose and Scope of ESDM Report (when report only represents a portion of facility)	☑ Yes	Section 1.1
	1.2 Description of Processes and NAICS code(s)	☑ Yes	Section 1.2
	1.3 Description of Products and Raw Materials	☑ Yes	Section 1.3
	1.4 Process Flow Diagram	☑ Yes	Section 1.4, Figures 4
	1.5 Operating Schedule	☑ Yes	Section 1.5
2.0	**Initial Identification of Sources and Contaminants**		
	2.1 Sources and Contaminants Identification Table	☑ Yes	Table 1
3.0	**Assessment of the Significance of Contaminants and Sources**		
	3.1 Identification of Negligible Contaminants and Sources	☑ Yes	Section 3.1, Appendix C
	3.2 Rationale for Assessment	☑ Yes	Section 3.2, Appendix C
4.0	**Operating Conditions, Emission Rate Estimating and Data Quality**		
	4.1 Description of operating conditions, for each significant contaminant that results in the maximum POI concentration for that contaminant	☑ Yes	Section 4.1
	4.2 Explanation of Method used to calculate the emission rate for each contaminant	☑ Yes	Section 4.2, Appendix B
	4.3 Sample calculation for each method	☑ Yes	Appendix B
	4.4 Assessment of Data Quality for each emission rate	☑ Yes	Appendix B
5.0	**Source Summary Table and Property Plan**		
	5.1 Source Summary Table	☑ Yes	Table 2a and Table 2b
	5.2 Site Plan (scalable)	☑ Yes	Figure 1, Figure 3
6.0	**Dispersion Modelling**		
	6.1 Dispersion Modelling Input Summary Table	☑ Yes	Table 3
	6.2 Land Use Zoning Designation Plan	☑ Yes	Figure 2
	6.3 Dispersion Modelling Input and Output Files	☑ Yes	Appendix D
7.0	**Emission Summary Table and Conclusions**		
	7.1 Emission Summary Table	☑ Yes	Table 4
	7.2 Assessment of Contaminants with no MECP POI Limits	☑ Yes	Section 7.2
	7.3 Conclusions	☑ Yes	Section 7.3
	Appendices (Provide supporting information or details such as…)		
	Supporting Calculations	☑ Yes	Appendix B
	Supporting Information for Assessment of Negligibility	☑ Yes	Appendix C
	Air Dispersion Modelling Files	☑ Yes	Appendix D

Project name		Brooks Road Landfill Stage 9					
Document title		Emission Summary and Dispersion Modelling Report | Brooks Road Landfill					
Project number		12561524-RPT-14					
File name		12561524-RPT-14-ESDM Report					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	0	Amin Costas, B.Eng., E.I.T.	Matt Griffin, P.Eng.		David Barton MEng, P.Eng., PE (FL)		Mar.18, 2024

GHD

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Version Control

Revision	Date	Revised Description	Reviewer Initials
1.0	May 2021	Landfill emission rate increased due to the proposed fill rate amendment. Updated based on comments received from MECP.	MG
2.0	August 2022	Landfill emission rate increased due to the proposed expansion.	MG
3.0	March 2024	Landfill emission rate increased due to the Stage 9.	MG

Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared to assist Brooks Road Environmental c/o 2270386 Ontario Limited (BRE) in evaluating the inclusion of Stage 9 at the Site for compliance with Ontario Regulation (O. Reg.) 419/05 and to support the Odour Management Plan. Stage 9 is estimated to yield 219,400 m^3 of additional space for a total landfill capacity of 1,264,465 m^3.

The ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05. In addition, guidance in the Ministry of Environment, Conservation and Parks (MECP) publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018 (ESDM Procedure Document) was followed as appropriate.

The Site is currently covered under Amended Environmental Compliance Approval (ECA) (Air) No. 7323-C6EJUM, issued on September 24, 2021. A copy of the existing ECA (Air) is provided in Appendix A.

BRE owns and operates a landfill at 160 Brooks Road in Cayuga, Ontario (Site). The NAICS code that applies to this Facility is 562210 – Waste Treatment and Disposal. The Facility is subject to s.20 of O. Reg. 419/05, and the modelled impact of contaminant emissions must be assessed using a Ministry approved dispersion model for each contaminant and applicable averaging period.

The Site is expected to emit Volatile Organic Compounds (VOCs) and odour. Some of the sources and contaminants were considered negligible in accordance with s.8 of O. Reg. 419/05.

The maximum point-of-impingement (POI) concentrations were calculated based on the operating conditions where all significant sources are operating simultaneously at their individual maximum rates of production. The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with s.11 of O. Reg. 419/05 and the data quality assessment follows the process outlined in the requirements of the ESDM Procedure Document.

A POI concentration for each significant contaminant emitted from the Site was calculated based on the calculated emission rates and the output from the approved dispersion model; the results are presented in the Emission Summary Table in accordance with s.26 of O. Reg. 419/05.

The POI concentrations listed in the Emission Summary Tables were compared against criteria listed in the MECP publication "Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants".

All of the predicted POI concentrations for contaminants listed in the Emission Summary Table that are included in the MECP's ACB List, are below the corresponding limits.

This ESDM Report demonstrates that the Facility can operate in compliance with O. Reg. 419/05.

Contents

Figure index

Table index

Appendices

1. Introduction and Site Description

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared in accordance with s.26 of Ontario Regulation (O. Reg.) 419/05. In addition, guidance in the Ministry publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018 (ESDM Procedure Document) PIBS 3614e04.1 was followed as appropriate.

For ease of review and to promote clarity this ESDM Report is structured to correspond to each of the items listed in the Ministry publication "Emission Summary and Dispersion Modelling Check-List" PIBS 5357e (2021).

This section provides a description of the Site as required by subparagraph 1 of s.26 (1) of O. Reg. 419/05.

1.1 Purpose and Scope of ESDM Report

This ESDM Report was prepared to evaluate the inclusion of Stage 9 at the Site and compliance with O. Reg. 419/05 and to support the Odour Management Plan. Stage 9 is estimated to yield 219,400 m^3 of additional airspace for a total landfill capacity of 1,264,465 m^3. The ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05 and guidance provided in the Ontario Ministry of the Environment, Conservation and Parks (MECP) publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report, Version 4.1" dated March 2018 (ESDM Procedure Document) PIBS 3614e04 was followed as appropriate.

The Site is legally described as Part of Lot 24, Concession I-N.T.R., Haldimand County. The total Site area is approximately 14.3 hectares (ha) (35.3 acres) of which approximately 6 hectares (15 acres) is approved for landfilling.

The location of the Site is presented on Figure 1 and the land use designation of the Site and surrounding area is presented on Figure 2. The location of the property line is presented on Figure 3. The location of the discharges from each of the sources are also presented on Figure 3; the location of each of the sources is specified with the source reference number.

1.2 Description of Processes and NAICS Codes

The Site is currently operating as a landfill that has an approved maximum fill rate of 250,000 tonnes per year and a capacity of 1,264,465 cubic metres (m^3) (including waste and daily cover).

The North American Industry Classification System (NAICS) Code that applies to this Site is 562210 – Waste Treatment and Disposal.

1.3 Description of Products and Raw Materials

Brooks Road Landfill is approved to accept solid non-hazardous Industrial, Commercial and Institutional (ICI) waste, including contaminated soils and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), generated from within the geographic boundaries of the Province of Ontario.

A copy of the current ECA (Air) for the Site is included in Appendix A.

Process information is provided in greater detail in Appendix B – Sample Calculations. Refer to Table 1 - Sources and Contaminants Identification Table, which tabulates the individual sources of emissions at the Site.

1.4 Process Flow Diagram

Refer to Figure 4 – Process Flow Diagram for a graphical representation of the leachate management process at the Site.

1.5 Operating Schedule

The Site operates from 6:00 a.m. to 6:00 p.m., Monday to Friday and from 6:00 a.m. to 2:00 p.m. on Saturdays.

Waste receipt occurs from 7:00 a.m. to 5:00 p.m. Monday to Friday and from 7:00 a.m. to 1:00 p.m. on Saturdays.

1.6 Scope and Limitations

This report: has been prepared by GHD for 2270386 Ontario Limited and may only be used and relied on by 2270386 Ontario Limited for the purpose agreed between GHD and 2270386 Ontario Limited as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than 2270386 Ontario Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared the AERMOD dispersion model (v. 22112) and AERMAP surface pre-processor (v. 18081) models ("Models") for, and for the benefit and sole use of, 2270386 Ontario Limited to support dispersion modelling and must not be used for any other purpose or by any other person.

The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Model are from publicly available sources or provided by or on behalf of the 2270386 Ontario Limited, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs becomes available.

The Model is limited by the mathematical rules and assumptions that are set out in the Report or included in the Model and by the software environment in which the Model is developed.

The Model is a customised model and not intended to be amended in any form or extracted to other software for amending. Any change made to the Model, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Model including any outputs.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

2. Initial Identification of Sources and Contaminants

This section provides an initial identification of all of the sources and contaminants emitted at the Site, as required by subparagraphs 2 to 4 of s.26 (1) of O. Reg. 419/05.

The air emissions generated from the Site are detailed below.

Landfill (Source 1)

The waste is received and landfilled within the proposed landfill footprint. The potential emissions from the landfill are Volatile Organic Compounds (VOCs) and odour.

Treated Effluent Tank (Source 2)

BRE operates an on-site leachate treatment system (LTS) in accordance with an approved ECA. Effluent from the LTS is temporarily stored in above-grade effluent storage tanks. The potential emissions from the treated effluent tank is odour.

Aeration System (Source 3)

BRE operates an on-site LTS in accordance with an approved ECA. The LTS includes an aeration system as a treatment component. The potential emissions from the aeration system is odour.

Raw Leachate Tank (Source 4)

BRE operates an on-site LTS in accordance with an approved ECA. Raw leachate is pumped from the landfill leachate collection system to the primary settling tank prior to gravity flow to the LTS. The potential emissions from the leachate tank is odour.

2.1 Sources and Contaminants Identification Table

Table 1 – Sources and Contaminants Identification Table tabulates all the emission sources at the Site. Table 1 provides the information required for subparagraphs 2 to 4 of s.26 (1) of O. Reg. 419/05.

The expected contaminants emitted from each source are also identified in Table 1. Each of the identified sources has been assigned a source reference number.

The location of the discharges from each of the sources is presented on Figure 3 – Site Plan and Air Emission Source Locations as identified by the source reference number.

3. Assessment of Significance of Sources and Contaminants

This section provides an explanation for each source and contaminant identified as negligible in Table 1, as required by subparagraph 5 of s.26 (1) of O. Reg. 419/05.

In accordance with s.8 of O. Reg. 419/05, emission rate calculations and dispersion modelling do not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from significant sources.

3.1 Identification of Negligible Contaminants and Sources

Each negligible source is identified in Table 1.

The remaining sources are significant. These sources will be included in the dispersion modelling for the Site.

Some contaminants from sources that are considered significant have been identified as negligible upon further investigation. This is shown in further detail in Appendix C.

3.2 Rationale for Assessment

For each source or contaminant in Table 1 that has been identified as being negligible there is an accompanying documented rationale. The technical information required to substantiate the argument that each of the identified sources or contaminants is negligible is presented in Appendix C – Supporting Information for Assessment of Negligibility.

4. Operating Conditions, Emissions Estimating, and Data Quality

This section provides a description of the operating conditions used in the calculation of the emission estimates and an assessment of the data quality of the emission estimates for each significant contaminant from the Site as required by subparagraphs 6 and 7 of s.26 (1) of O. Reg. 419/05.

4.1 Description of Operating Conditions

Section 10 of O. Reg. 419/05 states that an acceptable operating condition is a scenario that assumes operating conditions for the Site that would result, for the relevant contaminant, in the highest concentration of the contaminant at a POI that the Site is capable of. The operating condition described in this ESDM Report meets this requirement.

The averaging time for the operating condition is based on the applicable averaging time for each contaminant. The contaminants have either a 10-minute, 1-hour, 24-hour or annual averaging period. The operating condition used for this Site that results in the maximum concentration at a POI is the scenario where all significant sources are operating simultaneously at their individual maximum rates of production.

The individual maximum rates of production for each significant source of emissions correspond to the maximum emission rate during any hour period. The individual maximum rates of production for each significant source of emissions are explicitly described in Appendix B.

4.2 Explanation of the Methods Used to Calculate Emission Rates

The maximum daily and hourly emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with requirements of the ESDM Procedure Document.

The emission rate for each significant contaminant emitted from a significant source was estimated and the methodology for the calculation is documented in Table 2A and Table 2B.

4.3 Sample Calculations

The technical rationale, including sample calculations, required to substantiate the emission rates presented in Table 2A and Table 2B are documented in Appendix B.

4.4 Assessment of Data Quality

This section provides an assessment of the data quality of the emission estimates for each significant contaminant from the Site.

The assessment of the data quality of the emission rate estimates for each significant contaminant emitted from the significant sources was performed in accordance with the requirements of subparagraph 7iii of s.26 (1) of O. Reg. 419/05.

For each contaminant the emission rate was estimated and the data quality of the estimate is documented in Table 2A and Table 2B. The assessment of data quality for each source listed in Table 2A and Table 2B is documented in Appendix B.

All the emission rates listed in Table 2A and Table 2B are documented as having their highest available data quality and correspond to the operating scenario where all significant sources are operating simultaneously at their individual maximum rates of production. Therefore, emission rate estimates listed in Table 2A and Table 2B are not likely to be an underestimate of the actual emission rates and use of these emission rates will result in a calculated concentration at POI greater than the actual concentrations.

5. Source Summary Table and Site Plan

This section provides the table required by subparagraph 8 and the Site plan required by subparagraph 9 of s.26 (1) of O. Reg. 419/05.

5.1 Source Summary Table

For each source of significant contaminants, the following parameters are referenced in Table 2A and Table 2B and are as follows:

- Contaminant
- Chemical Abstract Society (CAS) reference number
- Source reference number
- Source description
- Stack parameters (flow rate, exhaust temperature, diameter, height above grade, height above roof)
- Location referenced to a Universal Transverse Mercator (UTM) coordinate system presented on Figure 3
- Maximum emission rate
- Averaging period
- Emission estimating technique
- Estimation of data quality
- Percentage of overall emission

5.2 Site Plan

The locations of the emission sources listed in Table 1 are presented on Figure 3; the location of each of the sources is specified with the source reference number. The location of the property-line is indicated on Figure 3, with the end points of each section of the property-line clearly referenced in UTM coordinate system. The location of each source is referenced to the UTM coordinates system under a column in Table 2A and Table 2B.

6. Dispersion Modelling

This section provides a description of how the dispersion modelling was conducted at the Site to calculate the maximum concentration at a POI.

The dispersion modelling was conducted in accordance with the Ministry publication "Air Dispersion Modelling Guideline for Ontario (February 2017)" PIBS 5165e03 (The ADMGO). A general description of the input data used in the dispersion model is summarized in Table 3.

As identified in Section 1.2, this Site is subject to s. 20 of O. Reg. 419/05, and the Site's compliance is assessed using Schedule 5 of O. Reg. 419/05. Furthermore, compliance is assessed using the United States Environmental Protection Agency (USEPA) atmospheric dispersion model AERMOD.

The AERMOD modelling system has been identified by the MECP as one of the approved dispersion models under O. Reg. 419/05, and currently includes the Plume Rise Model Enhancements (PRIME) algorithms for assessing the effects of buildings on air dispersion.

The AERMOD modelling system is made up of the AERMOD dispersion model, the AERMET meteorological pre-processor and the AERMAP terrain pre-processor. The following approved dispersion model and pre-processors were used in the assessment:

– AERMOD dispersion model (v. 22112)
– AERMAP surface pre-processor (v. 18081)

AERMET was not used in this assessment, as a pre-processed MECP meteorological dataset was used.

A summary of the AERMOD source input parameters is provided in Appendix D.

The emission rates used in the dispersion model meet the requirements of Section 11 (1) 1 of O. Reg. 419/05, which requires that the emission rate used in the dispersion model is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant. These emission rates are further described in Appendix B.

There is no childcare facility, health care facility, senior's residence, long-term care facility or an education facility located at the Site.

6.1 Dispersion Modelling Input Summary Table

A description of how the approved dispersion model was performed is included in Table 3. This table meets both requirements of s.26 (1) 11 and Sections 8-17 of O. Reg. 419/05 and follows formatting provided in the ESDM Procedure Document.

6.2 Co-ordinate System

The Universal Transverse Mercator (UTM) coordinate system, as per Section 5.2.2 of the ADMGO, was used to specify model object sources and receptors. All coordinates were defined in the North American Datum of 1983 (NAD83).

All sources and the property line coordinates are provided on Figure 3.

6.3 Meteorology and Land Use Zoning Plan

Subparagraph 10 of s.26 (1) of O. Reg. 419/05 requires a description of the local land use conditions if meteorological data described in paragraph 2 of s.13 (1) of O. Reg. 419/05 was used. The AERMOD model was run using a MECP site specific pre-processed 5-year dispersion meteorological data set (i.e., surface and profile files).

A land use zoning plan is provided on Figure 2. Figure 2 also illustrates the extents of the Site property boundary and provides zoning of adjacent land uses. The Site is located in an area zoned Disposal Industrial. The land surrounding the Site is zoned Agricultural.

6.4 Terrain

AERMOD captures the essential physics of dispersion in complex terrain though the use of a separate height scale factor for each receptor (USEPA, 1998 – AERMAP UG). The highest scale factor represents the terrain that would dominate flow in the vicinity of the receptor.

The height scale factor that is used by AERMOD is generated by an AERMAP terrain pre-processor. AERMAP utilizes terrain data, or Digital Elevation Model (DEM) data in conjunction with a layout of receptors and sources to height scale factors that can be directly used in AERMOD. Terrain data used in this assessment was obtained from MECP (7.5-minute format).

6.5 Receptors

Receptors were chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of O. Reg. 419/05. A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

– 20-m spacing within 200 m of the edge of the bounding box
– 50-m spacing from 200 to 500 m
– 100-m spacing from 500 to 1,000 m
– 200-m spacing from 1,000 to 2,000 m
– 500-m spacing from 2,000 to 5,000 m

A property line ground level receptor grid with 10-m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Site's property line. Sensitive receptors used for this assessment are shown in Figure 5.

6.6 Deposition

AERMOD has the ability to account for wet and dry deposition of substances that would reduce ground level concentrations at POIs. However, the deposition algorithm has not been implemented in this assessment and therefore, the predicted POI concentrations are considered to be more conservative.

6.7 Averaging Time and Conversions

The shortest time scale that AERMOD predicts is a 1-hour average value. Schedule 3 standards of O. Reg. 419/05 apply to this Site; these standards are based on 1-hour and 24-hour averaging times, which are averaging times that are easily provided by AERMOD Dispersion Modelling Options.

The options used in the AERMOD dispersion model are summarized in the table below:

Modelling Parameter	Description	Used in the Assessment?
DFAULT	Specifies that regulatory default options will be used	No, the non-default BETA option was used
BETA	Specifies that horizontal and capped sources dispersion algorithms will be used	Yes, the BETA option is the only non-default option that may be used without prior MECP approval

Modelling Parameter	Description	Used in the Assessment?
CONC	Specifies that concentration values will be calculated	Yes
DDPLETE	Specifies that dry deposition will be calculated	No
WDPLETE	Specifies that wet deposition will be calculated	No
FLAT	Specifies that the non-default option of assuming flat terrain will be used	No, the model will use elevated terrain as detailed in the AERMAP output
NOSTD	Specifies that the non-default option of no stack-tip downwash will be used	No
AVERTIME	Time averaging periods calculated	1-hour, 24-hour
URBANOPT	Allows model to incorporate the effects of increased surface heating from an urban area on pollutant dispersion under stable atmospheric conditions	No
URBANROUGHNESS	Specifies the urban roughness length (mm)	Not Applicable
FLAGPOLE	Specifies that receptor heights above local ground levels are allowed on the receptors	No

6.8 Dispersion Modelling Input and Output Files

The information input into the approved dispersion model is recorded in Appendix D. Appendix D also includes the input and output files from the AERMOD model in electronic form.

Table D.1 provides a detailed description of the source input parameters.

7. Emission Summary Table and Conclusions

This section provides the table required by subparagraph 14 of s.26 (1) of O. Reg. 419/05 and provides an interpretation of the results as required by the ESDM Procedure Report.

7.1 Emission Summary Table

A POI concentration for each significant contaminant emitted from the Site was calculated based on the emission rates listed in Table 2. The output from the approved dispersion model is presented in Appendix D. The results are presented in Table 4. This Table follows the format provided in the ESDM Procedure Document. For each source of significant contaminants, the following parameters are referenced:

– Contaminant name
– CAS number
– Total Site emission rate
– Approved dispersion model used
– Maximum POI concentration
– Averaging period for the dispersion modelling
– MECP POI limit
– Indication of limiting effect
– Schedule in Regulation 419/05
– The percentage of standard

The POI concentrations listed in Table 4 were compared against criteria listed in the MECP ACB List

7.2 Assessment of Contaminants with No MECP POI Limits

All contaminants have corresponding criteria.

7.3 Conclusions

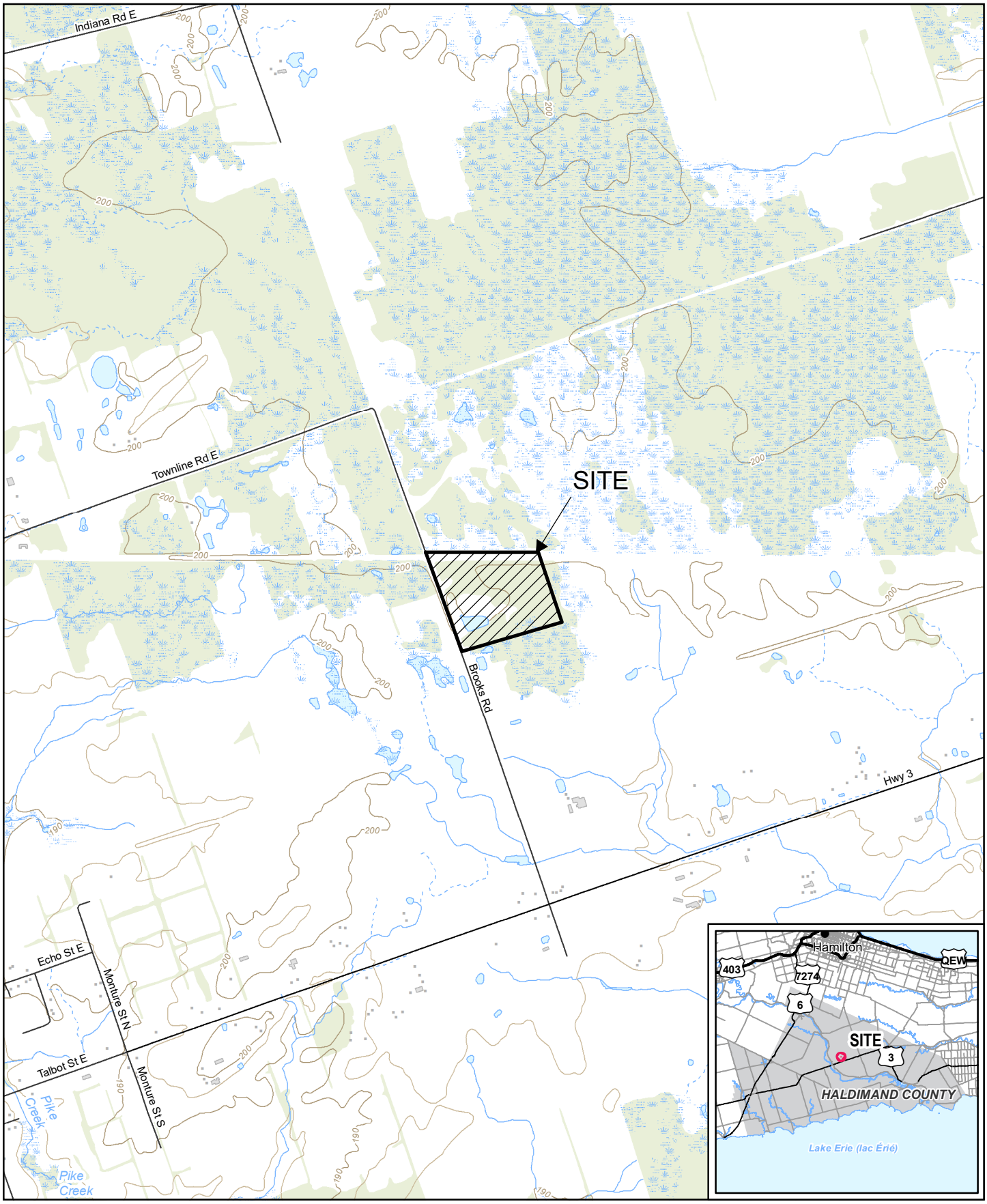
This ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05. In addition, guidance in the ESDM Procedure Document was followed as appropriate.

The emission rate estimates for each source of significant contaminants are documented in Table 2A and Table 2B. All the emission rates listed in Table 2A and Table 2B are documented as having their highest available data quality and correspond to the operating scenario where all significant sources are operating simultaneously at their individual maximum rates of production. Therefore, these emission rate estimates listed in Table 2A and Table 2B are not likely to be an underestimate of the actual emission rates.

A POI concentration for each significant contaminant emitted from the Site was calculated based on the calculated emission rates and the output from AERMOD model; the results are presented in Table 4.

The POI concentrations listed in Table 4 were compared against criteria listed in the MECP ACB List.

This ESDM Report demonstrates that the Site can operate in compliance with O. Reg. 419/05.



Paper Size ANSI A

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Project No. **12561524**
Revision No. **-**
Date **Feb 27, 2024**

SITE LOCATION MAP

FIGURE 1

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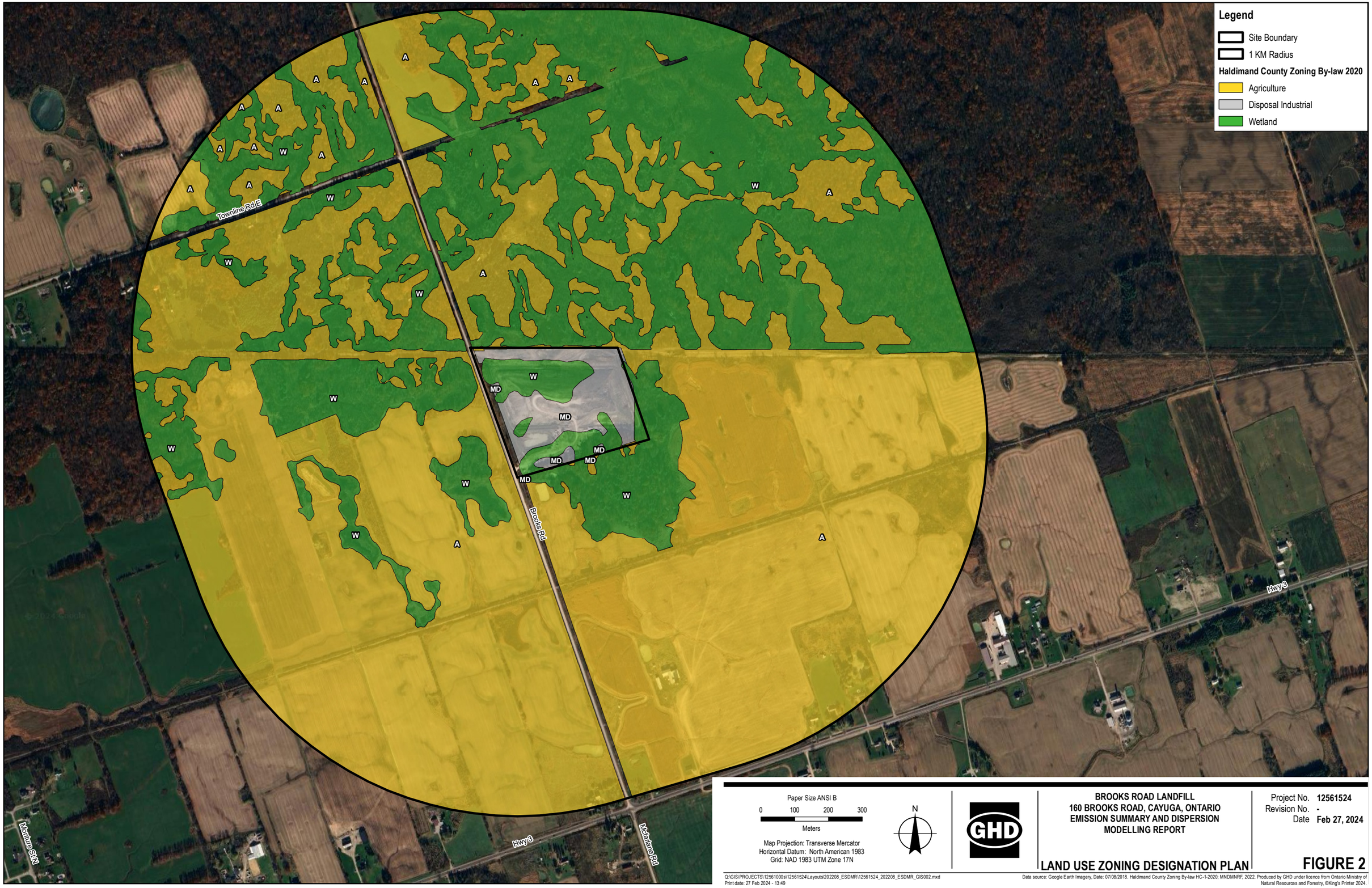

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Project No. **12561524**
Revision No. **-**
Date **Feb 27, 2024**

LAND USE ZONING DESIGNATION PLAN

FIGURE 2

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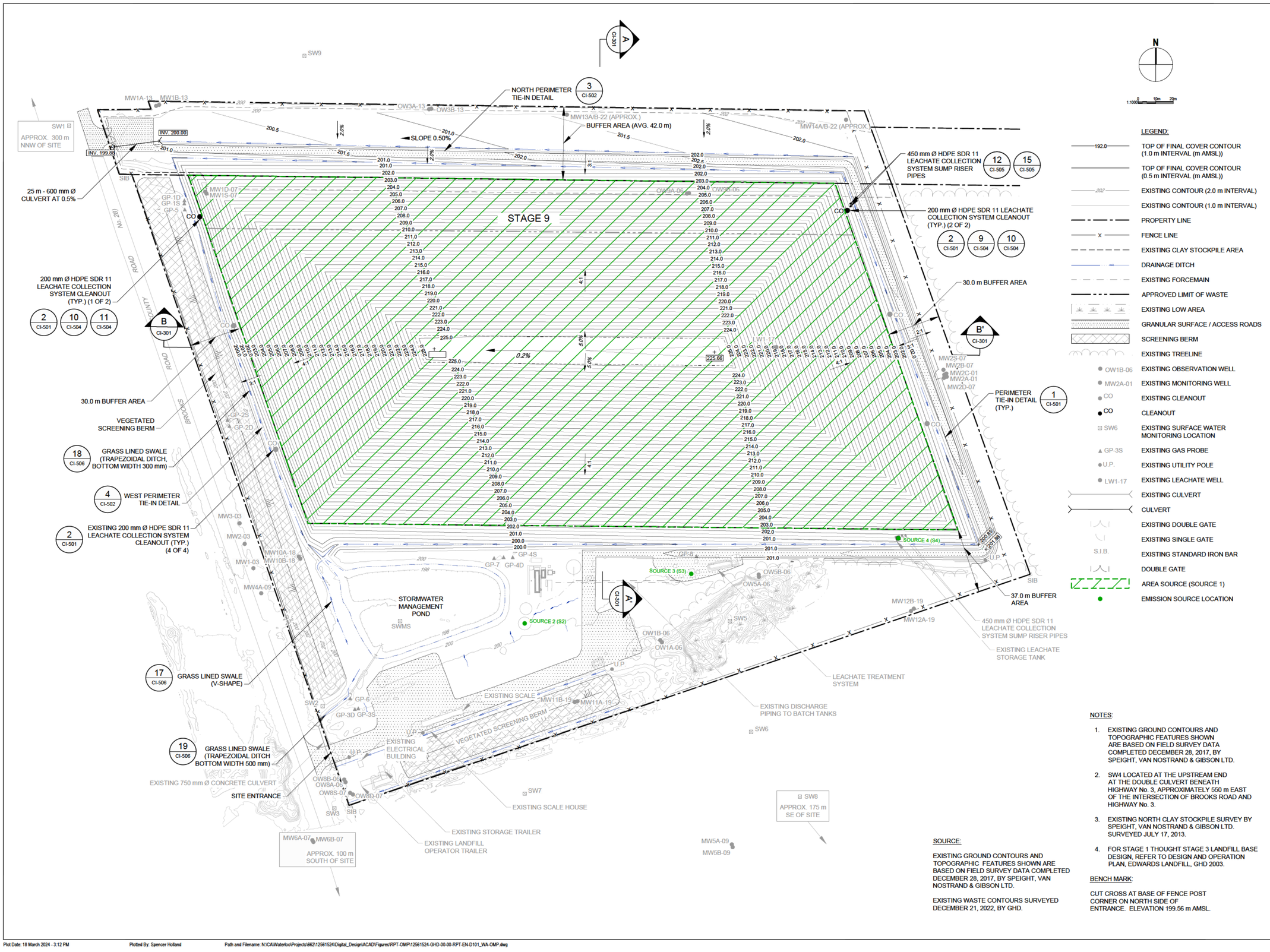

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- TOP OF FINAL COVER CONTOUR (0.5 m INTERVAL (m AMSL))
- EXISTING CONTOUR (2.0 m INTERVAL)
- EXISTING CONTOUR (1.0 m INTERVAL)
- PROPERTY LINE
- FENCE LINE
- EXISTING CLAY STOCKPILE AREA
- DRAINAGE DITCH
- EXISTING FORCEMAIN
- APPROVED LIMIT OF WASTE
- EXISTING LOW AREA
- GRANULAR SURFACE / ACCESS ROADS
- SCREENING BERM
- EXISTING TREELINE
- EXISTING OBSERVATION WELL
- EXISTING MONITORING WELL
- EXISTING CLEANOUT
- CLEANOUT
- EXISTING SURFACE WATER MONITORING LOCATION
- EXISTING GAS PROBE
- EXISTING UTILITY POLE
- EXISTING LEACHATE WELL
- EXISTING CULVERT
- CULVERT
- EXISTING DOUBLE GATE
- EXISTING SINGLE GATE
- EXISTING STANDARD IRON BAR
- DOUBLE GATE
- AREA SOURCE (SOURCE 1)
- EMISSION SOURCE LOCATION

SOURCE:

EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.

EXISTING WASTE CONTOURS SURVEYED DECEMBER 21, 2022, BY GHD.

NOTES:

1. EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON FIELD SURVEY DATA COMPLETED DECEMBER 28, 2017, BY SPEIGHT, VAN NOSTRAND & GIBSON LTD.
2. SW4 LOCATED AT THE UPSTREAM END AT THE DOUBLE CULVERT BENEATH HIGHWAY No. 3, APPROXIMATELY 550 m EAST OF THE INTERSECTION OF BROOKS ROAD AND HIGHWAY No. 3.
3. EXISTING NORTH CLAY STOCKPILE SURVEY BY SPEIGHT, VAN NOSTRAND & GIBSON LTD. SURVEYED JULY 17, 2013.
4. FOR STAGE 1 THOUGHT STAGE 3 LANDFILL BASE DESIGN, REFER TO DESIGN AND OPERATION PLAN, EDWARDS LANDFILL, GHD 2003.

BENCH MARK:

CUT CROSS AT BASE OF FENCE POST CORNER ON NORTH SIDE OF ENTRANCE. ELEVATION 199.56 m AMSL.

GHD Ltd.
455 Phillip Street
Waterloo, Ontario N2L 3X2 Canada
T 1 519 884 0510 F 1 519 884 0525
www.ghd.com

Bar is 25mm on original size sheet
0 25mm

No.	Issue	Checked	Approved	Date
C01	STAGE 9 APPROVAL	D.B.	R.L.	02-26-2024

Author | Designer
Drafting | Design
Check | Check
Project Manager | Project Director

Client
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Project
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Date: FEBRUARY 26, 2024
Scale: AS SHOWN
Project No.: 12561524
Size: ANSI D

Title
SOURCE LOCATION PLAN

Sheet No.
FIGURE 3

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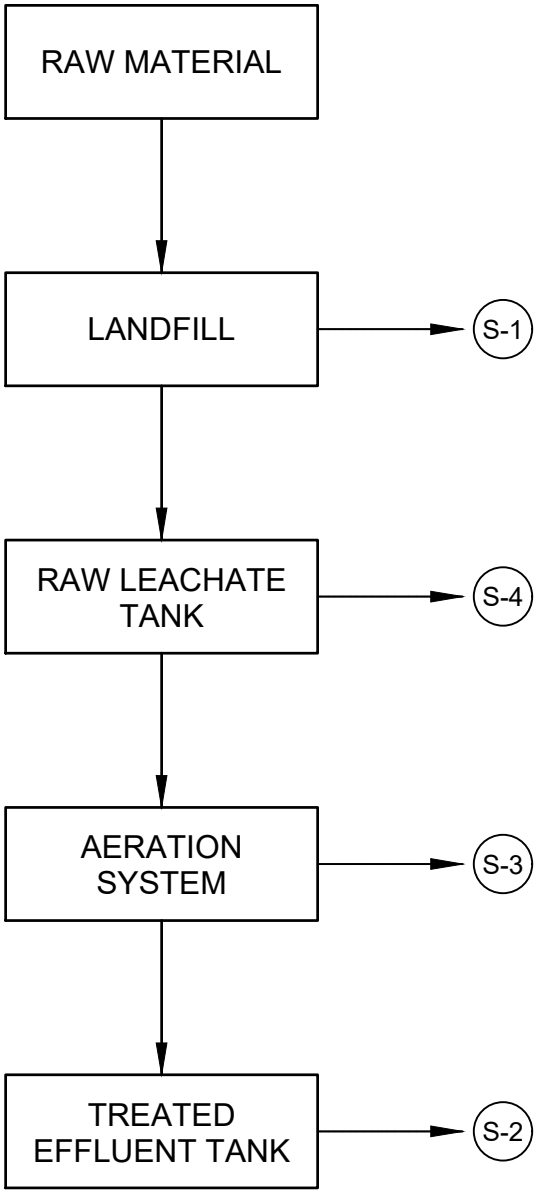

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Project No. **12561524**
Date **February 2024**

PROCESS FLOW DIAGRAM

FIGURE 4

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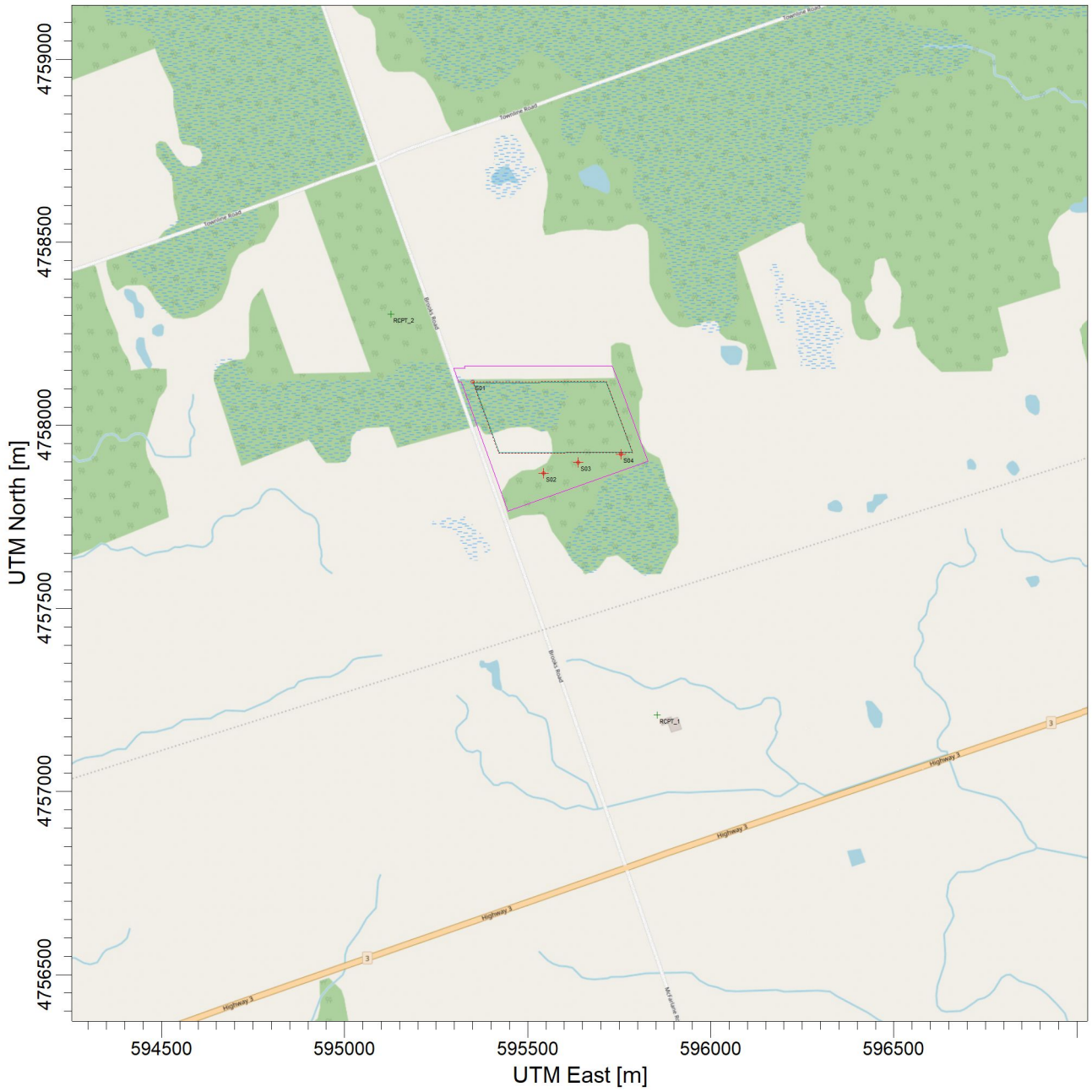
PROJECT TITLE:

Brooks Road Landfill
Sensitive Receptor Locations



COMMENTS:	SOURCES: **4**	COMPANY NAME: **GHD**	
	RECEPTORS: **2**	MODELER:	**Figure 5**
	OUTPUT TYPE:	SCALE: 1:17,451 (0 — 0.5 km)	
	MAX:	DATE: **4/1/2024**	PROJECT NO.: **12561524**

Table 1

Sources and Contaminants Identification Table
Brooks Road Landfill
Cayuga, Ontario

Source Information		Location	Expected Contaminants	Significant (Y/N)	Rationale
Source ID	**Source Description**				
S-1	Landfill	Outside	Volatile Organic Compounds	Y/N	Some has been classified as insignificant, see App. C.
			Odour	Y	
S-2	Treated Effluent Tank	Outside	Odour	Y	
S-3	Aeration System	Outside	Odour	Y	
S-4	Raw Leachate Tank	Outside	Odour	Y	
N/A	Roads, Parking Lot	Outside	Dust	N	Fugitive Dust Management Plan has been prepared for the Site

Table 2A

Source Summary Table - By Contaminant
Brooks Road Landfill
Cayuga, Ontario

Contaminant	CAS No.	Source Data								Emission Data				
		Source ID	Source Description	Stack Flow Rate (Am^3/s)	Stack Exit Gas Temperature (C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (x) (m)	Source Coordinates (y) (m)	Maximum Emission Rate (g/s)	Averaging Period (hours)	Emission Estimation Technique	Emission Data Quality	% of Overall Emissions (%)
1,1,2,2-tetrachloroethane	79-34-5	S-1	Landfill	0.083	Area Source		24.00	-	-	-	7.31E-04	24	EF	Average	100%
Acrylonitrile	107-13-1	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.32E-03	24	EF	Average	100%
Benzene	71-43-2	S-1	Landfill	0.083	Area Source		24.00	-	-	-	6.13E-04	Annual/Daily	EF	Average	100%
Dimethyl sulfide	75-18-3	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.91E-03	10-minute	EF	Average	100%
Ethyl mercaptan	75-08-1	S-1	Landfill	0.083	Area Source		24.00	-	-	-	5.56E-04	10-minute	EF	Average	100%
Hydrogen Sulphide	7783-06-4	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.20E-02	24, 10-minute	EF	Average	100%
Methyl mercaptan	74-93-1	S-1	Landfill	0.083	Area Source		24.00	-	-	-	4.70E-04	10-minute	EF	Average	100%
Odour	NA	S-1	Landfill	0.083	Area Source		24.00	-	-	-	9.41E+02 ou/s	10-minute	EF	Average	26%
Odour	NA	S-2	Treated Effluent Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595543.9	4757869.2	1.89E+00 ou/s	10-minute	EC	Average	<1%
Odour	NA	S-3	Aeration System	0.367	Outdoor Ambient	0.30	3.00	-	595637.5	4757898.5	2.57E+03 ou/s	10-minute	EC	Average	70%
Odour	NA	S-4	Raw Leachate Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595754.1	4757920.3	1.32E+02 ou/s	10-minute	EC	Average	4%
Vinyl Chloride	75-01-4	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.80E-03	24	EF	Average	100%

Notes:

EF - Emission Factor
EC - Engineering Calculation

Table 2B

Source Summary Table - By Source
Brooks Road Landfill
Cayuga, Ontario

Source ID	Contaminant	CAS No.	Source Data								Emission Data				
			Source Description	Stack Flow Rate (Am^3/s)	Stack Exit Gas Temperature (C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (x) (m)	Source Coordinates (y) (m)	Maximum Emission Rate (g/s)	Averaging Period (hours)	Emission Estimation Technique	Emission Data Quality	% of Overall Emissions (%)
S-1	1,1,2,2-tetrachloroethane	79-34-5	Landfill	0.083	Area Source		24.00	-	-	-	7.31E-04	24	EF	Average	100%
S-1	Acrylonitrile	107-13-1	Landfill	0.083	Area Source		24.00	-	-	-	1.32E-03	24	EF	Average	100%
S-1	Benzene	71-43-2	Landfill	0.083	Area Source		24.00	-	-	-	6.13E-04	Annual/Daily	EF	Average	100%
S-1	Dimethyl sulfide	75-18-3	Landfill	0.083	Area Source		24.00	-	-	-	1.91E-03	10-minute	EF	Average	100%
S-1	Ethyl mercaptan	75-08-1	Landfill	0.083	Area Source		24.00	-	-	-	5.56E-04	10-minute	EF	Average	100%
S-1	Hydrogen Sulphide	7783-06-4	Landfill	0.083	Area Source		24.00	-	-	-	1.20E-02	24, 10-minute	EF	Average	100%
S-1	Methyl mercaptan	74-93-1	Landfill	0.083	Area Source		24.00	-	-	-	4.70E-04	10-minute	EF	Average	100%
S-1	Odour	NA	Landfill	0.083	Area Source		24.00	-	-	-	9.41E+02 ou/s	10-minute	EF	Average	26%
S-1	Vinyl Chloride	75-01-4	Landfill	0.083	Area Source		24.00	-	-	-	1.80E-03	24	EF	Average	100%
S-2	Odour	NA	Treated Effluent Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595543.9	4757869.2	1.89E+00 ou/s	10-minute	EC	Average	<1%
S-3	Odour	NA	Aeration System	0.367	Outdoor Ambient	0.30	3.00	-	595637.5	4757898.5	2.57E+03 ou/s	10-minute	EC	Average	70%
S-4	Odour	NA	Raw Leachate Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595754.1	4757920.3	1.32E+02 ou/s	10-minute	EC	Average	4%

Note:
EF - Emission Factor
EC - Engineering Calculation

Table 3

Dispersion Modelling Input Summary Table
Brooks Road Landfill
Cayuga, Ontario

Relevant Section of the Regulation	Section Title	Description of How the Approved Dispersion Model was Used
Section 8	Negligible Sources	Sources and contaminants that were considered negligible were explicitly identified, and therefore were not modelled, in accordance with s.8 of O. Reg. 419. See Table 1 - Sources and Contaminants Identification Table and Appendix C of the ESDM Report for more information
Section 9	Same Structure Contamination	Not applicable as Brooks Road is the only tenant occupying the building, and does not have a child care facility, health care facility, senior's residence, long-term care facility or an educational facility located at the Facility
Section 10	Operating Conditions	All equipment was assumed to be operating at the maximum production rates at the same time. See Section 4.1 and Appendix B of the ESDM Report.
Section 11	Source of Contaminant Emission Rate	The emission rate for each significant contaminant emitted from a significant source was estimated, the methodology for the calculation is documented in Table 2 - Source Summary Table. See Section 4.1 and Section 4.2 and Appendix B of the ESDM Report for more information.
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	The operating conditions were estimated in accordance with s.10(1) and 1 and S.11 (1) 1 of O. Reg. 419 and are therefore considered to result in the highest concentrations at POI that the Facility is capable of for the contaminants emitted. See Section 4.1 and Section 4.2 of the ESDM Report.
Section 13	Meteorological Conditions	MECP site specific screening data was used.
Section 14	Area of Modelling Coverage	Completed in compliance with MECP Modelling Guidance
Section 15	Stack Height	Documented in accordance with MECP guidance
Section 16	Terrain Data	MECP available terrain data sets were used.
Section 17	Averaging Periods	The averaging periods used for each contaminant are summarized on Table 4 and Appendix C.

Table 4

Emission Summary Table
Brooks Road Landfill
Cayuga, Ontario

Contaminant	CAS No.	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Max. POI Concentration (µg/m^3)	Averaging Period (hours)	MECP POI Limit [(2)] (µg/m^3)	Limiting Effect	Regulation Schedule #	Percentage of MECP POI Limit
1,1,2,2-tetrachloroethane	79-34-5	7.31E-04	AERMOD v. 22112	1.37E-02	24	0.1	Health	B2	13.65%
Vinyl Chloride	75-01-4	1.80E-03	AERMOD v. 22112	3.36E-02	24	1	Health	B1	3.36%
Vinyl Chloride	75-01-4	1.80E-03	AERMOD v. 22112	3.36E-02	URT	100	Health	B1	<1%
Acrylonitrile	107-13-1	1.32E-03	AERMOD v. 22112	2.46E-02	24	0.6	Health	B1	4.10%
Acrylonitrile	107-13-1	1.32E-03	AERMOD v. 22112	2.46E-02	URT	60	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	2.42E-03	Annual	0.45	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	2.42E-03	AAV	4.5	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	1.14E-02	DAV	100	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	1.14E-02	URT	100	Health	B1	<1%
Total Reduced Sulphur	N/A	1.52E-02	AERMOD v. 22112	2.84E-01	24	7	Health	B1	4.06%
Total Reduced Sulphur	N/A	1.52E-02	AERMOD v. 22112	1.99E+00	10-minute	13	Odour	B1	15.29%
Total Reduced Sulphur	N/A	1.52E-02	AERMOD v. 22112	2.84E-01	URT	70	Odour	B1	<1%
Odour, MECP grid	NA	3.64E+03	AERMOD v. 22112	-	10-minute	1	Odour	Guidance	- [(3)]
Odour, sensitive receptor	NA	3.64E+03	AERMOD v. 22112	-	10-minute	1	Odour	Guidance	- [(3)]

Notes:

(1) The 1-hr maximum concentration was converted to a 10-min average using a conversion factor of 1.65 as specified in the ADMGO, MECP guidance document.
(2) Schedule 3 Standard criteria listed in the MECP Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants
(3) See Table 5 for Frequency Analysis Results.
B1 - Benchmark 1 - Exceedance of a Benchmark 1 concentration triggers specific actions under the Regulation.
B2 - Benchmark 2 - Exceedance of a Benchmark 2 concentration triggers a toxicological assessment to determine the likelihood of adverse effect.

Table 5

Odour Frequency Analysis at Sensitive Receptor
Brooks Road Landfill
Cayuga, Ontario

			Model Year [1]				
			2015	**2016**	**2017**	**2018**	**2019**
SR01	Residence	Total Hours	8760	8784	8760	8760	8760
		Max. Predicted Odour (OU)	1.05	1.00	0.90	0.98	0.99
		Hours Exceeding 1 OU	2	1	0	0	0
		Frequency of Exceedances (%)	0.02%	0.01%	0.00%	0.00%	0.00%
SR02	Residence	Total Hours	8760	8784	8760	8760	8760
		Max. Predicted Odour (OU)	1.81	1.81	1.78	1.79	1.81
		Hours Exceeding 1 OU	28	21	26	26	30
		Frequency of Exceedances (%)	0.32%	0.24%	0.30%	0.30%	0.34%

Note:

(1) Site-specific meteorological data, as processed and provided by MECP.

Appendices

Appendix A

Environmental Compliance Approval

No. 7323-C6EJUM

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 7323-C6EJUM
Issue Date: September 24, 2021

2270386 Ontario Limited
162 Cumberland Street
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd North, Cayuga, Haldimand County, Ontario.

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

- one (1) landfill site, having a capacity of 1,045,065 cubic metres (including waste and daily cover), a maximum fill rate of 250,000 tonnes per year and 1,000 tonnes per day;
- one (1) leachate treatment system, having a rated capacity of 200 cubic metres per day, complete with a leachate collection sump, a raw leachate primary settling tank, an aeration system and above-grade treated effluent storage tanks;

all in accordance with the supporting information listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Acoustic Assessment Report" means the report, prepared in accordance with Publication NPC-233 submitted in support of the application, that documents all sources of noise emissions and Noise Control Measures present at the Facility. "Acoustic Assessment Report" also means the Acoustic Assessment Report prepared by GHD, dated September 7, 2021 and signed by Michael Masschaele;
2. "Approval" means this Environmental Compliance Approval, including the application and supporting documentation listed above;
3. "Company" means 2270386 Ontario Limited, that is responsible for the construction or operation of the Facility and includes any successors and assigns;
4. "District Manager" means the District Manager of the appropriate local district office of the Ministry, where the Facility is geographically located;

5. "EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;
6. "Equipment" means all the equipment, described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval;
7. "ESDM report" means the Emission Summary and Dispersion Modelling Report which was prepared in accordance with section 26 of O. Reg. 419/05 and the Procedure Document by GHD and dated June 11, 2021, submitted in support of the application, and includes any changes to the report made up to the date of issuance of this Approval;
8. "Facility" means the entire operation located on the property where the Equipment is located;
9. "Manual" means a document or a set of documents that provide written instructions to staff of the Company;
10. "Ministry" means the ministry of the government of Ontario responsible for the EPA and includes all officials, employees or other persons acting on its behalf;
11. "Noise Control Measures" means measures to reduce the noise emissions from the Facility and/or Equipment including, but not limited to, silencers, acoustic louvres, enclosures, absorptive treatment, plenums and barriers;
12. "Noise Guidelines for Landfill Sites" means the Ministry draft publication "Noise Guidelines for Landfill Sites", October 1998, as amended;
13. "Odour Management Plan" means the Odour Management Plan, Brooks Road Landfill Site, Haldimand County, prepared by GHD, dated June 11, 2021 that includes mitigation measures to minimize off-Site odour impacts, and if appropriate, a trigger mechanism and contingency plan;
14. "Publication NPC-233" means the Ministry Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995;
15. "Publication NPC-300" means the Ministry Publication NPC-300, “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300”, August 2013, as amended;
16. “Site" means the entire waste disposal site, including the buffer lands, at the Brooks Road Landfill Site, Lot 24, Concession 1 North, Haldimand County; and
17. "Truck(s)" means trucks carrying waste for disposal at the Facility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **OPERATION AND MAINTENANCE**
    1. The Company shall prepare, not later than three (3) months from the date of this Approval, implement and continue to update as necessary, a Manual outlining the operating procedures and maintenance programs for the Equipment/Facility, which shall specify as a minimum:
        a. routine operating and maintenance procedures in accordance with good engineering practices;
        b. emergency procedures;
        c. frequency of inspections and scheduled preventative maintenance;
        d. procedures to prevent upset conditions;
        e. all appropriate measures to prevent/minimize fugitive particulate matter, noise and odorous emissions from all potential sources at the Site; and
        f. procedures for record keeping activities relating to the operation and maintenance programs.
    2. The Company shall ensure that the Facility/Equipment is properly operated and maintained at all times and in accordance with this Approval, the operating procedures and maintenance Manual, and the Odour Management Plan.
2. **ODOUR MANAGEMENT PLAN**
    1. The Company shall forthwith implement the Odour Management Plan and continue to review and update as necessary and in consultation with the District Manager as applicable.
    2. If there is any odour complaint, or significant odour is detected during daily inspection, and the odour is confirmed to originate from the Site, mitigation measures shall be implemented immediately in accordance with the Odour Management Plan.
    3. If odour causes adverse off-site impacts that are not mitigated through implementation of odour mitigation measures according to the Odour Management Plan, the Company shall, upon written notification from the District Manager, conduct an investigation into the cause as to why the impacts were not mitigated and submit to the District Manager within the time frame identified in the notice, an assessment of the issues and the need for implementation of contingency actions in accordance with the Odour Management Plan.
    4. If the Ministry deems the odour mitigation measures taken as per Condition

2.3 to be unsuitable, insufficient or ineffective, the District Manager may direct the Company, in writing, to propose further measures to address the noted failure, upset or malfunction, which may include requiring a reduction in the receipt of waste, cessation of the receipt of waste, removal and disposal of waste from the waste diversion area, the removal of leachate from the Site as well as, making repairs or modifications to equipment or processes. Such measures shall be implemented by the Company upon approval by the District Manager.

5. If the cessation of the receipt of waste is required, as determined by Condition 2.4, no waste shall be received at the Site until the District Manager is satisfied that odour impacts have been adequately mitigated.
6. The Company shall prepare and maintain an annual summary of the actions taken and achievements made under the Odour Management Plan as of December 31 of the previous calendar year.

3. **NOISE**
    1. The Company shall, at all times, ensure that the noise emissions from the Facility comply with the limits set out in Ministry Publication NPC-300.
    2. The Company shall, at all times, ensure that the noise emissions from the landfill site operations at the Facility comply with the limits set out in Ministry draft publication "Noise Guidelines for Landfill Sites".
    3. The Company shall ensure that the operating times and numbers of Equipment are limited as detailed in Section 2 of the Acoustic Assessment Report.
    4. The Company shall limit Truck arrivals and departures to a maximum of sixteen (16) trucks per sixty (60) minute period, restricted to the daytime hours from 7 a.m. to 7 p.m.

4. **COMPLAINTS RESPONSE PROCEDURE**
    1. The Company shall develop in consultation with the District Manager, not later than three (3) months from the date of this Approval, implement and continue to update as necessary, a Complaint Response Protocol for dealing with and responding to environmental complaints as a result of operation of the Equipment/Facility approved by this Approval. The Complaint Response Protocol shall include:
        a. procedures for recording the complaint;
        b. procedures for investigating the complaint, including determining all possible causes of the complaint, and the necessary actions to appropriately deal with the cause of the subject matter of the complaint;

c. procedures for taking the necessary actions to appropriately deal with the cause of the subject matter of the complaint in a timely and effective manner;

d. a description of any measures taken to address the complaint, outcome of the actions taken and steps to be taken to avoid the recurrence of similar incidents;

e. procedures for record keeping of activities relating to the complaints;

f. procedures for notifying the District Manager of the complaint in a manner acceptable to the District Manager; and

g. procedures for replying to the complainant.

5. **RECORD RETENTION**
    1. Any information requested by any employee in or agent of the Ministry concerning the Facility and its operation under this Approval, including, but not limited to, any records required to be kept by this Approval, shall be provided to the employee in or agent of the Ministry, upon request, in a timely manner. Unless otherwise specified in this Approval, the Company shall retain, for a minimum of five (5) years from the date of their creation all reports, records and information described in this Approval, including,
        a. a copy of the ESDM Report;
        b. a copy of the Odour Management Plan and activities pertaining to the implementation of the Odour Management Plan;
        c. a copy of the Acoustic Assessment Report;
        d. records of maintenance, repair and inspection of Equipment/Facility;
        e. all records of any upset conditions associated with the operation of the Equipment/Facility;
        f. all records on the environmental complaints, as required under condition 4.

SCHEDULE A

Supporting Documentation

1. Environmental Compliance Approval Application and all supporting information, dated June 1, 2021, signed by Richard Weldon and submitted by the Company;
2. Emission Summary and Dispersion Modelling Report, dated June 11, 2021 and prepared by GHD;

3. Odour Management Plan, dated June 11, 2021 and prepared by GHD;
4. Acoustic Assessment Report prepared by GHD, dated September 7, 2021 and signed by Michael Masschaele; and the additional information provided by Sam East of GHD in the email dated September 7, 2021 and Daniel Turner of GHD in the email dated September 10, 2021.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No. 1 is included to emphasize that the Equipment/Facility must be maintained and operated according to a procedure that will result in compliance with the EPA, the Regulations and this Approval.
2. Condition No. 2 is included to ensure that the Equipment/Facility is operated in a manner that does not result in unacceptable odour emissions and mitigation measures are employed in event of an odour impact.
3. Condition No. 3 is included to provide the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Equipment/Facility.
4. Condition Nos. 4 and 5 are included to require the Company to keep records and to provide information to the Ministry so that compliance with the EPA, the regulations and this Approval can be verified.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 8922-9ZHR29 issued on October 8, 2015.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of September, 2021

Neryed Ragbar, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

QN/
c: District Manager, MECP Hamilton - District
Daniel Turner, GHD

Appendix B

Sample Calculations

Appendix B Supporting Calculations Brooks Road Environmental

Source S-1: Landfill

Methodology: Emission Factor

The emission rates were based on the Volatile Organic Compound (VOC) factor and the maximum landfill gas generation. The VOC Factors from the Landfill were calculated based on the average concentrations reported in US EPA Chapter 2.4 "Municipal Solid Waste Landfills", as published in November 1998 and the ratio of the non-methane organic compounds and the molecular weight of hexane (average non-methane organic compound). For the parameters that are not VOCs, the VOC factor was calculated from the average concentration. The maximum landfill gas generation was based on the memorandum in Appendix E.

Table B.1 provides a summary of the emission calculations from the Landfill.

Sample Calculation: Dichlorodifluoromethane (VOC)

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times {}^{Molecular\ Weight}/_{Hexane\ Molecular\ Weight} \times Concentration$$

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times {}^{120.91}/_{86.18} \times 15.7\ ppm$$

$$VOC\ Factor = 7.92\ \times 10^{-8} \frac{kg}{L}$$

$$Emission\ Rate = \ Maximum\ Landfill\ Gas\ Generation\ \times VOC\ Factor$$

$$ER = 2{,}888{,}172 \frac{m^3}{yr} \times 7.92\ \times 10^{2} \frac{kg}{L} \times 1000 \frac{L}{m^3} \times 1000 \frac{g}{kg} \times 365\ \frac{days}{year} \times 24 \frac{hours}{day} \times 3600 \frac{seconds}{hour}$$

$$ER = 7.25\ \times 10^{-3} \frac{g}{s}$$

Sample Calculation: Mercury (non-VOC)

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times Concentration$$

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times 2.92 \times 10^{-4}\ ppm$$

$$VOC\ Factor = 1.05\ \times 10^{-12} \frac{kg}{L}$$

$$Emission\ Rate = \ Maximum\ Landfill\ Gas\ Generation\ \times VOC\ Factor$$

$$ER = 2{,}888{,}172 \frac{m^3}{yr} \times 1.05\ \times 10^{-12} \frac{kg}{L} \times 1000 \frac{L}{m^3} \times 1000 \frac{g}{kg} \times 365\ \frac{days}{year} \times 24 \frac{hours}{day} \times 3600 \frac{seconds}{hour}$$

$$ER = 9.61\ \times 10^{-8} \frac{g}{s}$$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes emission rate estimates developed from tests on a reasonable number of sources.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-1: Landfill

Methodology: Emission Factor

The odour emissions from the Landfill was based on the default landfill gas concentration from the "Interim Guide to Estimate and Assess Landfill Air Impacts", as published by Resource Branch in October 1992 and the landfill gas generation rate. The landfill gas generation rate was based on the landfill gas generation rate, provided in the report found in Appendix E.

Table B.2 provides a summary of the Odour emission calculations from the Landfill.

Sample Calculation: Odour

$ER = 10{,}000\ ou\ \times 0.0916 \frac{m^3}{s}$

$ER = 9.16\ \times 10^2 \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes emission rate estimates developed from tests on a reasonable number of sources.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-2: *Treated* Effluent Odour Emissions

Methodology: Engineering Calculation

The emissions from the treated leachate were based on the "Design and Operations Report" published by GHD in April, 2019 and the fill rate of 18.92 L/s.

Table B.3 provides a summary of the Odour emission calculations from the treated leachate tank.

Sample Calculation: Odour

$ER = 100\ ou\ \times 0.0189 \frac{m^3}{s}$

$ER = 1.89\ \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes engineering calculations.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-3: Aeration System Odour Emissions

Methodology: Engineering Calculation

The emissions from the aeration system were assumed to be similar to a Sludge Blend Tank "Odour Threshold Emission Factor for Common WWTP Processes", as published in 2008 and the flow rate of 22 m^3 per minute.

Table B.4 provides a summary of the Odour emission calculations from the aeration system.

Sample Calculation: Odour

$ER = 7{,}000\ ou\ \times 0.3667 \frac{m^3}{s}$

$ER = 2.57\ \times 10^3 \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes engineering calculations.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-4: *Raw* Leachate Odour Emissions

Methodology: Engineering Calculation

The emissions from the raw leachate were assumed to be similar to a Sludge Blend Tank "Odour Threshold Emission Factor for Common WWTP Processes", as published in 2008 and the fill rate of 18.92 L/s.

Table B.5 provides a summary of the Odour emission calculations from the raw leachate tank.

Sample Calculation: Odour

$ER = 7{,}000\ ou\ \times 0.0189 \frac{m^3}{s}$

$ER = 1.32\ \times 10^2 \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes engineering calculations.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Table B.1

Landfill Gas Composition and Emission Rate
Brooks Road Landfill
Cayuga, Ontario

Landfill Gas Generation Rate (4)	2,966,136	m^3/yr	

Parameter		Average Concentration (ppm) (1)	VOC Factor (kg/L) (2)	Emission Rate (kg/yr)	Emission Rate (g/s)
Dichlorodifluoromethane	75-71-8	15.7	7.92E-08	2.35E+02	7.45E-03
Chlorodifluoromethane	75-45-6	1.3	4.69E-09	1.39E+01	4.41E-04
1,1,2,2-tetrachloroethane	79-34-5	1.11	7.77E-09	2.31E+01	7.31E-04
Chloromethane	74-87-3	1.21	2.55E-09	7.56E+00	2.40E-04
Vinyl Chloride	75-01-4	7.34	1.91E-08	5.68E+01	1.80E-03
1,2-dichloroethane	107-06-2	0.41	1.69E-09	5.02E+00	1.59E-04
Chloroethane	75-00-3	1.25	3.36E-09	9.98E+00	3.16E-04
Trichlorofluoromethane	75-69-4	0.76	4.36E-09	1.29E+01	4.10E-04
Dichlorofluoromethane	75-43-4	2.62	1.12E-08	3.34E+01	1.06E-03
1,2-dichloropropane	78-87-5	0.18	8.48E-10	2.52E+00	7.98E-05
1,1-Dichloroethylene	75-35-4	0.2	8.09E-10	2.40E+00	7.61E-05
Acrylonitrile	107-13-1	6.33	1.40E-08	4.16E+01	1.32E-03
Dichloromethane	75-09-2	14.30	5.07E-08	1.50E+02	4.77E-03
Bromodichloromethane	75-27-4	3.13	2.14E-08	6.34E+01	2.01E-03
Butane	106-97-8	5.03	1.22E-08	3.62E+01	1.15E-03
1,1,1-Trichloroethane	71-55-6	0.48	2.67E-09	7.92E+00	2.51E-04
Chlorobenzene	108-90-7	0.25	1.17E-09	3.48E+00	1.10E-04
Carbon tetrachloride	56-23-5	0.004	2.57E-11	7.61E-02	2.41E-06
Carbonyl sulphide	463-58-1	0.49	1.23E-09	3.64E+00	1.15E-04
1,4-Dichlorobenzene	106-46-7	0.21	1.29E-09	3.82E+00	1.21E-04
Propane	74-98-6	11.1	2.04E-08	6.06E+01	1.92E-03
Pentane	109-66-0	3.29	9.90E-09	2.94E+01	9.31E-04
Ethanol	64-17-5	27.2	5.23E-08	1.55E+02	4.92E-03
Acetone	67-64-1	7.01	1.70E-08	5.04E+01	1.60E-03
Carbon Disulfide	75-15-0	0.58	1.84E-09	5.46E+00	1.73E-04
Isopropyl Alcohol	67-63-0	50.1	1.26E-07	3.73E+02	1.18E-02
Hexane	110-54-3	6.57	2.36E-08	7.01E+01	2.22E-03
MEK	78-93-3	7.09	2.13E-08	6.33E+01	2.01E-03
MIBK	108-10-1	1.87	7.81E-09	2.32E+01	7.35E-04
Chloroform	67-66-3	0.03	1.49E-10	4.43E-01	1.41E-05
Dimethyl sulfide	75-18-3	7.82	2.03E-08	6.01E+01	1.91E-03
Ethane	74-84-0	889	1.12E-06	3.31E+03	1.05E-01
Ethyl mercaptan	75-08-1	2.28	5.91E-09	1.75E+01	5.56E-04
Ethylene dibromide	106-93-4	0.001	7.84E-12	2.32E-02	7.37E-07
Mercury (3)	7439-97-6	2.92E-04	1.05E-12	3.11E-03	9.87E-08
Methyl mercaptan	74-93-1	2.49	5.00E-09	1.48E+01	4.70E-04
cis-1,2-Dichloroethene	540-59-0	2.84	1.15E-08	3.41E+01	1.08E-03
t-1,2-dichloroethene	156-59-2	2.84	1.15E-08	3.41E+01	1.08E-03
Benzene	71-43-2	2.00	6.52E-09	1.93E+01	6.13E-04
Trichloroethene	79-01-6	2.82	1.55E-08	4.58E+01	1.45E-03
Toluene	108-88-3	36.00	1.38E-07	4.10E+02	1.30E-02
Tetrachlorothene	127-18-4	3.73	2.58E-08	7.65E+01	2.43E-03
Ethylbenzene	100-41-4	4.61	2.04E-08	6.05E+01	1.92E-03
Total Xylenes	1330-20-7	12.10	5.36E-08	1.59E+02	5.04E-03
1,2,4-Trimethylbenzene	95-63-6	3.00	1.50E-08	4.46E+01	1.41E-03
1,1-Dichloroethane	75-34-3	2.35	9.70E-09	2.88E+01	9.13E-04
Cyclohexane	110-82-7	2.10	7.37E-09	2.19E+01	6.93E-04
NMOC (1)		454	1.63E-06	4.84E+03	1.54E-01
Hydrogen Sulphide (3)	7783-06-4	35.5	1.28E-07	3.79E+02	1.20E-02

Notes:

NMOC -non methane organic compound - based on hexane as the average NMOC.
(1) The concentrations are based on the reported USEPA AP42, Chapter 2.4 - Municipal Solid Waste Landfills (November 1998) values.
(2) VOC factor is calculated based on the ratio of the molecular weight of the NMOC and the molecular weight of hexane (the average NMOC as detailed above) and the average concentration of the NMOC.
(3) As these compounds are not VOC's, the VOC factor has been calculated just from the average concentration and not the ratio of the molecular weight of the compound and the molecular weight of hexane.
(4) Gas generation rate based on memorandum in Appendix E.

Table B.2

Summary of Odour Emissions from Landfill
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (ou) (1)	Landfill Gas Generation Rate (m^3/s) (2)	Emission Rate (ou/s)
S-1	Landfill	10,000	0.094	9.41E+02

Notes:

(1) Default landfill gas concentration from "Interim Guide to Estimate and Assess Landfill Air Impacts", Resource Branch, October 1992.

(2) Based on landfill gas generation rate of 338.6 m^3/hr of landfill gas, report provided in Appendix E.

Table B.3

Estimated Treated Effluent Odour Emissions
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (OU) (1)	Fill Rate (m^3/s) (2)	Estimated Maximum Emission Rate (ou/s)
S-2	Treated Effluent Tank	100	0.019	1.89E+00

Notes:

(1) The leachate odour concentration was based on Report 81 published by GHD titled "Design and Operations Report" in April, 2019.
(2) Based on a filling rate of 18.92 Litres per second.

Table B.4

Estimated Aeration System Odour Emissions
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (OU) (1)	Fill Rate (m^3/s) (2)	Estimated Maximum Emission Rate (ou/s)
S-3	Aeration System	7,000	0.367	2.57E+03

Notes:

(1) The leachate odour concentration was assumed to be similar to a Sludge Blend Tanks "Odor Threshold Emission Factor for Common WWTP Processes" 2008.

(2) Based on an aeration system flow rate of 22 m^3/minute.

Table B.5

Estimated Raw Leachate Odour Emissions
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (OU) (1)	Fill Rate (m^3/s) (2)	Estimated Maximum Emission Rate (ou/s)
S-4	Raw Leachate Tank	7,000	0.019	1.32E+02

Notes:

(1) The leachate odour concentration was assumed to be similar to a Sludge Blend Tanks "Odor Threshold Emission Factor for Common WWTP Processes" 2008.
(2) Based on a filling rate of 18.92 Litres per second.

Appendix C

Supporting Information for Assessment of Negligibility

Appendix C Supporting Information for Assessment of Negligibility Brooks Road Environmental

Sources were screened for negligibility using the following screening protocols listed in the ESDM Procedure Document:

– Identifying significant contaminants using an emission threshold (Section 7.1.2)
– Fugitive dust from on-site roadways (Section 7.4)

The results of the screening are discussed in greater detail in the following text.

Identifying Significant Contaminants using an Emission Threshold:

Section 7.1.2 of the ESDM Procedure Document states that contaminants that are emitted from a specific facility may be identified as negligible when they are below emissions thresholds that are developed using the following formula:

$$\text{Emission Threshold (g/s)} = \frac{0.5 \times \text{MECP POI Limit } (\mu g/m^3)}{\text{Dispersion Factor } (\mu g/m^3 \text{ per g/s emission})}$$

All Site emissions of contaminants with an MECP POI limit were assessed against the appropriate emission threshold based on the appropriate 1-hour rural dispersion factor of 10,000 $\mu g/m^3$ per g/s 20 m from the property boundary. For 10-minute standards a conversion of 1.65 was used. For 30-minute standards a conversion of 1.2 was used. For 24-hour standards a conversion of 0.4 was used. A number of contaminants are deemed to be emitted in negligible amounts, as indicated in Table C.1.

Table C.1

Assessment of Significance of Contaminants Using Emission and Concentration Thresholds
Brooks Road Landfill
Cayuga, Ontario

Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period (hrs)	MECP Criteria (µg/m^3)	Regulation Schedule	Emission Threshold (g/s)	Significant? (Y/N)
Dichlorodifluoromethane	75-71-8	7.45E-03	24	500,000	B1	6.25E+01	N
Chlorodifluoromethane	75-45-6	4.41E-04	24	350,000	B1	4.38E+01	N
1,1,2,2-tetrachloroethane	79-34-5	7.31E-04	24	0.1	B2	1.25E-05	Y
Chloromethane	74-87-3	2.40E-04	24	320	B1	4.00E-02	N
Vinyl Chloride	75-01-4	1.80E-03	24	1	B1	1.25E-04	Y
1,2-dichloroethane	107-06-2	1.59E-04	24	2	B1	2.50E-04	N
Chloroethane	75-00-3	3.16E-04	24	5,600	B1	7.00E-01	N
Trichlorofluoromethane	75-69-4	4.10E-04	24	6,000	B1	7.50E-01	N
Dichlorofluoromethane	75-43-4	1.06E-03	24	500	B2	6.25E-02	N
1,2-dichloropropane	78-87-5	7.98E-05	24	2,400	B1	3.00E-01	N
1,1-Dichloroethylene	75-35-4	7.61E-05	24	10	B1	1.25E-03	N
Acrylonitrile	107-13-1	1.32E-03	24	1	B1	7.50E-05	Y
Dichloromethane	75-09-2	4.77E-03	24	220	B1	2.75E-02	N
Bromodichloromethane	75-27-4	2.01E-03	24	350	B2	4.38E-02	N
Butane	106-97-8	1.15E-03	24	3,600	B2	4.50E-01	N
1,1,1-Trichloroethane	71-55-6	2.51E-04	24	115,000	B1	1.44E+01	N
Chlorobenzene	108-90-7	1.10E-04	1	3,500	B1	1.75E-01	N
Chlorobenzene	108-90-7	1.10E-04	10-minute	4,500	B1	1.36E-01	N
Carbon tetrachloride	56-23-5	2.41E-06	24	2	B1	3.00E-04	N
Carbonyl sulphide	463-58-1	1.15E-04	24	13	B2	1.63E-03	N
1,4-Dichlorobenzene	106-46-7	1.21E-04	24	95	B1	1.19E-02	N
Propane	74-98-6	1.92E-03	24	215,000	B2	2.69E+01	N
Pentane	109-66-0	9.31E-04	24	35,500	B2	4.44E+00	N
Ethanol	64-17-5	4.92E-03	1	19,000	B1	9.50E-01	N
Acetone	67-64-1	1.60E-03	24	11,880	B1	1.49E+00	N
Carbon Disulfide	75-15-0	1.73E-04	24	330	B1	4.13E-02	N
Isopropyl Alcohol	67-63-0	1.18E-02	24	7,300	B1	9.13E-01	N
Hexane	110-54-3	2.22E-03	24	2,500	B1	3.13E-01	N
MEK	78-93-3	2.01E-03	24	1,000	B1	1.25E-01	N
MIBK	108-10-1	7.35E-04	24	1,200	B1	1.50E-01	N
Chloroform	67-66-3	1.41E-05	24	1	B1	1.25E-04	N
Dimethyl sulfide	75-18-3	1.91E-03	10-minute	30	B1	9.09E-04	Y
Ethane	74-84-0	1.05E-01	24	14,500	B2	1.81E+00	N
Ethyl mercaptan	75-08-1	5.56E-04	10-minute	13	B1	3.94E-04	Y
Ethylene dibromide	106-93-4	7.37E-07	24	3	B1	3.75E-04	N
Mercury	7439-97-6	9.87E-08	24	1	B1	6.25E-05	N
Methyl mercaptan	74-93-1	4.70E-04	10-minute	13	B1	3.94E-04	Y
cis-1,2-Dichloroethene	540-59-0	1.08E-03	24	105	B1	1.31E-02	N
t-1,2-dichloroethene	156-59-2	1.08E-03	24	105	B1	1.31E-02	N
Benzene	71-43-2	6.13E-04	Annual	0.5	-	-	Y (1)
Benzene	71-43-2	6.13E-04	AAV	5	-	-	Y (1)
Benzene	71-43-2	6.13E-04	DAV	100	-	-	Y (1)
Trichloroethene	79-01-6	1.45E-03	24	12	B1	1.50E-03	N
Toluene	108-88-3	1.30E-02	24	2,000	B1	2.50E-01	N
Tetrachlorothene	127-18-4	2.43E-03	24	360	B1	4.50E-02	N
Ethylbenzene	100-41-4	1.92E-03	10-minute	1,900	B1	5.76E-02	N
Total Xylenes	1330-20-7	5.04E-03	10-minute	3,000	B1	9.09E-02	N
Total Xylenes	1330-20-8	5.04E-03	24	730	B1	9.13E-02	N
1,2,4-Trimethylbenzene	95-63-6	1.41E-03	24	220	B1	2.75E-02	N
1,1-Dichloroethane	75-34-3	9.13E-04	24	165	B1	2.06E-02	N
Cyclohexane	110-82-7	6.93E-04	24	6,100	B1	7.63E-01	N
Hydrogen Sulphide	7783-06-4	1.20E-02	24	7	B1	8.75E-04	Y
Hydrogen Sulphide	7783-06-4	1.20E-02	24	7	B1	8.75E-04	Y

Notes:

(1) Compounds with an annual averaging period cannot be considered negligible.

Appendix D

Dispersion Modelling Files (Electronic)

Table D.1

AERMOD Input Source Parameters
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Source Type	Stack Velocity (m/s)	Stack Exit Gas Temperature (K)	Stack Inner Diameter (m)	Release Height (m)	Building Height (m)	Stack Height Above Roof (m)	Stack Orientation
S01	Landfill	Area	MODELLED AS AN AREA SOURCE			24.00	-	-	-
S02	Treated Effluent Tank	Point	0.269	Ambient	0.3	3	-	-	Capped
S03	Aeration System	Point	5.192	Ambient	0.3	3	-	-	Capped
S04	Raw Leachate Tank	Point	0.269	Ambient	0.3	3	-	-	Capped

Appendix E

Predicted Methane Generation Memorandum

Memorandum

February 27, 2024

To	Neil Shannick, PEng		
From	Bryan Szalda	**Tel**	+1 519 884 0510
Subject	**Predicted Methane Generation Brooks Road Landfill**	**Project no.**	12561524

Purpose of this Memorandum

This memorandum presents a summary of the methane generation modelling analysis for the Brooks Road Landfill located in Cayuga, Ontario (Site). This assessment is a revision to the previous assessment for the Site initially undertaken in November 2016 as part of the Environmental Assessment for a Landfill Expansion project that was used to approve the existing Site Environmental Compliance Approval (ECA) No. A110302, dated October 1, 2021. This assessment forms part of an ECA amendment application to seek approval for Stage 9.

Scope and Limitations

This report: has been prepared by GHD for 2270386 Ontario Limited and may only be used and relied on by 2270386 Ontario Limited for the purpose agreed between GHD and 2270386 Ontario Limited as set out in the introductory paragraph of this report.

GHD otherwise disclaims responsibility to any person other than 2270386 Ontario Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared the Scholl Canyon model ("Model") for, and for the benefit and sole use of, 2270386 Ontario Limited to support estimation of methane generation and must not be used for any other purpose or by any other person.

The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Model are from publicly available sources or provided by or on behalf of the 2270386 Ontario Limited, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs becomes available.

The Model is limited by the mathematical rules and assumptions that are set out in the Report or included in the Model and by the software environment in which the Model is developed.

The Model is a customised model and not intended to be amended in any form or extracted to other software for amending. Any change made to the Model, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Model including any outputs.

GHD has prepared this report on the basis of information provided by 2270386 Ontario Limited and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

Predicted Methane Generation

Consistent with the previous methane generation assessment, modelling was undertaken in accordance with Title 40 of the United States Code of Federal Regulations (CFR), Part 98, Subpart HH (Mandatory Greenhouse Gas [GHG] Reporting for Municipal Solid Waste [MSW] Landfills) (Title 40 CFR Mandatory GHG Reporting Requirements). This method is generally in accordance with the Ontario Ministry of the Environment, Conservation and Parks (MECP), (formerly Ministry of the Environment [MOE]) Air Resources Branch guidance document entitled “Interim Guide to Estimate and Assess Landfill Air Impacts” dated October 1992 that references methods and default parameters within US Title 40 CFR. This assessment uses the most recent methods for estimating landfill gas within US Title 40 CFR as supplemented by Environment and Climate Change Canada’s (ECCC’s) Greenhouse Gas Reporting Program (GHGRP).

There are two modelling simulations considered in this revised assessment:

– Simulation 1: The modelling methodology was taken from the Title 40 CFR Mandatory GHG Reporting Requirements. The waste types were broken down into specific categories (bulk waste, garden waste, construction and demolition (C&D) waste, sewage sludge, food waste, and inert waste) and the degradable organic content (DOC) and reactivity constant (k) values from 40 CFR 98 Subpart HH were applied to each respective waste category.
– Simulation 2: An average degradable organic content (DOC) and reactivity constant (k) were taken from ECCC’s document *National Inventory Report 1990 – 2018: Greenhouse Gas Sources and Sinks in Canada* and applied to total putrescible waste accepted. Inert waste was excluded from the model as it does not break down into methane.

This modelling analysis only details anthropogenic emissions from the landfill and does not include biogenic emissions.

Simulation 1 – Waste Category Specific Model

Modelling Methane Generation – No Gas Collection System

The methane generation within a landfill for a given year, G_{CH4}, was calculated based on historical waste records. Equation 1 presents the Scholl Canyon equation which is used to calculate the methane generation from a landfill for a given year:

$$G_{CH4} = \sum \{W_x * L_{o,x} * (e^{-k\,(T - x - 1)} - e^{-k\,(T - x)})\} \quad \text{[for x = S through T-1]} \quad (1)$$

Where:

– G_{CH4} = modelled methane generation rate in year, T, in metric tonnes per year
– x = year in which waste was disposed
– S = start year of calculation

– T = reporting year for which emissions are calculated
– W_x = quantity of waste disposed in year x (metric tonnes, wet weight)
– L_o = CH_4 generation potential (metric tonnes CH_4/metric tonnes waste)
– k = decay rate constant from Table 1 (yr^{-1})

The methane generation potential, L_o, is calculated using Equation 2:

$$L_o = \frac{MCF * DOC * DOC_F * F * 16}{12} \quad (2)$$

Where:

– L_o = CH_4 generation potential (metric tonnes CH_4/metric tonnes waste)
– MCF = Methane correction factor (default value is 1)
– DOC = Degradable organic carbon from Table 1 (metric tonnes of carbon/metric tonne waste)
– DOC_F = Fraction of DOC dissimilated (default value is 0.5)
– F = Fraction by volume of CH_4 in landfill gas from measurement data, if available (default value is 0.5)

Actual waste disposal numbers were provided by the Site in the form of a Material Activity Report for the period of October 8, 2009 through October 9, 2016 and annual reports for the period of 2016 through 2020. Refer to Attachment 1 for these reports. Table 1 provides a summary of the potential modelling parameters from 40 CFR 98 Subpart HH differentiated by waste categories (i.e., bulk waste, C&D waste, food waste, garden waste, sewage sludge, or inerts). Tables 2A through 2F present the breakdown of waste into the categories shown in Table 1 along with the approximate composition (percent of total landfilled waste in a given year).

The approved capacity of the existing landfill is 1,045,065 m^3. Stage 9 includes an additional 219,400 m^3 for a total proposed capacity of 1,264,465 m^3. A waste acceptance rate of 250,000 tonnes per year was assumed for future years (starting in 2023) until the total proposed landfill capacity was reached (approximately 2026). While landfill closure is anticipated to occur in 2026 based on recent filling rates, the evaluation of an accelerated closure period represents a conservative estimate, providing a higher peak year methane generation rate (i.e., representing a worst-case scenario). Waste composition for future years (starting in 2021) was assumed to be the same as shown in Table 2F, which presents average waste composition data from 2016 to 2020. Table 3 presents the annual breakdown of waste quantities for the Brooks Road Landfill from the open year (2009) to closure (approximately 2026). Capacity consumed each future year is based on the in-place waste density of 1.956 tonnes/m^3.

Table 4 presents a summary of the input values used for the model. A review of climate data for the Site shows that the average precipitation is 500-1,000 mm (20-40 inches) per year. It is assumed that mean annual precipitation exceeds the potential evapotranspiration rate at the Site. The default methane concentration of 50 percent by volume was also assumed.

The estimated methane generation in the peak year (2026) for each waste category is shown in the following tables:

– Table 5 bulk waste
– Table 6 C&D
– Table 7 sewage sludge
– Table 8 garden waste
– Table 9 food waste
– Table 10 all waste types (please note that inert waste does not generate methane emissions)

Methane generation values (in tonnes per year) were converted to carbon dioxide equivalent (as tonnes CO_2e per year) by applying a 100-year warming factor of 25 (for methane).

For landfills without landfill gas collection and control systems, methane emissions are calculated using an oxidation factor shown in Equation 3:

$$MG = G_{CH4} * (1 – OX) \quad (3)$$

where,

MG = methane generation, after adjustment for oxidation (metric tonnes CH_4)

G_{CH4} = modelled methane generation rate in reporting year, calculated from Equation 1 (metric tonnes CH_4)

OX = Oxidation fraction

This equation accounts for methane that is oxidized upon diffusion through the soil cover. Table 11 presents the estimated peak methane emissions from the Brooks Road Landfill when accounting for soil cover oxidation. Therefore, without an LFG collection and control system, peak methane emissions from the Brooks Road Landfill (in 2026) are estimated to be approximately 902 tonnes of methane (approximately 22,540 tonnes CO_2e). Converting to units of flow, the maximum methane generation rate is approximately 152 cubic metres per hour (m^3/hr) (90 standard cubic feet per minute [scfm]) in 2026.

Figure 1 presents the projected methane generation for the Brooks Road Landfill. This figure provides total generation quantities prior to cover oxidation. This figure was produced by utilizing the USEPA LandGEM model upon which the first-order Scholl Canyon model used in Ontario for estimating landfill gas volumes is based.

Modelling Methane Generation – With Gas Collection and Control System

The total proposed capacity of the landfill is 1,264,465 m^3. In accordance with Ontario Regulation (O. Reg. 347) Section 11.1(2) all landfills in Ontario meeting the following criteria are required to install facilities for the collection and the burning or use of LFG generated by the site during operation of the site and during site closure if:

– The site accepts only MSW
– On or after June 30, 2009, the site will landfill waste under a certificate of approval (C of A) or provisional C of A issued under Part V of the EPA (now referred to as an Environmental Compliance Approval [ECA])
– On or after June 30, 2009, the site will have a total waste disposal volume of more than 1.5 million m^3

As an operating landfill not meeting the above criteria, the Site is not required to install LFG collection or control facilities, either at the current capacity of the proposal expanded capacity.

Notwithstanding the above, ECCC has recently issued a proposed regulatory framework entitled “Reducing Canada’s Landfill Methane Emissions” (PRF), inviting interested parties to provide their feedback on the PRF (feedback closure date of May 19, 2023). The PRF seeks to require landfills exceeding either a methane generation or a methane emission threshold to comply with regulatory requirements for controlling methane emissions. A tiered approach to identifying specific regulatory obligations is proposed that generally includes:

– Applicability threshold based on quantity of MSW disposed
– Methane generation assessment and threshold
– Methane emission assessment and thresholds (optional approach)

The PRF indicates that this approach is in line with the way other North American jurisdictions have identified which landfills are required to take action to reduce methane emissions. The regulation would apply to landfills that have received more than a specified quantity of MSW, i.e., waste generated by the residential, industrial, commercial and institutional (ICI), and construction, renovation and demolition (CRD) sectors. ICI sector waste is defined as waste from sources like office buildings, shopping malls, schools and hospitals. As proposed, the regulations would apply to landfills that meet the following criteria:

– Closed landfills that accepted MSW for disposal after January 1, 2009 and that have more than 450,000 tonnes of MSW in place (total waste disposed)

– Open landfills that:
  - Have more than 100,000 tonnes of MSW in place or
  - Accepted more than 10,000 tonnes of MSW for disposal per year in any year following the coming into force of the regulations

Landfills that meet these criteria would have requirements under the regulation. Some landfills would only be required to do minimal assessment, while others may have further obligations based on the results of the assessment.

As this Site currently has more than 100,000 tonnes of MSW or bulk waste in place this section will consider the environmental, energy, and economic impacts associated with the operation of a landfill gas collection and control system.

To determine the effectiveness of the system, the estimated methane emission reduction was calculated. In accordance with Table HH-3 of 40 CFR 98, Subpart HH, a gas collection recovery factor of 60 percent was assumed as most of the Site currently has daily cover (see Table 11). The methane that is generated in the landfill and not recovered by the collection system is given an oxidation factor. A destruction efficiency is applied to the methane that is recovered by the collection system (the lesser of 99 percent and the manufacturer's specified destruction efficiency). Equation 4 is used to calculate total annual methane emissions:

$$E_{CH4} = [(G_{CH4} – R) * (1 – OX)] + [R * (1 – (DE * f_{dest}))] \qquad (4)$$

Where:

– E_{CH4} = Methane emissions from landfill (metric tonnes CH_4)
– R = Quantity of recovered CH_4 in collection system [R= Collection Efficiency (%) * G_{CH4}]
– OX = Oxidation fraction
– DE = Destruction efficiency
– f_{dest} = fraction of hours the control device was operating (annual operating hours/8,760 hours per year). If the gas is destroyed in a back-up flare (or similar device) or if the gas is transported off-site for destruction, use f_{dest} = 1

Figure 2 presents the projected methane collection for the Site. Table 12 presents a summary of the methane emissions for each option (Option 1: No Collection System, Option 2: With Gas Collection System), as well as the estimated methane reduction by going forward with Option 2. It is assumed that the only feasible control option is an open/utility flare since the Site does not generate enough gas to support an enclosed flare.

Gas Collection and Control System – Environmental Impacts

In an open/utility flare, LFG is burned in the elevated flare tip located at the top of the gas flare stack. Commonly the flame is open at the top of the gas flare stack and hence the name. Due to the open flame, this type of flare system can be a source of noise. Also, the radiant heat from open flame renders some area around the stack unsuitable for installation of some equipment.

Gas Collection and Control System – Energy Impacts

An active gas collection system would require the operation of a blower system. In addition, the open flare would require a fuel source for startup. An active collection and control system would also require much more monitoring and maintenance, which would result in more vehicle traffic to and from the Site. All the aforementioned items would be a source of GHG emissions which would partially offset any methane reduction that is achieved by a gas collection and control system.

Gas Collection and Control System – Economic Impacts

The average annual costs (capital and operating) associated with the operation of a utility flare and a gas collection system over a 25-year period is presented in Tables 13 and 14, respectively. The total annual cost for the operation of a gas collection and control system is estimated to be $334,000 per year. The average annual methane emission reduction for the period of 2026-2050 is estimated to be 8,118 tonnes CO_2e per year. Therefore, the cost effectiveness with this option is estimated to be $41 per tonne CO_2e reduced. Historically, when evaluated based on Ontario's discontinued Cap-and-Trade system, the threshold for determining if a project is cost effective was in the range of $3-$15 per tonne CO_2e reduced (for GHG). Based on this, the operation of a gas collection and control system at the Brooks Road Landfill is not considered cost-effective. Consideration can be given to credits that would be generated under the ECCC's Clean Fuel Regulations (CFR), though it is unclear if the ECCC's PRF would remove eligibility for generation of credits under the CFR.

Simulation 2 – Model Based on Parameters from ECCC's National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada

Modelling Methane Generation – No Gas Collection System

GHD prepared a second model simulation in which DOC and k values were referenced from the document "*National Inventory Report 1990 – 2018: Greenhouse Gas Sources and Sinks in Canada*", dated 2020. Table A3.6-4 from Part 2 provides average DOC and k values broken down by provinces within Canada. For Ontario, a DOC value of 0.21 is specified for the period of 2002-2014 and a DOC value of 0.18 is specified for 2015 to present. Table A3.6-5 specifies a k value of 0.045 yr^{-1} for Ontario for the period of 2008 to present. These model parameters are only being applied to the putrescible waste accepted at the Site, defined as the total waste minus inert waste categories shown in Table 3.

The estimated methane generation in the peak year (2026) is shown in the following tables:

– Table 15 presents the estimated peak methane generation for the putrescible waste accepted in 2009 through 2014
– Table 16 presents the estimated peak methane generation for the putrescible waste accepted in 2015 through 2026
– Table 17 presents the estimated peak methane generation for all wasted types combined (please note that inert waste does not generate methane emissions)

Methane generation values (in tonnes per year) were converted to carbon dioxide equivalents (as tonnes CO_2e per year) by applying a 100-year warming factor of 25 for methane.

Table 18 presents the estimated peak methane emissions from the Site when accounting for soil cover oxidation. Therefore, without an LFG collection and control system, peak methane emissions from the Site in 2026 are estimated to be approximately 1,525 tonnes of methane (approximately 38,117 tonnes CO_2e). Converting to units of flow, the maximum methane generation rate is approximately 257 m^3/hr (152 scfm) in 2026.

Figure 3 presents the projected methane generation for the Site. This figure provides total generation quantities prior to cover oxidation. This figure was produced by utilizing the USEPA LandGEM model.

Modelling Methane Generation – With Gas Collection and Control System

This section presents a discussion of the impacts associated with the operation of a gas collection and control system. The environmental, energy, and economic impacts were evaluated for the installation of a gas collection and control system at the Site.

To determine the effectiveness of the system, the estimated methane emission reduction was calculated. In accordance with Table HH-3 of 40 CFR 98, Subpart HH, a gas collection recovery factor of 60 percent was assumed as most of the Site currently has daily cover (see Table 18). The methane that is generated in the landfill and not recovered by the collection system is given an oxidation factor. A destruction efficiency is

applied to the methane that is recovered by the collection system (the lesser of 99 percent and the manufacturer's specified destruction efficiency).

Figure 4 presents the projected methane collection for the Site. Table 19 presents a summary of the methane emissions for each option (Option 1: No Collection System, Option 2: With Gas Collection System), as well as the estimated methane reduction by going forward with Option 2. It is assumed that the only feasible control option is an open/utility flare since the Site does not generate enough gas to support an enclosed flare.

Gas Collection and Control System – Environmental Impacts

In an open/utility flare, LFG is burned in the elevated flare tip located at the top of the gas flare stack. Commonly the flame is open at the top of the gas flare stack and hence the name. Due to the open flame, this type of flare system can be a source of noise. Also, the radiant heat from open flame renders some area around the stack unsuitable for installation of some equipment.

Gas Collection and Control System – Energy Impacts

An active gas collection system would require the operation of a blower system. In addition, the open flare would require a fuel source for startup. An active collection and control system would also require much more monitoring and maintenance, which would result in more vehicle traffic to and from the Site. All the aforementioned items would be a source of GHG emissions which would partially offset any methane reduction that is achieved by a gas collection and control system.

Gas Collection and Control System – Economic Impacts

The average annual costs (capital and operating) associated with the operation of a utility flare and a gas collection system over a 25-year period is presented in Tables 13 and 14, respectively. The total annual cost for the operation of a gas collection and control system is estimated to be $333,712 per year. The average annual methane emission reduction for the period of 2026-2050 is estimated to be 14,027 tonnes CO_2e per year. Therefore, the cost effectiveness with this option is estimated to be $24 per tonne CO_2e reduced. Historically, when evaluated based on Ontario's discontinued Cap-and-Trade system, the threshold for determining if a project is cost effective was in the range of $3 - $15 per tonne CO_2e reduced (for GHG). Based on this, the operation of a gas collection and control system at the Brooks Road Landfill is not considered cost-effective. Consideration can be given to credits that would be generated under the ECCC's CFR, though it is unclear if the ECCC's PRF would remove eligibility for generation of credits under the CFR.

Discussion/Conclusion

The estimated maximum landfill gas generation and methane generation quantities for the Site are shown in the table below (adjusted for cover oxidation):

	Maximum Generation – Simulation 1		Maximum Generation – Simulation 2	
	m^3/hr	cfm	m^3/hr	cfm
LFG	338.6	199.3	572.1	336.7
Methane	152.4	89.7	257.4	151.5

Based on an evaluation of the waste quantities shown in Table 2F, the landfill accepts mostly construction/demolition waste (~27 percent) and inert material (~65 percent). These waste categories contain a very low amount of DOC when compared to higher organic materials such as bulk waste and food waste. Therefore, the landfill is not expected to generate a large amount of methane emissions as a typical MSW landfill would.

GHD concludes that model Simulation 1 is more indicative of what is occurring at the Site since this scenario accounts for actual waste types accepted at the Site. Simulation 2 is based on estimated average DOC and k values collected across Canada (by province) and is more aligned with MSW sites that contain more organic waste than what is accepted at the Site. Brooks Road Landfill accepts ICI waste which generally contains less

degradable organic content than MSW. We should note that for both model simulations, the landfill is expected to generate less than 100,000 tonnes of carbon dioxide equivalent in the peak year of generation and a gas collection system is not considered feasible in either case.

It should be noted that the Site did accept waste prior to 2009. However, the Site does not have detailed waste records for years prior to 2009. Therefore, it is more conservative (i.e., biases landfill gas conservatively high) to start the modelling analysis in 2009 using a fixed design capacity of 624,065 tonnes for the existing landfill. By employing a fixed design capacity of 624,065 tonnes, the waste is assumed to be deposited in the landfill sooner than it was and is expected to produce more gas in the present time than older waste.

Based on the relatively low levels of methane expected to be generated at the Brooks Road Landfill and the lack of regulatory or economic drivers associated with the installation of a gas collection and control system, it is not recommended to install such a system at this time. The installation of a gas collection or control system will need to be revisited should ECCC adopt the PRF put out for public comment this year.

Regards,

Bryan Szalda
Senior Engineer

Figure 1
LandGEM - Modelled Methane Generation - Simulation 1
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

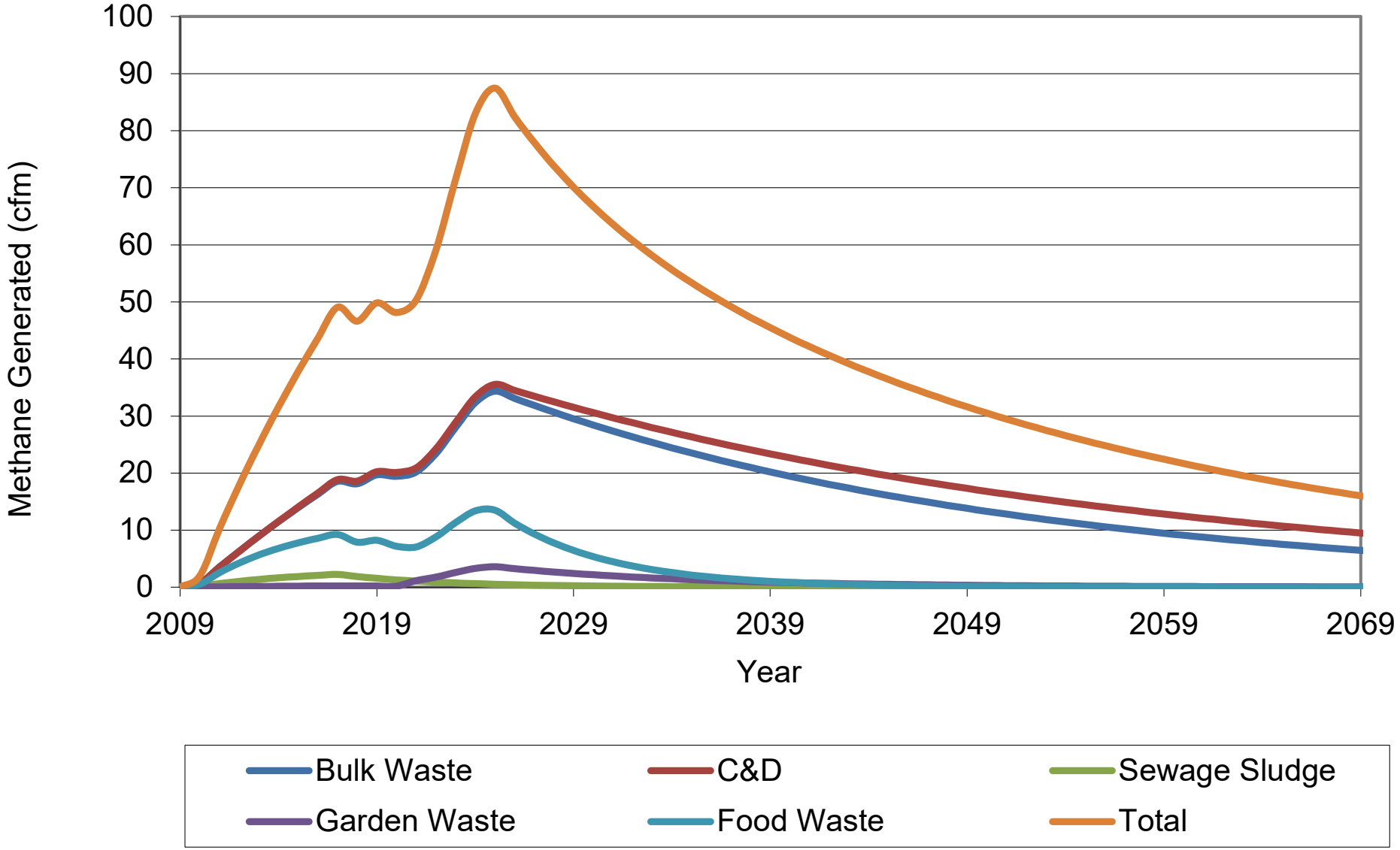


Figure 2
LandGEM - Modelled Methane Collection - Simulation 1
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

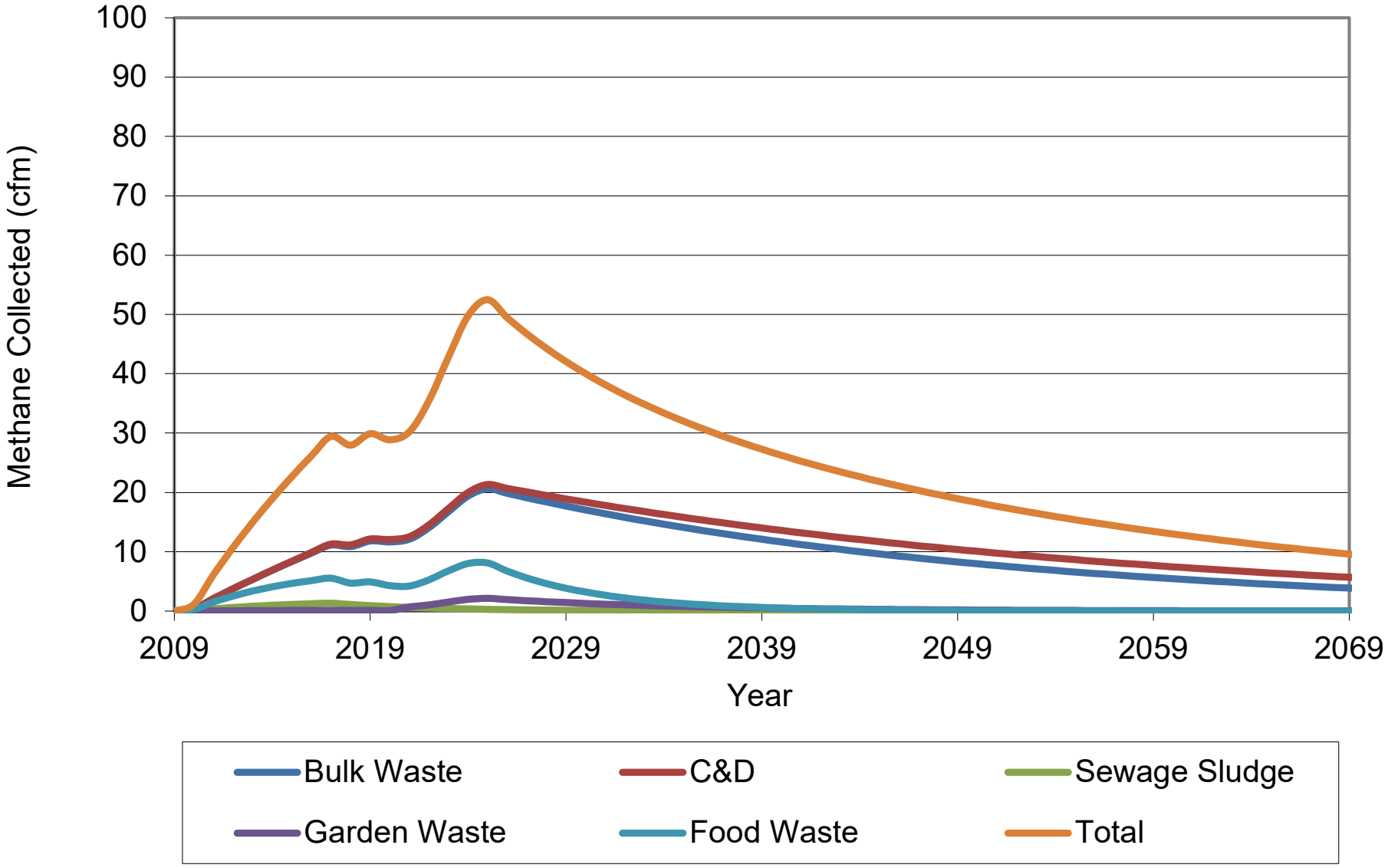


Figure 3
LandGEM - Modelled Methane Generation - Simulation 2
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

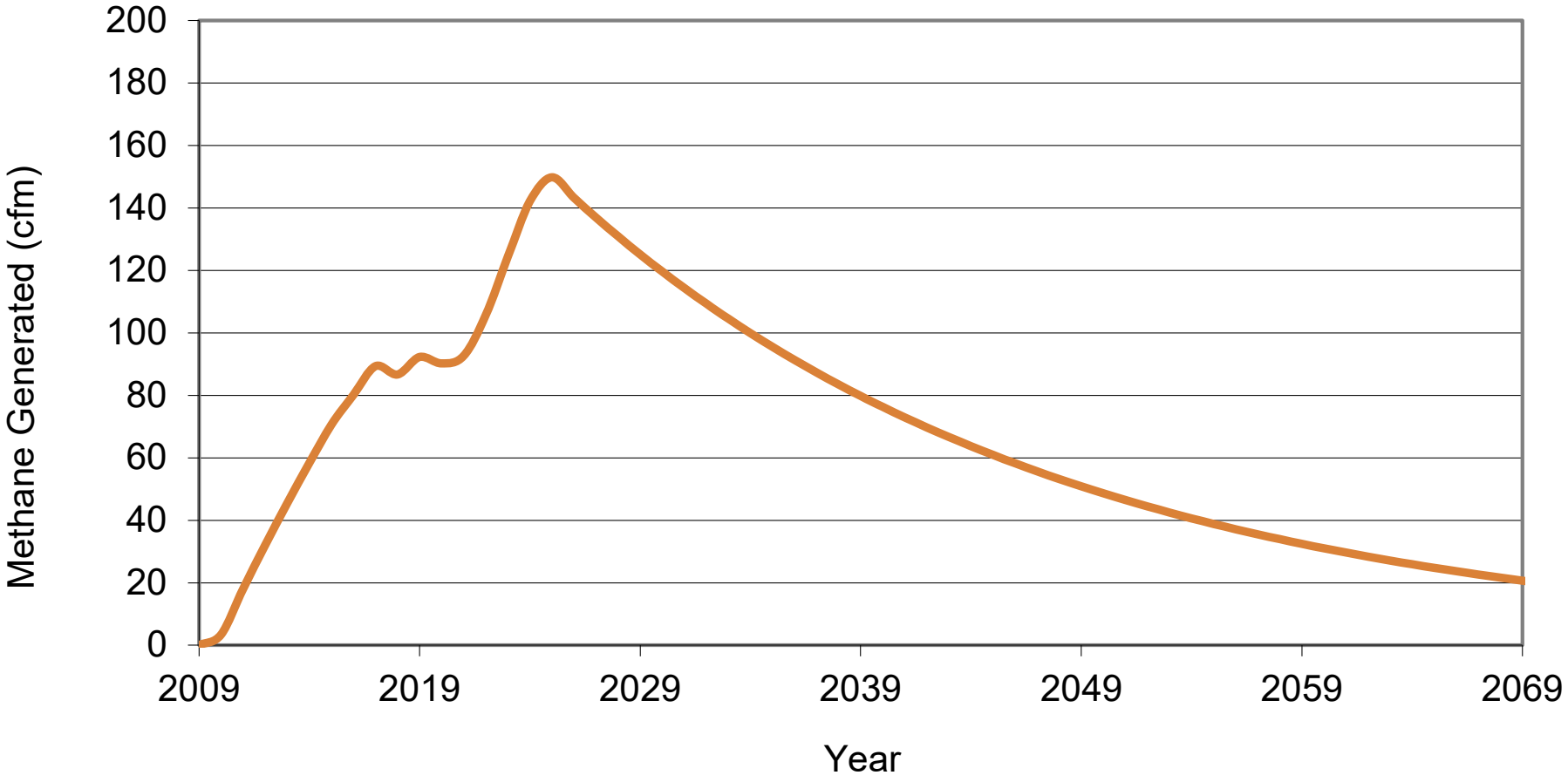


Figure 4
LandGEM - Modelled Methane Collection - Simulation 2
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

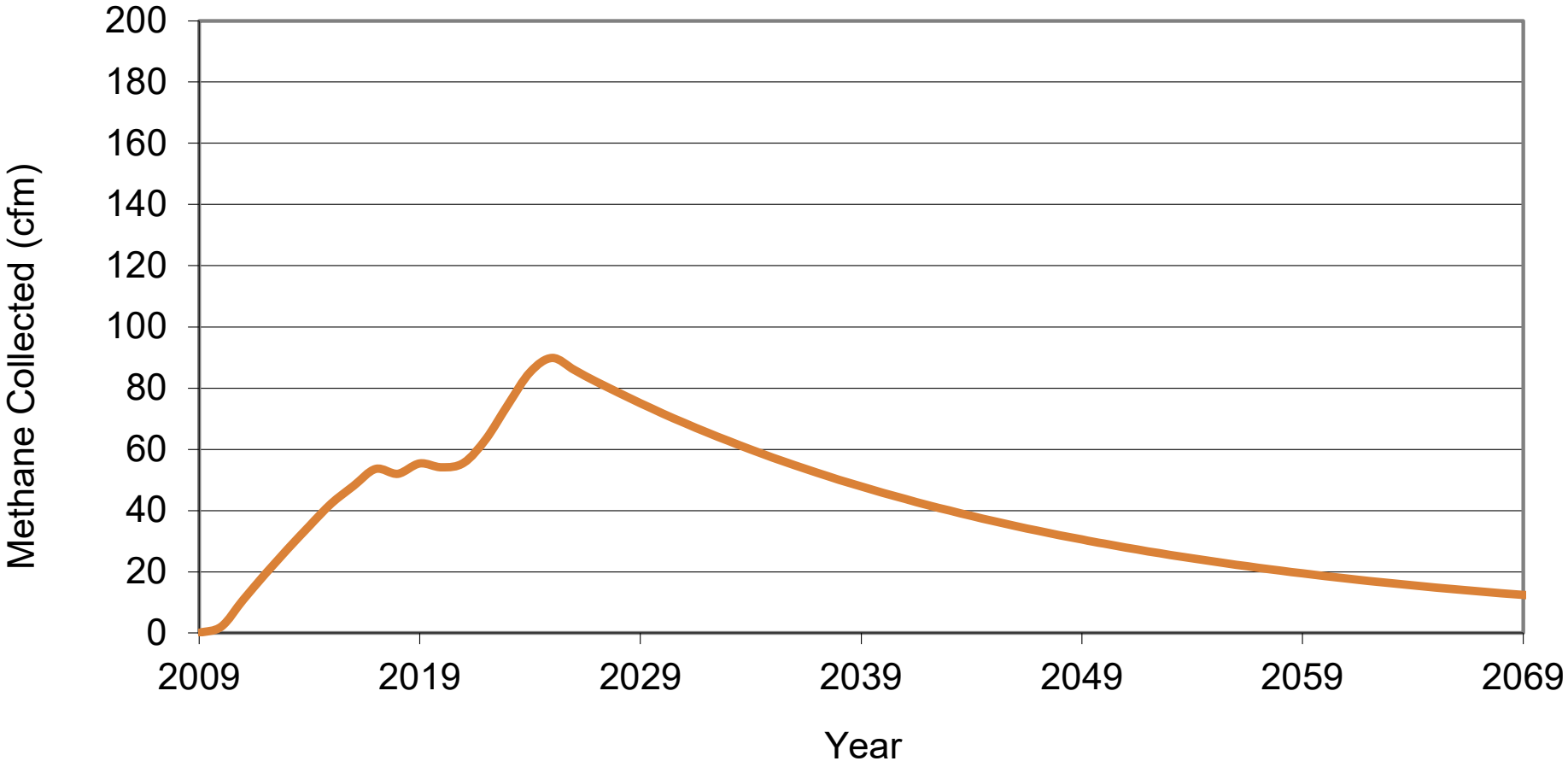


Table 1

Modelling Parameters
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Factor	Default value	Units
DOC and k values—Bulk waste option		
DOC (bulk waste)	0.2	Weight fraction, wet basis.
k (precipitation plus recirculated leachate[(a)] <20 inches/year)	0.02	yr^{-1}
k (precipitation plus recirculated leachate[(a)] 20-40 inches/year)	0.038	yr^{-1}
k (precipitation plus recirculated leachate[(a)] >40 inches/year)	0.057	yr^{-1}
DOC and k values—Modified bulk MSW option		
DOC (bulk MSW, excluding inerts and C&D waste)	0.31	Weight fraction, wet basis.
DOC (inerts, e.g., glass, plastics, metal, concrete)	0	Weight fraction, wet basis.
DOC (C&D waste)	0.08	Weight fraction, wet basis.
k (bulk MSW, excluding inerts and C&D waste)	0.02 to 0.057[(b)]	yr^{-1}
k (inerts, e.g., glass, plastics, metal, concrete)	0	yr^{-1}
k (C&D waste)	0.02 to 0.04[(b)]	yr^{-1}
DOC and k values—Waste composition option		
DOC (food waste)	0.15	Weight fraction, wet basis.
DOC (garden)	0.2	Weight fraction, wet basis.
DOC (paper)	0.4	Weight fraction, wet basis.
DOC (wood and straw)	0.43	Weight fraction, wet basis.
DOC (textiles)	0.24	Weight fraction, wet basis.
DOC (diapers)	0.24	Weight fraction, wet basis.
DOC (sewage sludge)	0.05	Weight fraction, wet basis.
DOC (inerts, e.g., glass, plastics, metal, cement)	0	Weight fraction, wet basis.
k (food waste)	0.06 to 0.185[(c)]	yr^{-1}
k (garden)	0.05 to 0.10[(c)]	yr^{-1}
k (paper)	0.04 to 0.06[(c)]	yr^{-1}
k (wood and straw)	0.02 to 0.03[(c)]	yr^{-1}
k (textiles)	0.04 to 0.06[(c)]	yr^{-1}
k (diapers)	0.05 to 0.10[(c)]	yr^{-1}
k (sewage sludge)	0.06 to 0.185[(c)]	yr^{-1}
k (inerts e.g., glass, plastics, metal, concrete)	0	yr^{-1}
Other parameters—All MSW landfills		
Methane Correction Factor, MCF	1	
Fraction of DOC Dissimilated, DOC_F	0.5	
Fraction by volume of CH4 in landfill gas from measurement data, if available, F	0.5	
Oxidation Fraction, OX	See Table HH-4 of this subpart	
Destruction Efficiency, DE	0.99	

Notes:

Source: 40 CFR 98 Subpart HH, Table HH-1
DOC - degradable organic carbon

k - decay rate constant

a. Recirculated leachate (in inches/year) is the total volume of leachate recirculated from company records or engineering estimates divided by the area of the portion of the landfill containing waste with appropriate unit conversions. Alternatively, landfills that use leachate recirculation can elect to use the k value of 0.057 rather than calculating the recirculated leachate rate.

b. Use the lesser value when precipitation plus recirculated leachate is less than 20 inches/year. Use the greater value when precipitation plus recirculated leachate is greater than 40 inches/year. Use the average of the range of values when precipitation plus recirculated leachate is 20 to 40 inches/year (inclusive). Alternatively, landfills that use leachate recirculation can elect to use the greater value rather than calculating the recirculated leachate rate.

c. Use the lesser value when the potential evapotranspiration rate exceeds the mean annual precipitation rate plus recirculated leachate. Use the greater value when the potential evapotranspiration rate does not exceed the mean annual precipitation rate plus recirculated leachate. Alternatively, landfills that use leachate recirculation can elect to use the greater value rather than assessing the potential evapotranspiration rate or recirculated leachate rate.

Table 2A

Historical Waste Receipt Categorization (2009 - 2016)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		350,951.53		
70% C&D - Transfer Stations	X	245,666.07	245,666.07	C&D
5% Food Waste	X	17,547.58	17,547.58	FOOD
10% Inerts (Glass, Roxul)		35,095.15		INERT
15% Residential Rolloffs	X	52,642.73	52,642.73	BULK
C&D	X	5,514.35	5,514.35	C&D
Shingles		15,876.78		INERT
Contaminated Soil		87,691.42		INERT
Sludge	X	12,644.03	12,644.03	SEWAGE SLUDGE
Yard Waste	X	461.11	461.11	GARDEN
Asbestos		5,398.30		INERT
Demolition	X	105.44	105.44	C&D
Demo/brick/block	X	2,112.12	2,112.12	C&D
Clay		0.00		INERT
Tire Fluff		770.67		INERT
Salt Cake		233.14		INERT
Ash		2,289.55		INERT
C&D/Roofing/Shingles	X	2,056.40	2,056.40	C&D
Total Material (2009 - 2016)		**486,105**	**338,750**	
Total Material (per year)		**69,444**	**48,393**	
Total Bulk Waste (per year)		**7,520**	**tonnes per year**	
Total Bulk Waste (% of Total)		**10.8**		
Total C&D Waste (per year)		**36,493**	**tonnes per year**	
Total C&D Waste (% of Total)		**52.6**		
Total Sewage Sludge (per year)		**1,806**	**tonnes per year**	
Total Sewage Sludge (% of Total)		**2.6**		
Total Garden Waste (per year)		**66**	**tonnes per year**	
Total Garden Waste (% of Total)		**0.1**		
Total Food Waste (per year)		**2,507**	**tonnes per year**	
Total Food Waste (% of Total)		**3.6**		
Total Inert Waste (per year)		**21,051**	**tonnes per year**	
Total Inert Waste (% of Total)		**30.3**		

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 2B

Historical Waste Receipt Categorization (2017)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		4,529.59		
70% C&D - Transfer Stations	X	3,170.71	3,170.71	C&D
5% Food Waste	X	226.48	226.48	FOOD
10% Inerts (Glass, Roxul)		452.96		INERT
15% Residential Rolloffs	X	679.44	679.44	BULK
C&D	X	0.00	0.00	C&D
Shingles		0.00		INERT
Contaminated Soil		13,478.45		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		0.00		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	894.28	894.28	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Total Material (2017)		**18,902**	**4,971**	
Total Material (per year)		**18,902**	**4,971**	
Total Bulk Waste (per year)		**679**	**tonnes per year**	
Total Bulk Waste (% of Total)		**3.6**		
Total C&D Waste (per year)		**4,065**	**tonnes per year**	
Total C&D Waste (% of Total)		**21.5**		
Total Sewage Sludge (per year)		**0**	**tonnes per year**	
Total Sewage Sludge (% of Total)		**0.0**		
Total Garden Waste (per year)		**0**	**tonnes per year**	
Total Garden Waste (% of Total)		**0.0**		
Total Food Waste (per year)		**226**	**tonnes per year**	
Total Food Waste (% of Total)		**1.2**		
Total Inert Waste (per year)		**13,931**	**tonnes per year**	
Total Inert Waste (% of Total)		**73.7**		

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 2C

Historical Waste Receipt Categorization (2018)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		39,179.67		
70% C&D - Transfer Stations	X	27,425.77	27,425.77	C&D
5% Food Waste	X	1,958.98	1,958.98	FOOD
10% Inerts (Glass, Roxul)		3,917.97		INERT
15% Residential Rolloffs	X	5,876.95	5,876.95	BULK
C&D	X	0.00	0.00	C&D
Shingles		0.00		INERT
Contaminated Soil		19,122.72		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		82.87		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	503.70	503.70	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Total Material (2018)		**58,889**	**35,765**	
Total Material (per year)		**58,889**	**35,765**	
Total Bulk Waste (per year)		**5,877**	**tonnes per year**	
Total Bulk Waste (% of Total)		**10.0**		
Total C&D Waste (per year)		**27,929**	**tonnes per year**	
Total C&D Waste (% of Total)		**47.4**		
Total Sewage Sludge (per year)		**0**	**tonnes per year**	
Total Sewage Sludge (% of Total)		**0.0**		
Total Garden Waste (per year)		**0**	**tonnes per year**	
Total Garden Waste (% of Total)		**0.0**		
Total Food Waste (per year)		**1,959**	**tonnes per year**	
Total Food Waste (% of Total)		**3.3**		
Total Inert Waste (per year)		**23,124**	**tonnes per year**	
Total Inert Waste (% of Total)		**39.3**		

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Historical Waste Receipt Categorization (2019)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		8,371.84		
70% C&D - Transfer Stations	X	5,860.29	5,860.29	C&D
5% Food Waste	X	418.59	418.59	FOOD
10% Inerts (Glass, Roxul)		837.18		INERT
15% Residential Rolloffs	X	1,255.78	1,255.78	BULK
C&D	X	0.00	0.00	C&D
Shingles		0.00		INERT
Contaminated Soil		65,084.88		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		0.00		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	0.00	0.00	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D

Total Material (2019)	**73,457**	**7,535**
Total Material (per year)	**73,457**	**7,535**
Total Bulk Waste (per year)	**1,256**	**tonnes per year**
Total Bulk Waste (% of Total)	**1.7**	
Total C&D Waste (per year)	**5,860**	**tonnes per year**
Total C&D Waste (% of Total)	**8.0**	
Total Sewage Sludge (per year)	**0**	**tonnes per year**
Total Sewage Sludge (% of Total)	**0.0**	
Total Garden Waste (per year)	**0**	**tonnes per year**
Total Garden Waste (% of Total)	**0.0**	
Total Food Waste (per year)	**419**	**tonnes per year**
Total Food Waste (% of Total)	**0.6**	
Total Inert Waste (per year)	**65,922**	**tonnes per year**
Total Inert Waste (% of Total)	**89.7**	

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Historical Waste Receipt Categorization (2020)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		25,622.69		
70% C&D - Transfer Stations	X	17,935.88	17,935.88	C&D
5% Food Waste	X	1,281.13	1,281.13	FOOD
10% Inerts (Glass, Roxul)		2,562.27		INERT
15% Residential Rolloffs	X	3,843.40	3,843.40	BULK
C&D	X	0.00	0.00	C&D
Shingles		2,382.12		INERT
Contaminated Soil		30,410.29		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		45.94		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	0.00	0.00	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Wood	X	1,564.47	1,564.47	GARDEN

Total Material (2020)	**60,026**	**24,625**
Total Material (per year)	**60,026**	**24,625**
Total Bulk Waste (per year)	**3,843**	**tonnes per year**
Total Bulk Waste (% of Total)	**6.4**	
Total C&D Waste (per year)	**17,936**	**tonnes per year**
Total C&D Waste (% of Total)	**29.9**	
Total Sewage Sludge (per year)	**0**	**tonnes per year**
Total Sewage Sludge (% of Total)	**0.0**	
Total Garden Waste (per year)	**1,564**	**tonnes per year**
Total Garden Waste (% of Total)	**2.6**	
Total Food Waste (per year)	**1,281**	**tonnes per year**
Total Food Waste (% of Total)	**2.1**	
Total Inert Waste (per year)	**35,401**	**tonnes per year**
Total Inert Waste (% of Total)	**59.0**	

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 2F

Historical Waste Receipt Categorization (2016 - 2020)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		95,197.66		
70% C&D - Transfer Stations	X	66,638.36	66,638.36	C&D
5% Food Waste	X	4,759.88	4,759.88	FOOD
10% Inerts (Glass, Roxul)		9,519.77		INERT
15% Residential Rolloffs	X	14,279.65	14,279.65	BULK
C&D	X	12.50	12.50	C&D
Shingles		2,382.12		INERT
Contaminated Soil		150,928.49		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		140.34		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	2,188.53	2,188.53	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Wood	X	1,564.47	1,564.47	GARDEN

Total Material (2016 - 2020)	**252,414**	**89,443**
Total Material (per year)	**50,483**	**17,889**
Total Bulk Waste (per year)	**2,856**	**tonnes per year**
Total Bulk Waste (% of Total)	**5.7**	
Total C&D Waste (per year)	**13,768**	**tonnes per year**
Total C&D Waste (% of Total)	**27.3**	
Total Sewage Sludge (per year)	**0**	**tonnes per year**
Total Sewage Sludge (% of Total)	**0.0**	
Total Garden Waste (per year)	**313**	**tonnes per year**
Total Garden Waste (% of Total)	**0.6**	
Total Food Waste (per year)	**952**	**tonnes per year**
Total Food Waste (% of Total)	**1.9**	
Total Inert Waste (per year)	**32,594**	**tonnes per year**
Total Inert Waste (% of Total)	**64.6**	

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 3

Average Annual Waste Quantities
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Year	Existing Permitted Landfill							Stage 9							Total Waste Acceptance [2, 3]							Total Waste
	Total Waste	Bulk	C&D	Sludge	Garden	Food	Inert	Total Waste	Bulk	C&D	Sludge	Garden	Food	Inert	Total Waste	Bulk	C&D	Sludge	Garden	Food	Inert	
	(tonnes/yr)	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*
2009	15,982	1,731	8,399	416	15	577	4,845								15,982	1,731	8,399	416	15	577	4,845	15,982
2010	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2011	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2012	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2013 [1]	119,444	7,520	36,493	1,806	66	2,507	71,051								119,444	7,520	36,493	1,806	66	2,507	71,051	119,444
2014	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2015	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2016	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2017	18,902	679	4,065	0	0	226	13,931								18,902	679	4,065	0	0	226	13,931	18,902
2018	58,889	5,877	27,929	0	0	1,959	23,124								58,889	5,877	27,929	0	0	1,959	23,124	58,889
2019	73,457	1,256	5,860	0	0	419	65,922								73,457	1,256	5,860	0	0	419	65,922	73,457
2020	60,026	3,843	17,936	0	1,564	1,281	35,401								60,026	3,843	17,936	0	1,564	1,281	35,401	60,026
2021	183,977	10,408	50,175	0	1,140	3,469	118,785								183,977	10,408	50,175	0	1,140	3,469	118,785	183,977
2022	164,527	9,308	44,870	0	1,020	3,103	106,226								164,527	9,308	44,870	0	1,020	3,103	106,226	164,527
2023	250,000	14,143	68,181	0	1,550	4,714	161,412								250,000	14,143	68,181	0	1,550	4,714	161,412	250,000
2024	85,677	4,847	23,366	0	531	1,616	55,317	164,323	9,296	44,815	0	1,018	3,099	106,095	250,000	14,143	68,181	0	1,550	4,714	161,412	250,000
2025								250,000	14,143	68,181	0	1,550	4,714	161,412	250,000	14,143	68,181	0	1,550	4,714	161,412	250,000
2026								14,823	839	4,043	0	92	280	9,570	14,823	839	4,043	0	92	280	9,570	14,823
Total	1,447,541	104,735	506,236	13,060	6,281	34,912	782,318	429,146	24,278	117,038	0	2,660	8,093	277,077	1,876,687	129,013	623,275	13,060	8,941	43,004	1,059,395	1,876,687

Total Capacity - Existing	Total Capacity - Stage 9	Total Capacity
1,045,065 m^3	219,400 m^3	1,264,465 m^3

Notes:
Waste for the years 2009 to 2016 is an average of the Material Activity Report for the period of October 8, 2009 to October 9, 2016.
1. Includes 50,000 cubic metres of relocated waste from decommissioned Original Landfill Area. Due to the composition and age of this waste, it is assumed to be inert material with respect to current waste stream.
2. Actual waste totals used through **2022** (based on material reports in Attachment 1).
3. Projected waste totals for future years (**2023** to closure) based on percentages calculated in Table 2F for each waste type and a density of 1.956 tonnes per cubic metre.

Table 4

Methane Generation Model Input Values - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Enter the Landfill Open Year:	2009
Enter the Peak Year:	2026

Step 1 - Selection of rate constant (k) for bulk waste

		Bulk Waste k (yr^{-1})	C&D k (yr^{-1})
Option 1:	Mean annual precipitation less than 20 inches/year and landfill does not practice leachate recirculation	0.02	0.02
Option 2:	Mean annual precipitation between 20 - 40 inches/year and landfill does not practice leachate recirculation	0.038	0.03
Option 3:	Mean annual precipitation greater than 40 inches/year or landfill does practice leachate recirculation	0.057	0.04

Select option using criteria above (Enter 1, 2, or 3): **2**

Step 2 - Selection of rate constants (k) for categorized wastes

Waste Type	Option 1: Potential evapotranspiration rate exceeds mean annual precipitation and no leachate recirculation at landfill **k (yr^{-1})**	Option 2: Mean annual precipitation exceeds potential evapotranspiration rate or landfill practices leachate recirculation **k (yr^{-1})**
Food Waste	0.06	0.185
Garden Waste	0.05	0.1
Paper Waste	0.04	0.06
Wood & Straw	0.02	0.03
Textiles	0.04	0.06
Diapers	0.05	0.1
Sewage Sludge	0.06	0.185

Select option using criteria above (Enter 1 or 2): **2**

Step 3 - Selection of methane concentration (F) for landfill gas

If measured methane concentration is available, enter value as a percent by volume; if measured methane concentration is not available, use default value of 50%

Select methane concentration (F) using criteria above: **50** **%**

Notes:
DOC and k parameters above referenced from 40 CFR 98 Subpart HH, Table HH-1

Methane Generation Model - Bulk Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.31	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.038	yr^{-1}
Calculated L_o	0.1033	tonnes CH_4 / tonne waste

Year	Bulk Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	1,731	4
2010	7,520	16
2011	7,520	17
2012	7,520	18
2013	7,520	18
2014	7,520	19
2015	7,520	20
2016	7,520	21
2017	679	2
2018	5,877	17
2019	1,256	4
2020	3,843	12
2021	10,408	34
2022	9,308	32
2023	14,143	51
2024	14,143	52
2025	14,143	54

Total 2026 CH_4 Generated (tonnes): 392
Total 2026 CO_2 Equivalents Generated (tonnes): 9,796

Notes:
Methane generation from bulk waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Methane Generation Model - Construction and Demolition Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.08	(Construction & Demolition)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.03	yr^{-1}
Calculated L_o	0.0267	tonnes CH_4 / tonne waste

Year	C&D Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	8,399	4
2010	36,493	18
2011	36,493	19
2012	36,493	19
2013	36,493	20
2014	36,493	21
2015	36,493	21
2016	36,493	22
2017	4,065	3
2018	27,929	18
2019	5,860	4
2020	17,936	12
2021	50,175	35
2022	44,870	32
2023	68,181	51
2024	68,181	52
2025	68,181	54

Total 2026 CH_4 Generated (tonnes): 405
Total 2026 CO_2 Equivalents Generated (tonnes): 10,127

Notes:
Methane generation from C&D waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Table 7

Methane Generation Model - Sewage Sludge Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.05	(sewage sludge waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.185	yr^{-1}
Calculated L_o	0.0167	tonnes CH_4 / tonne waste

Year	Sewage Sludge Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	416	0
2010	1,806	0
2011	1,806	0
2012	1,806	0
2013	1,806	1
2014	1,806	1
2015	1,806	1
2016	1,806	1
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	0
2022	0	0
2023	0	0
2024	0	0
2025	0	0

Total 2026 CH_4 Generated (tonnes): 4
Total 2026 CO_2 Equivalents Generated (tonnes): 105

Notes:
Methane generation from sewage sludge based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Table 8

Methane Generation Model - Garden Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.2	(garden waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.1	yr^{-1}
Calculated L_o	0.0667	tonnes CH_4 / tonne waste

Year	Garden Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	15	0
2010	66	0
2011	66	0
2012	66	0
2013	66	0
2014	66	0
2015	66	0
2016	66	0
2017	0	0
2018	0	0
2019	0	0
2020	1,564	6
2021	1,140	5
2022	1,020	5
2023	1,550	8
2024	1,550	9
2025	1,550	10

Total 2026 CH_4 Generated (tonnes):	**43**
Total 2026 CO_2 Equivalents Generated (tonnes):	**1,084**

Notes:
Methane generation from garden waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Table 9

Methane Generation Model - Food Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.15	(food waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.185	yr^{-1}
Calculated L_o	0.0500	tonnes CH_4 / tonne waste

Year	Food Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	577	0
2010	2,507	1
2011	2,507	2
2012	2,507	2
2013	2,507	2
2014	2,507	3
2015	2,507	3
2016	2,507	4
2017	226	0
2018	1,959	5
2019	419	1
2020	1,281	4
2021	3,469	14
2022	3,103	15
2023	4,714	27
2024	4,714	33
2025	4,714	40

Total 2026 CH_4 Generated (tonnes): 157
Total 2026 CO_2 Equivalents Generated (tonnes): 3,933

Notes:
Methane generation from food waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Methane Generation Model - Totals - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009
Reporting Year:	2026

Waste Type	2026 CH_4 Generation (tonnes)
Bulk Waste	392
C&D	405
Sewage Sludge	4
Garden	43
Food	157
Inerts	0

Total 2026 CH_4 Generated (tonnes):	**1,002**
Total 2026 CO_2 Equivalents Generated (tonnes):	**25,045**

Threshold (tonnes):	**100,000**

Notes:
Methane generation from food waste based on calculation methodology in 40 CFR 98.343(a)(1). This table provides aggregate of all waste types.

Table 11

Methane Generation Adjusted for Methane Oxidation - Simulation 1
Predicted Methane Generation
Brooks Landfill Site, Cayuga, Ontario
Brooks Road Environmental

Calculation of methane generation, adjusted for oxidation, from the modelled CH_4, using Equation HH-5

$$MG = G_{CH\,4} * (1 - OX)$$

G_{CH4} =	Modelled methane generation rate =	1,001.8	tonnes CH_4 in 2026
SArea =	Surface area of the landfill =	60,703	square metres
MF =	Methane flux rate from the landfill =	45	g/m^2/day
OX =	Oxidation fraction =	0.1	(Landfill has 1 foot of interim cover; 6" of daily cover, option C4)

MG = 901.6 tonnes CH_4

MG = 22,540.2 tonnes CO_2 equivalent

Table HH-4 to Subpart HH of Part 98—Landfill Methane Oxidation Fractions

Under these conditions:	Use this landfill methane oxidation fraction:
I. For all reporting years prior to the 2013 reporting year	
C1: For all landfills regardless of cover type or methane flux	0.10
II. For the 2013 reporting year and all subsequent years	
C2: For landfills that have a geomembrane (synthetic) cover with less than 12 inches of cover soil for the majority of the landfill area containing waste	0.0
C3: For landfills that do not meet the conditions in C2 above, and for which you elect not to determine methane flux	0.10
C4: For landfills that do not meet the conditions in C2 above and that do not have a soil cover of at least 24 inches for a majority of the landfill area containing waste	0.10
C5: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is less than 10 grams per square meter per day ($g/m^2/d$)	0.35
C6: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is 10 to 70 $g/m^2/d$	0.25
C7: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is greater than 70 $g/m^2/d$	0.10

[a]Methane flux rate (in grams per square meter per day; $g/m^2/d$) is the mass flow rate of methane per unit area at the bottom of the surface soil prior to any oxidation and is calculated as follows:

Table 12

Methane Modelling Results - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated						Methane Collected						Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	1	1	0	0	0	2	0	0	0	0	0	1	439	178	260
2011	4	3	1	0	3	10	2	2	0	0	2	6	2,312	940	1,372
2012	6	6	1	0	4	18	4	4	1	0	3	11	4,045	1,645	2,400
2013	9	9	1	0	6	25	5	5	1	0	3	15	5,655	2,300	3,355
2014	11	12	2	0	7	32	7	7	1	0	4	19	7,157	2,910	4,246
2015	14	14	2	0	8	38	8	8	1	0	5	23	8,564	3,483	5,081
2016	16	16	2	0	9	44	10	10	1	0	5	26	9,886	4,020	5,866
2017	19	19	2	0	9	49	11	11	1	0	6	29	11,133	4,528	6,606
2018	18	19	2	0	8	47	11	11	1	0	5	28	10,581	4,303	6,278
2019	20	20	2	0	8	50	12	12	1	0	5	30	11,308	4,599	6,709
2020	19	20	1	0	7	48	12	12	1	0	4	29	10,922	4,442	6,481
2021	20	21	1	1	7	50	12	13	1	1	4	30	11,418	4,643	6,775
2022	23	24	1	2	9	59	14	15	1	1	5	35	13,397	5,448	7,949
2023	26	27	1	2	10	66	16	16	0	1	6	40	14,975	6,090	8,885
2024	31	32	1	3	12	78	18	19	0	2	7	47	17,682	7,191	10,491
2025	35	36	1	4	14	89	21	22	0	2	8	53	20,221	8,223	11,998
2026	39	40	0	4	16	100	23	24	0	3	9	60	22,609	9,195	13,415
2027	38	39	0	4	13	95	23	24	0	2	8	57	21,509	8,747	12,762
2028	36	38	0	4	11	90	22	23	0	2	7	54	20,316	8,262	12,054
2029	35	37	0	3	9	85	21	22	0	2	6	51	19,239	7,824	11,415
2030	34	36	0	3	8	80	20	22	0	2	5	48	18,262	7,426	10,835
2031	32	35	0	3	6	77	19	21	0	2	4	46	17,371	7,064	10,307
2032	31	34	0	2	5	73	19	20	0	1	3	44	16,555	6,732	9,823
2033	30	33	0	2	4	70	18	20	0	1	3	42	15,804	6,427	9,377
2034	29	32	0	2	4	67	17	19	0	1	2	40	15,109	6,144	8,965
2035	28	31	0	2	3	64	17	19	0	1	2	38	14,464	5,882	8,582
2036	27	30	0	2	3	61	16	18	0	1	2	37	13,862	5,637	8,225
2037	26	29	0	1	2	59	16	17	0	1	1	35	13,300	5,409	7,891
2038	25	28	0	1	2	56	15	17	0	1	1	34	12,772	5,194	7,578
2039	24	27	0	1	1	54	14	16	0	1	1	32	12,274	4,992	7,283
2040	23	27	0	1	1	52	14	16	0	1	1	31	11,805	4,801	7,004
2041	22	26	0	1	1	50	13	16	0	1	1	30	11,360	4,620	6,741
2042	21	25	0	1	1	48	13	15	0	1	0	29	10,939	4,448	6,490
2043	21	24	0	1	1	46	12	15	0	0	0	28	10,538	4,285	6,252
2044	20	24	0	1	1	45	12	14	0	0	0	27	10,156	4,130	6,026
2045	19	23	0	1	0	43	11	14	0	0	0	26	9,792	3,982	5,810
2046	18	22	0	1	0	42	11	13	0	0	0	25	9,444	3,840	5,603
2047	18	22	0	1	0	40	11	13	0	0	0	24	9,111	3,705	5,406
2048	17	21	0	0	0	39	10	13	0	0	0	23	8,792	3,575	5,216
2049	16	20	0	0	0	37	10	12	0	0	0	22	8,486	3,451	5,035
2050	16	20	0	0	0	36	9	12	0	0	0	22	8,192	3,332	4,861
2051	15	19	0	0	0	35	9	11	0	0	0	21	7,910	3,217	4,694
2052	15	19	0	0	0	34	9	11	0	0	0	20	7,640	3,107	4,533
2053	14	18	0	0	0	33	8	11	0	0	0	20	7,379	3,001	4,378
2054	14	18	0	0	0	31	8	11	0	0	0	19	7,128	2,899	4,230
2055	13	17	0	0	0	30	8	10	0	0	0	18	6,887	2,801	4,086
2056	13	16	0	0	0	29	8	10	0	0	0	18	6,655	2,706	3,948
2057	12	16	0	0	0	28	7	10	0	0	0	17	6,431	2,615	3,815
2058	12	16	0	0	0	27	7	9	0	0	0	16	6,215	2,527	3,687
2059	11	15	0	0	0	26	7	9	0	0	0	16	6,007	2,443	3,564
2060	11	15	0	0	0	26	6	9	0	0	0	15	5,806	2,361	3,445
2061	10	14	0	0	0	25	6	9	0	0	0	15	5,612	2,282	3,330
2062	10	14	0	0	0	24	6	8	0	0	0	14	5,425	2,206	3,219

Table 12

Methane Modelling Results - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated						Methane Collected						Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2063	10	13	0	0	0	23	6	8	0	0	0	14	5,245	2,133	3,112
2064	9	13	0	0	0	22	6	8	0	0	0	13	5,071	2,062	3,009
2065	9	13	0	0	0	22	5	8	0	0	0	13	4,903	1,994	2,909
2066	9	12	0	0	0	21	5	7	0	0	0	13	4,741	1,928	2,813
2067	8	12	0	0	0	20	5	7	0	0	0	12	4,584	1,864	2,720
2068	8	12	0	0	0	20	5	7	0	0	0	12	4,433	1,803	2,630
2069	8	11	0	0	0	19	5	7	0	0	0	11	4,286	1,743	2,543
2070	7	11	0	0	0	18	4	7	0	0	0	11	4,145	1,686	2,460
2071	7	11	0	0	0	18	4	6	0	0	0	11	4,009	1,630	2,379
2072	7	10	0	0	0	17	4	6	0	0	0	10	3,877	1,577	2,300
2073	7	10	0	0	0	17	4	6	0	0	0	10	3,750	1,525	2,225
2074	6	10	0	0	0	16	4	6	0	0	0	10	3,627	1,475	2,152
2075	6	9	0	0	0	15	4	6	0	0	0	9	3,508	1,426	2,081
2076	6	9	0	0	0	15	4	5	0	0	0	9	3,393	1,380	2,013
2077	6	9	0	0	0	14	3	5	0	0	0	9	3,282	1,335	1,947
2078	5	9	0	0	0	14	3	5	0	0	0	8	3,174	1,291	1,883
2079	5	8	0	0	0	14	3	5	0	0	0	8	3,071	1,249	1,822
2080	5	8	0	0	0	13	3	5	0	0	0	8	2,970	1,208	1,762
2081	5	8	0	0	0	13	3	5	0	0	0	8	2,873	1,169	1,705
2082	5	8	0	0	0	12	3	5	0	0	0	7	2,780	1,130	1,649
2083	5	7	0	0	0	12	3	4	0	0	0	7	2,689	1,094	1,596
2084	4	7	0	0	0	11	3	4	0	0	0	7	2,601	1,058	1,544
2085	4	7	0	0	0	11	3	4	0	0	0	7	2,517	1,023	1,493
2086	4	7	0	0	0	11	2	4	0	0	0	6	2,435	990	1,445
2087	4	7	0	0	0	10	2	4	0	0	0	6	2,356	958	1,398
2088	4	6	0	0	0	10	2	4	0	0	0	6	2,279	927	1,352
2089	4	6	0	0	0	10	2	4	0	0	0	6	2,205	897	1,308
2090	3	6	0	0	0	9	2	4	0	0	0	6	2,134	868	1,266
2091	3	6	0	0	0	9	2	3	0	0	0	5	2,064	839	1,225
2092	3	6	0	0	0	9	2	3	0	0	0	5	1,997	812	1,185
2093	3	5	0	0	0	9	2	3	0	0	0	5	1,933	786	1,147
2094	3	5	0	0	0	8	2	3	0	0	0	5	1,870	760	1,110
2095	3	5	0	0	0	8	2	3	0	0	0	5	1,809	736	1,074
2096	3	5	0	0	0	8	2	3	0	0	0	5	1,751	712	1,039
2097	3	5	0	0	0	7	2	3	0	0	0	4	1,694	689	1,005
2098	3	5	0	0	0	7	2	3	0	0	0	4	1,640	667	973

Table 12

Methane Modelling Results - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated						Methane Collected						Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2099	2	5	0	0	0	7	1	3	0	0	0	4	1,587	645	941
2100	2	4	0	0	0	7	1	3	0	0	0	4	1,535	624	911
2101	2	4	0	0	0	7	1	3	0	0	0	4	1,486	604	882
2102	2	4	0	0	0	6	1	2	0	0	0	4	1,438	585	853
2103	2	4	0	0	0	6	1	2	0	0	0	4	1,391	566	826
2104	2	4	0	0	0	6	1	2	0	0	0	4	1,347	548	799
2105	2	4	0	0	0	6	1	2	0	0	0	3	1,303	530	773
2106	2	4	0	0	0	6	1	2	0	0	0	3	1,261	513	748
2107	2	4	0	0	0	5	1	2	0	0	0	3	1,221	496	724
2108	2	3	0	0	0	5	1	2	0	0	0	3	1,181	480	701
2109	2	3	0	0	0	5	1	2	0	0	0	3	1,143	465	678
2110	2	3	0	0	0	5	1	2	0	0	0	3	1,107	450	657
2111	2	3	0	0	0	5	1	2	0	0	0	3	1,071	436	636
2112	1	3	0	0	0	5	1	2	0	0	0	3	1,037	422	615
2113	1	3	0	0	0	4	1	2	0	0	0	3	1,003	408	595
2114	1	3	0	0	0	4	1	2	0	0	0	3	971	395	576
2115	1	3	0	0	0	4	1	2	0	0	0	2	940	382	558
2116	1	3	0	0	0	4	1	2	0	0	0	2	910	370	540
2117	1	3	0	0	0	4	1	2	0	0	0	2	881	358	523
2118	1	3	0	0	0	4	1	2	0	0	0	2	853	347	506
2119	1	2	0	0	0	4	1	1	0	0	0	2	825	336	490
2120	1	2	0	0	0	4	1	1	0	0	0	2	799	325	474
2121	1	2	0	0	0	3	1	1	0	0	0	2	773	315	459
2122	1	2	0	0	0	3	1	1	0	0	0	2	749	304	444
2123	1	2	0	0	0	3	1	1	0	0	0	2	725	295	430
2124	1	2	0	0	0	3	1	1	0	0	0	2	702	285	416
2125	1	2	0	0	0	3	1	1	0	0	0	2	679	276	403
2126	1	2	0	0	0	3	1	1	0	0	0	2	657	267	390
2127	1	2	0	0	0	3	1	1	0	0	0	2	637	259	378
2128	1	2	0	0	0	3	0	1	0	0	0	2	616	251	366
2129	1	2	0	0	0	3	0	1	0	0	0	2	597	243	354

Cost Analysis - Utility Flare - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Capital Costs

Direct Costs		
Utility Flare	$100,000	(estimated)
(includes enclosed stack, control panel/ instrumentation, and blower skid/ mechanical components)		
Auxiliary Equipment	$6,000	(6% of Flare System Costs)
Equipment Cost ($) ……	$106,000	
Sales Tax	$3,180	(3% of Equipment Cost)
Freight	$5,300	(5%of Equiment Cost)
Purchased Equipment Cost (PEC) ($) ……	$114,480	
Direct Installation Costs		
Foundations & Supports	$13,738	12% of PEC
Handling & Erection	$45,792	40% of PEC
Electrical	$1,145	1% of PEC
Piping	$2,290	2% of PEC
Insulation	$1,145	1% of PEC
Painting	$1,145	1% of PEC
Direct Installation Cost ($)	$65,254	
Site Preparation	$0	
Facilities & Buildings	$0	
Total Direct Costs, DC ($) ……	$179,734	
Indirect Costs, IC		
Engineering	$11,448	10% of PEC
Construction and Field Expenses	$11,448	10% of PEC
Contractor Fees	$11,448	10% of PEC
Start-up	$1,145	1% of PEC
Performance Test	$1,145	1% of PEC
Contingencies	$3,434	3% of PEC
Total Indirect Costs, IC	$40,068	
Total Capital Investment (TCI) ($) ……	$219,802	

Cost Analysis - Utility Flare - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Annual Cost Inputs

Operating factor (hr/yr):		8,760	100% operation capacity
Annual interest rate (fraction):		0.05	
Project life (years):		30	
Capital recovery factor:		0.06505	
Flare Operator Labor Rate	$	30.00	/ hour
Maintenance Labor Rate	$	33.00	/ hour

Direct Annual Costs

Operator labor costs	$18,900	630 hours/year
Supervisor	$2,835	(15% of Operator labor)
Maintenance Labor	$18,068	(0.5 hr per shift)
Maintenance Materials	$18,068	(100% of Maintenance Labor)
Utilities		
Electricity	$33,328	(30 hp blower; $0.17/kw-hr)
Propane	$1,000	(estimated)

Total Direct Costs, DC ($) …… $92,198

Indirect Annual Costs, IC

Overhead	$34,722	(60% of labor % material costs)
Administrative Charges	$4,396	2% of TCI
Property Tax	$2,198	1% of TCI
Insurance	$2,198	1% of TCI
Capital Recovery	$14,298	

Total Indirect Costs, IC ($) …… $57,812

Total Annual Costs ($) …… $150,011

Notes:
Cost assumptions and recommendations were referenced from the EPA Air Pollution Cost Control Manual, Sixth Edition (January 2002).

Table 14

Cost Analysis - Installation of Gas Collection System - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Capital Costs

Direct Costs		
Installation of Gas Collection System	$450,000	($30,000 per acre)
Equipment Cost ($) ……	$450,000	
Sales Tax	$13,500	(3% of Equipment Cost)
Freight	$22,500	(5% of Equiment Cost)
Purchased Equipment Cost (PEC) ($) ……	$486,000	
Direct Installation Costs		
Foundations & Supports	$58,320	12% of PEC
Handling & Erection	$194,400	40% of PEC
Electrical	$4,860	1% of PEC
Piping	$9,720	2% of PEC
Insulation	$4,860	1% of PEC
Painting	$4,860	1% of PEC
Direct Installation Cost ($)	$277,020	
Site Preparation	$0	
Facilities & Buildings	$0	
Total Direct Costs, DC ($) ……	$763,020	
Indirect Costs, IC		
Engineering	$48,600	10% of PEC
Construction and Field Expenses	$48,600	10% of PEC
Contractor Fees	$48,600	10% of PEC
Start-up	$4,860	1% of PEC
Performance Test	$4,860	1% of PEC
Contingencies	$14,580	3% of PEC
Total Indirect Costs, IC	$170,100	
Total Capital Investment (TCI) ($) ……	$933,120	

Cost Analysis - Installation of Gas Collection System - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Annual Cost Inputs

Operating factor (hr/yr):	8,760	100% operation capacity
Annual interest rate (fraction):	0.05	
Project life (years):	30	
Capital recovery factor:	0.06505	
Direct Annual Costs		
Operating Costs	$61,500	($4,100 per acre)
Total Direct Costs, DC ($) ……	$61,500	
Indirect Annual Costs, IC		
Capital Recovery	$60,701	
Operating Costs	$61,500	
Total Indirect Costs, IC ($) ……	$122,201	
Total Annual Costs ($) ……	$183,701	

Notes:
Cost assumptions and recommendations were referenced from the EPA Air Pollution Cost Control Manual, Sixth Edition (January 2002).

Table 15

Methane Generation Model - Bulk Waste (2009-2014) - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.21	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.045	yr^{-1}
Calculated L_o	0.0700	tonnes CH_4 / tonne waste

Year	Putrescible Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	11,137	17
2010	48,393	76
2011	48,393	79
2012	48,393	83
2013	48,393	87
2014	48,393	91

Total 2026 CH_4 Generated (tonnes): 433
Total 2026 CO_2 Equivalents Generated (tonnes): 10,819

Notes:
Methane generation for putrescible waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from National Inventory Report 1990 – 2018: Greenhouse Gas Sources and Sinks in Canada.

Table 16

Methane Generation Model - Bulk Waste (2015-2024) - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.18	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.045	yr^{-1}
Calculated L_o	0.0600	tonnes CH_4 / tonne waste

Year	Putrescible Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2015	48,393	81
2016	48,393	85
2017	4,971	9
2018	35,765	69
2019	7,535	15
2020	24,625	52
2021	65,193	144
2022	58,300	134
2023	88,588	214
2024	88,588	224
2025	88,588	234

Total 2026 CH_4 Generated (tonnes): 1,261
Total 2026 CO_2 Equivalents Generated (tonnes): 31,533

Notes:
Methane generation for putrescible waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from National Inventory Report 1990 – 2018: Greenhouse Gas Sources and

Methane Generation Model - Bulk Waste (2015-2024) - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.18	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.045	yr^{-1}
Calculated L_o	0.0600	tonnes CH_4 / tonne waste

Year	Putrescible Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)

Sinks in Canada.

Methane Generation Model - Totals - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open: 2009
Reporting Year: 2026

Waste Type	2026 CH_4 Generation (tonnes)
2009-2014	433
2015-2024	1,261

Total 2026 CH_4 Generated (tonnes): 1,694
Total 2026 CO_2 Equivalents Generated (tonnes): 42,352

Threshold (tonnes): 100,000

Notes:
Methane generation from food waste based on calculation methodology in 40 CFR 98.343(a)(1). This table provides aggregate of all waste types.

Table 18

Methane Generation Adjusted for Methane Oxidation - Simulation 2
Predicted Methane Generation
Brooks Landfill Site, Cayuga, Ontario
Brooks Road Environmental

Calculation of methane generation, adjusted for oxidation, from the modelled CH_4, using Equation HH-5

$$MG = G_{CH\,4} * (1 - OX)$$

G_{CH4} =	Modelled methane generation rate =	1,694.1	tonnes CH_4 in 2026
SArea =	Surface area of the landfill =	60,703	square metres
MF =	Methane flux rate from the landfill =	76	g/m^2/day
OX =	Oxidation fraction =	0.1	(Landfill has 1 foot of interim cover; 6" of daily cover, option C4)

MG = 1,524.7 tonnes CH_4

MG = 38,116.8 tonnes CO_2 equivalents

Table HH-4 to Subpart HH of Part 98—Landfill Methane Oxidation Fractions

Under these conditions:	Use this landfill methane oxidation fraction:
I. For all reporting years prior to the 2013 reporting year	
C1: For all landfills regardless of cover type or methane flux	0.10
II. For the 2013 reporting year and all subsequent years	
C2: For landfills that have a geomembrane (synthetic) cover with less than 12 inches of cover soil for the majority of the landfill area containing waste	0.0
C3: For landfills that do not meet the conditions in C2 above, and for which you elect not to determine methane flux	0.10
C4: For landfills that do not meet the conditions in C2 above and that do not have a soil cover of at least 24 inches for a majority of the landfill area containing waste	0.10
C5: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is less than 10 grams per square meter per day ($g/m^2/d$)	0.35
C6: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is 10 to 70 $g/m^2/d$	0.25
C7: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is greater than 70 $g/m^2/d$	0.10

Table 19

Methane Modelling Results - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated			Methane Collected			Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2009	0		0	0	0	0	0	0	0
2010	3		3	2	0	2	774	315	459
2011	18		18	11	0	11	4,101	1,668	2,433
2012	32		32	19	0	19	7,282	2,961	4,321
2013	45		45	27	0	27	10,323	4,198	6,125
2014	58		58	35	0	35	13,230	5,380	7,850
2015	71	0	71	42	0	42	16,010	6,511	9,499
2016	67	13	80	40	8	48	18,186	7,396	10,791
2017	64	25	89	39	15	54	20,267	8,242	12,025
2018	62	25	87	37	15	52	19,672	8,000	11,672
2019	59	33	92	35	20	55	20,935	8,514	12,422
2020	56	34	90	34	20	54	20,463	8,322	12,141
2021	54	39	93	32	23	56	21,028	8,552	12,477
2022	51	54	106	31	33	63	23,985	9,754	14,231
2023	49	67	116	30	40	70	26,400	10,736	15,664
2024	47	87	134	28	52	81	30,513	12,409	18,104
2025	45	107	152	27	64	91	34,445	14,008	20,437
2026	43	125	168	26	75	101	38,203	15,536	22,667
2027	41	121	162	25	73	97	36,835	14,980	21,855
2028	39	116	155	24	70	93	35,214	14,320	20,894
2029	38	111	148	23	66	89	33,665	13,690	19,974
2030	36	106	142	22	64	85	32,183	13,088	19,095
2031	34	101	136	21	61	81	30,767	12,512	18,255
2032	33	97	130	20	58	78	29,413	11,961	17,452
2033	31	93	124	19	56	74	28,119	11,435	16,684
2034	30	88	118	18	53	71	26,882	10,932	15,950
2035	29	85	113	17	51	68	25,699	10,451	15,248
2036	27	81	108	16	49	65	24,568	9,991	14,577
2037	26	77	104	16	46	62	23,487	9,551	13,936
2038	25	74	99	15	44	59	22,454	9,131	13,322
2039	24	71	95	14	42	57	21,466	8,729	12,736
2040	23	68	90	14	41	54	20,521	8,345	12,176
2041	22	65	86	13	39	52	19,618	7,978	11,640
2042	21	62	83	13	37	50	18,755	7,627	11,128
2043	20	59	79	12	35	47	17,930	7,291	10,638
2044	19	56	76	11	34	45	17,141	6,971	10,170
2045	18	54	72	11	32	43	16,386	6,664	9,723
2046	17	52	69	10	31	41	15,665	6,371	9,295
2047	17	49	66	10	30	40	14,976	6,090	8,886
2048	16	47	63	10	28	38	14,317	5,822	8,495
2049	15	45	60	9	27	36	13,687	5,566	8,121
2050	15	43	58	9	26	35	13,085	5,321	7,764
2051	14	41	55	8	25	33	12,509	5,087	7,422
2052	13	39	53	8	24	32	11,959	4,863	7,095
2053	13	38	50	8	23	30	11,432	4,649	6,783

Table 19

Methane Modelling Results - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated			Methane Collected			Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2054	12	36	48	7	22	29	10,929	4,445	6,485
2055	12	34	46	7	21	28	10,448	4,249	6,199
2056	11	33	44	7	20	26	9,989	4,062	5,927
2057	11	31	42	6	19	25	9,549	3,883	5,666
2058	10	30	40	6	18	24	9,129	3,712	5,417
2059	10	29	38	6	17	23	8,727	3,549	5,178
2060	9	27	37	6	16	22	8,343	3,393	4,950
2061	9	26	35	5	16	21	7,976	3,244	4,732
2062	9	25	34	5	15	20	7,625	3,101	4,524
2063	8	24	32	5	14	19	7,290	2,964	4,325
2064	8	23	31	5	14	18	6,969	2,834	4,135
2065	7	22	29	4	13	18	6,662	2,709	3,953
2066	7	21	28	4	13	17	6,369	2,590	3,779
2067	7	20	27	4	12	16	6,089	2,476	3,613
2068	6	19	26	4	11	15	5,821	2,367	3,454
2069	6	18	25	4	11	15	5,565	2,263	3,302
2070	6	18	23	4	11	14	5,320	2,163	3,156
2071	6	17	22	3	10	13	5,086	2,068	3,018
2072	5	16	21	3	10	13	4,862	1,977	2,885
2073	5	15	20	3	9	12	4,648	1,890	2,758
2074	5	15	20	3	9	12	4,444	1,807	2,636
2075	5	14	19	3	8	11	4,248	1,728	2,520
2076	5	13	18	3	8	11	4,061	1,652	2,410
2077	4	13	17	3	8	10	3,882	1,579	2,304
2078	4	12	16	2	7	10	3,712	1,509	2,202
2079	4	12	16	2	7	9	3,548	1,443	2,105
2080	4	11	15	2	7	9	3,392	1,379	2,013
2081	4	11	14	2	6	9	3,243	1,319	1,924
2082	3	10	14	2	6	8	3,100	1,261	1,839
2083	3	10	13	2	6	8	2,964	1,205	1,758
2084	3	9	12	2	6	7	2,833	1,152	1,681
2085	3	9	12	2	5	7	2,709	1,102	1,607
2086	3	9	11	2	5	7	2,589	1,053	1,536
2087	3	8	11	2	5	7	2,476	1,007	1,469
2088	3	8	10	2	5	6	2,367	962	1,404
2089	3	7	10	2	4	6	2,262	920	1,342
2090	2	7	10	1	4	6	2,163	880	1,283
2091	2	7	9	1	4	5	2,068	841	1,227
2092	2	7	9	1	4	5	1,977	804	1,173
2093	2	6	8	1	4	5	1,890	769	1,121
2094	2	6	8	1	4	5	1,807	735	1,072
2095	2	6	8	1	3	5	1,727	702	1,025
2096	2	5	7	1	3	4	1,651	671	980
2097	2	5	7	1	3	4	1,578	642	937
2098	2	5	7	1	3	4	1,509	614	895

Table 19

Methane Modelling Results - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated			Methane Collected			Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2099	2	5	6	1	3	4	1,443	587	856
2100	2	5	6	1	3	4	1,379	561	818
2101	1	4	6	1	3	3	1,318	536	782
2102	1	4	6	1	2	3	1,260	513	748
2103	1	4	5	1	2	3	1,205	490	715
2104	1	4	5	1	2	3	1,152	468	683
2105	1	4	5	1	2	3	1,101	448	653
2106	1	3	5	1	2	3	1,053	428	625
2107	1	3	4	1	2	3	1,006	409	597
2108	1	3	4	1	2	3	962	391	571
2109	1	3	4	1	2	2	920	374	546
2110	1	3	4	1	2	2	879	358	522
2111	1	3	4	1	2	2	841	342	499
2112	1	3	4	1	2	2	804	327	477
2113	1	3	3	1	2	2	768	312	456
2114	1	2	3	0	1	2	735	299	436
2115	1	2	3	0	1	2	702	286	417
2116	1	2	3	0	1	2	671	273	398
2117	1	2	3	0	1	2	642	261	381
2118	1	2	3	0	1	2	614	249	364
2119	1	2	3	0	1	2	587	239	348
2120	1	2	2	0	1	1	561	228	333
2121	1	2	2	0	1	1	536	218	318
2122	1	2	2	0	1	1	512	208	304
2123	1	2	2	0	1	1	490	199	291
2124	1	2	2	0	1	1	468	190	278
2125	0	1	2	0	1	1	448	182	266
2126	0	1	2	0	1	1	428	174	254
2127	0	1	2	0	1	1	409	166	243
2128	0	1	2	0	1	1	391	159	232
2129	0	1	2	0	1	1	374	152	222

Attachment 1

Material Activity Reports

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2016 to December 31, 2016
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	17,493.87	0.00 MT	0.00	0.00 YD	0.00	0.00	17,493.87 MT	$700,469.29	$91,061.53	$791,530.82	1006	
C&D	12.50	0.00 MT	0.00	0.00 YD	0.00	0.00	12.50 MT	$812.50	$105.63	$918.13	1	
Contaminated Soil	22,832.15	0.00 MT	0.00	0.00 YD	0.00	0.00	22,832.15 MT	$603,137.57	$77,149.33	$680,286.90	716	
Asbestos	11.53	0.00 MT	0.00	0.00 YD	0.00	0.00	11.53 MT	$2,594.25	$337.25	$2,931.50	2	
Demo/brick/block	790.55	0.00 MT	0.00	0.00 YD	0.00	0.00	790.55 MT	$28,723.60	$3,734.05	$32,457.65	63	
	41,140.60	0.00 MT	0.00	0.00 YD	0.00	0.00	41,140.60 MT	$1,335,737.21	$172,387.79	$1,508,125.00	1788	1788

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2017 to December 31, 2017
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	4,529.59	0.00 MT	0.00	0.00 YD	0.00	0.00	4,529.59 MT	$171,789.47	$22,332.69	$194,122.16	245	
Contaminated Soil	13,478.45	0.00 MT	0.00	0.00 YD	0.00	0.00	13,478.45 MT	$335,226.82	$43,579.84	$378,806.66	432	
Demo/brick/block	894.28	0.00 MT	0.00	0.00 YD	0.00	0.00	894.28 MT	$32,505.24	$4,225.68	$36,730.92	68	
	18,902.32	0.00 MT	0.00	0.00 YD	0.00	0.00	18,902.32 MT	$539,521.53	$70,138.21	$609,659.74	745	745

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2018 to December 31, 2018
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	39,179.67	0.00 MT	0.00	0.00 YD	0.00	0.00	39,179.67 MT	$1,447,045.85	$188,116.40	$1,635,162.25	1748	
Contaminated Soil	19,122.72	0.00 MT	0.00	0.00 YD	0.00	0.00	19,122.72 MT	$426,024.57	$55,383.23	$481,407.80	585	
Asbestos	82.87	0.00 MT	0.00	0.00 YD	0.00	0.00	82.87 MT	$14,916.60	$1,939.16	$16,855.76	31	
Demo/brick/block	503.70	0.00 MT	0.00	0.00 YD	0.00	0.00	503.70 MT	$17,196.41	$2,235.55	$19,431.96	39	
	58,888.96	0.00 MT	0.00	0.00 YD	0.00	0.00	58,888.96 MT	$1,905,183.43	$247,674.34	$2,152,857.77	2403	2403

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2019 to December 31, 2019
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	8,371.84	0.00 MT	0.00	0.00 YD	0.00	0.00	8,371.84 MT	$339,391.67	$44,121.06	$383,512.73	532	
Contaminated Soil	65,084.88	0.00 MT	0.00	0.00 YD	0.00	0.00	65,084.88 MT	$1,448,021.78	$188,242.99	$1,636,264.77	1689	
	73,456.72	0.00 MT	0.00	0.00 YD	0.00	0.00	73,456.72 MT	$1,787,413.45	$232,364.05	$2,019,777.50	2221	2221

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2020 to December 31, 2020
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	25,622.69	0.00 MT	0.00	0.00 YD	0.00	0.00	25,622.69 MT	$1,056,662.22	$137,366.34	$1,194,028.56	1453	
Shingles	2,382.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,382.12 MT	$71,463.60	$9,290.31	$80,753.91	68	
Contaminated Soil	30,410.29	0.00 MT	0.00	0.00 YD	0.00	0.00	30,410.29 MT	$898,652.30	$116,825.14	$1,015,477.44	719	
Asbestos	45.94	0.00 MT	0.00	0.00 YD	0.00	0.00	45.94 MT	$6,891.00	$895.85	$7,786.85	5	
Wood	1,564.47	0.00 MT	0.00	0.00 YD	0.00	0.00	1,564.47 MT	$46,934.10	$6,101.47	$53,035.57	46	
	60,025.51	0.00 MT	0.00	0.00 YD	0.00	0.00	60,025.51 MT	$2,080,603.22	$270,479.11	$2,351,082.33	2291	2291

Summary Material Activity Report

All Ticket Types
History and Waiting
* - Confirmed Qty Applied to Billing

October 08, 2009 to October 09, 2016
All Materials

All Facilities

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	350,951.53	0.00 MT	0.00	0.00 YD	21,440.00	0.00	350,951.53 MT	$13,407,183.54	$1,632,115.30	15,039,298.84	17867	
C&D	5,514.35	0.00 MT	0.00	0.00 YD	0.00	0.00	5,514.35 MT	$165,093.44	$19,760.71	$184,854.15	238	
Shingles	15,876.78	0.00 MT	0.00	0.00 YD	0.00	0.00	15,876.78 MT	$453,567.55	$39,846.11	$493,413.66	427	
Contaminated Soil	87,691.42	19.24 MT	0.00	0.00 YD	68,450.00	0.00	87,710.66 MT	$1,960,418.49	$227,003.64	$2,187,422.13	2903	
Sludge	12,644.03	0.00 MT	0.00	0.00 YD	0.00	0.00	12,644.03 MT	$288,658.61	$22,780.75	$311,439.36	310	
Yard Waste	461.11	1,308.44 MT	0.00	0.00 YD	0.00	0.00	1,769.55 MT	$8,299.98	$1,079.02	$9,379.00	47	
Asbestos	5,398.30	0.00 MT	0.00	0.00 YD	0.00	0.00	5,398.30 MT	$938,551.27	$121,539.09	$1,060,090.36	1219	
Demolition	105.44	0.00 MT	0.00	0.00 YD	0.00	0.00	105.44 MT	$3,780.65	$189.03	$3,969.68	4	
Demo/brick/block	2,112.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,112.12 MT	$67,203.57	$7,973.54	$75,177.11	125	
Clay	0.00	40,000.00 MT	0.00	0.00 YD	0.00	0.00	40,000.00 MT	$180,000.00	$23,400.00	$203,400.00	2	
Leachate	(123.20)	18,781.94 MT	0.00	0.00 YD	0.00	0.00	18,658.74 MT	$0.00	$0.00	$0.00	500	
Tire Fluff	770.67	0.00 MT	0.00	0.00 YD	0.00	0.00	770.67 MT	$20,181.42	$2,623.59	$22,805.01	63	
Salt Cake	233.14	0.00 MT	0.00	0.00 YD	0.00	0.00	233.14 MT	$8,159.90	$1,060.79	$9,220.69	6	
Ash	2,289.55	0.00 MT	0.00	0.00 YD	0.00	0.00	2,289.55 MT	$59,528.30	$7,738.67	$67,266.97	68	
C&D/Roofing/Shingles	2,056.40	0.00 MT	0.00	0.00 YD	0.00	0.00	2,056.40 MT	$52,586.06	$3,459.97	$56,046.03	88	
	485,981.64	60,109.62 MT	0.00	0.00 YD	9,890.00	0.00	546,091.26 MT	$17,613,212.78	$2,110,570.21	$19,723,782.99	23867	23867

Material Summary	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Quantity	Material Total	Tax Total	Total
Waste	350,951.53	0.00 MT	0.00	0.00 YD	21,440.00	0.00	350,951.53 MT	407,183.54	2,115.30	39,298.84
C&D	5,514.35	0.00 MT	0.00	0.00 YD	0.00	0.00	5,514.35 MT	165,093.44	9,760.71	84,854.15
Shingles	15,876.78	0.00 MT	0.00	0.00 YD	0.00	0.00	15,876.78 MT	453,567.55	9,846.11	93,413.66
Contaminated Soil	87,691.42	19.24 MT	0.00	0.00 YD	68,450.00	0.00	87,710.66 MT	960,418.49	7,003.64	87,422.13
Sludge	12,644.03	0.00 MT	0.00	0.00 YD	0.00	0.00	12,644.03 MT	288,658.61	2,780.75	11,439.36
Yard Waste	461.11	1,308.44 MT	0.00	0.00 YD	0.00	0.00	1,769.55 MT	$8,299.98	1,079.02	$9,379.00
Asbestos	5,398.30	0.00 MT	0.00	0.00 YD	0.00	0.00	5,398.30 MT	938,551.27	1,539.09	60,090.36
Demolition	105.44	0.00 MT	0.00	0.00 YD	0.00	0.00	105.44 MT	$3,780.65	$189.03	$3,969.68
Demo/brick/block	2,112.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,112.12 MT	67,203.57	7,973.54	75,177.11
Clay	0.00	40,000.00 MT	0.00	0.00 YD	0.00	0.00	40,000.00 MT	180,000.00	3,400.00	03,400.00
Leachate	(123.20)	18,781.94 MT	0.00	0.00 YD	0.00	0.00	18,658.74 MT	$0.00	$0.00	$0.00
Tire Fluff	770.67	0.00 MT	0.00	0.00 YD	0.00	0.00	770.67 MT	20,181.42	2,623.59	22,805.01
Salt Cake	233.14	0.00 MT	0.00	0.00 YD	0.00	0.00	233.14 MT	$8,159.90	1,060.79	$9,220.69
Ash	2,289.55	0.00 MT	0.00	0.00 YD	0.00	0.00	2,289.55 MT	59,528.30	7,738.67	67,266.97
C&D/Roofing/Shingles	2,056.40	0.00 MT	0.00	0.00 YD	0.00	0.00	2,056.40 MT	52,586.06	3,459.97	56,046.03

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2016 to December 31, 2020
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	95,197.66	0.00 MT	0.00	0.00 YD	0.00	0.00	95,197.66 MT	$3,715,358.50	$482,998.02	$4,198,356.52	4984	
C&D	12.50	0.00 MT	0.00	0.00 YD	0.00	0.00	12.50 MT	$812.50	$105.63	$918.13	1	
Shingles	2,382.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,382.12 MT	$71,463.60	$9,290.31	$80,753.91	68	
Contaminated Soil	150,928.49	0.00 MT	0.00	0.00 YD	0.00	0.00	150,928.49 MT	$3,711,063.04	$481,180.53	$4,192,243.57	4141	
Asbestos	140.34	0.00 MT	0.00	0.00 YD	0.00	0.00	140.34 MT	$24,401.85	$3,172.26	$27,574.11	38	
Wood	1,564.47	0.00 MT	0.00	0.00 YD	0.00	0.00	1,564.47 MT	$46,934.10	$6,101.47	$53,035.57	46	
Demo/brick/block	2,188.53	0.00 MT	0.00	0.00 YD	0.00	0.00	2,188.53 MT	$78,425.25	$10,195.28	$88,620.53	170	
	252,414.11	0.00 MT	0.00	0.00 YD	0.00	0.00	252,414.11 MT	$7,648,458.84	$993,043.50	$8,641,502.34	9448	9448

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Appendix B

Sample Odour Inspection Sheet

Appendix B

Odour Management Plan

Odour Inspection Sheet

Inspection Completed by: _____ **Date:** _____ **Time:** _____

General Description of Weather Conditions: (Temperature, Wind speed and direction, precipitation, humidity) _____

General Description of Site Activity (make note of any activity that is abnormal): _____

Area Inspected	Was the area in good working condition?	Were any odours detected?	Is any mitigation or contingency action required? (1)	Person responsible for initiating corrective action	Notes
Waste Receiving					
Landfill Working Face					
Leachate Collection and Treatment System					
Covered Portions of Landfill					

Note: If a mitigation or contingency measure that is implemented and not listed in Section 7 or 8 of the OMP, the OMP will be required to be updated.

(1) Refer to OMP for Mitigation Measures and Contingency Actions

Appendix C

Complaint Protocol

Brooks Road Environmental

Brooks Road Landfill Site Vertical Capacity Expansion

Complaint Protocol

Brooks Road Landfill

160 Brooks Road Haldimand County, Ontario

May 2020 (Revised)
REF. NO. 018235 (94)

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Table of Contents

List of Appendices

1. Introduction

1.1 Purpose and Background

This document describes the Complaint Protocol prepared in accordance with Condition No. 6 of the Minister of Environment, Conservation and Parks' (Minister) Notice of Approval to Proceed with the Undertaking. The Minister approved the EA for the Brooks Road Landfill Site Vertical Capacity Expansion on February 14, 2019.

The Notice of Approval, issued under Section 9 of the *Environmental Assessment Act*, gives Brooks Road the approval to proceed with the proposed vertical expansion of the waste disposal capacity of the Brooks Road Landfill Site, subject to the conditions set out in it. With this in mind, the Minister's Notice of Approval specified the following compliance monitoring and reporting related conditions:

6. Complaints Protocol

6.1 The Proponent shall prepare and Implement a complaint protocol that sets out provisions for dealing with and responding to inquiries and complaints during all stages of the Undertaking. The complaint protocol shall include a procedure for notifying the Ministry's Hamilton District Office for the complaints received.

6.2 The Proponent shall submit the complaint protocol to the Director for approval and for the public record within one year from the Date of Approval, or 60 days before the start of Construction, whichever is earlier, or by another date agreed upon by the director.

6.3 The Director may require the Proponent to amend the complaint protocol at any time. Should an amendment be required, the Director shall notify the proponent in writing of the amendment required and when the amendment must be completed.

6.4 The Proponent shall submit the amended complaint protocol to the Director within the time period specified by the Director.

6.5 The Proponent shall implement the complaint protocol and any amendments to it.

6.6 The Proponent shall provide a summary on the complaints received and how they were addressed as part of the annual compliance reporting (Condition 5) and post the summary on the website as part of the public record.

In addition, the following conditions are included in the Amended Environmental Compliance Approval No. A110302:

9. Complaints Response Procedure

(1) If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:

a. The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the

name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;

b. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint. When possible, the Owner will forward a written reply to the complainant; and

c. The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

11. Public Liaison Committee (PLC)

(1) The Owner/Operator shall maintain and participate in a landfill PLC, which shall function in accordance with the Terms of Reference for the PLC, as amended from time to time. Any amendment to the Terms of Reference must be approved by the District Manager. The PLC shall serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the landfill Site, including environmental monitoring, maintenance, complaint resolution, and new approvals or amendments to existing approvals related to the operation of this landfill Site.

With these EA and ECA conditions in mind, Section 2 provides details on the complaints procedure that is in place at the Site, including complaint documentation and issues resolutions mechanisms, and Section 3 outlines the complaint reporting process.

2. Complaints Procedure

The purpose of this procedure is to establish a clear process for residents to voice any concerns they may have with respect to operating issues at the Site. This Public Complaint Procedure is an update to the currently approved procedure dated December 2004. The following steps outline the various avenues the public may follow to lodge any complaint resulting from operations at the Site:

1. During regular hours of operation, 7:00 am to 5:00 pm (Monday to Friday) any complaints should be made directly to the Site by calling 1-888-40-BRENV (27368) or 416-389-8876. The Site Supervisor on duty at the time will ensure the issue is dealt with immediately. Alternatively, complainants may choose to visit the Site in person and speak directly to the Site Supervisor during the above noted regular hours, provided the Site is not closed between these hours. Upon entering the Site, the complainant shall check-in at the scale house.
2. Outside regular hours of operation, a voice message can be left at 1-888-40-BRENV (27368) or 416-389-8876. In cases of emergency, residents should call 911 so that appropriate action(s) can be taken
3. When making a complaint, residents should be prepared to provide the following information

    i) Date and time

ii) Resident's name

iii) Resident's address

iv) Location relative to the Site

v) Contact information (email address is preferred for follow-up purposes)

vi) Nature of the complaint

vii) Weather conditions at the time of the complaint

Each complaint will be assigned a unique identifier for tracking purposes. The unique identifier will include the date and the complaint number.

Weather conditions will be documented to determine if the weather was a contributing factor to the complaint (e.g., litter impacts can be associated with periods of high winds, or odour impacts can be associated with overcast periods with little wind). The weather condition information at the time of the complaint will be taken from the Environment Canada – Hamilton A station.

In the event of receipt of a complaint related to odour, BRE personnel will travel to the location of the odour complaint (or the nearest accessible location) to assess for the presence of odour. BRE personnel will then trace back toward the Site and complete a perimeter inspection for the presence of odour. This inspection will be in addition to any daily inspections already carried out by BRE. The purpose will be to determine if odour is coming from the Site and to determine the potential on-Site source. If odour is confirmed to originate from the Site, per Condition 3(29) of ECA No. A110302, BRE will initiate mitigation measures in accordance with the Odour Management Plan. Mitigation measures to be implemented are specific to the source of on-Site odour.

Complaint forms will be completed and logged by Brooks Road Environmental (BRE) when a complaint has been received. This will be undertaken for all complaints, whether written or verbal. The complaint form template is provided in Appendix A. This form can be used for the different types of complaints received, such as dust, noise, or other, in addition to odour complaints. As the potential for dust, noise or other complaints at locations away from BRE are minimal the complaint investigation would be focused on the BRE operations. These forms will provide a record to be kept on file, along with copies of any correspondence to, or discussion with, the complainant. Upon request, members of the Public Liaison Committee (PLC) will receive a copy of each complaint.

BRE will ensure the Ministry of Environment, Conservation, and Parks (MECP) is notified within two business days of each complaint.

A response will be made to the complainant by the end of the next business day (from the day that BRE receives the complaint) confirming the receipt of the complaint, the nature of the complaint, and results of any follow-up. If the complaint cannot be resolved within a reasonable time period, the complainant will be notified of the action to be taken.

Appropriate signage will be placed at the Site entrance/exit indicating the overview of the Public Complaint Procedure, including the phone number for registering any complaint. Phone numbers for

the MECP Hamilton District Office and Haldimand County By-law enforcement will also be included on the signs.

MECP Hamilton District Office: Taylor Buck, 365-336-7491	Haldimand County By-law Enforcement Caledonia Office, 905-318-5932

3. Complaint Reporting

All complaints will be reviewed on an annual basis and summarized in the Annual Monitoring Report. BRE will be responsible to ensure that the following is undertaken and documented:

- Circulating all complaints to members of the PLC, MECP Hamilton District Office and Haldimand County prior to each PLC meeting, and keeping a public record at the Owner offices. Copies of complaint forms will be available at the Site office.
- Reviewing with the PLC and County all complaints received and Owner's response/ action at each PLC meeting.
- Provide a summary of complaints received and how they were addressed as part of the Annual Compliance Report and posting that summary on the website, as per EA Condition of Approval 6.6

Appendix A
Complaint Form

Brooks Road Environmental

160 Brooks Road, Cayuga N0A 1E0
Tel: 416-389-8876

COMMUNITY REPORT 2021 -

Complaint Details	
Complaint Number (MM-DD-YY-##)	
How was the complaint received	
Date / Time of Complaint Received	
Resident Name	
Address	
Phone Number	
Nature of Complaint	
Date / Time of Complaint Occurred	
Type of complaint received (Odour, Dust, Noise, other)	
Quality of the odour	
Intensity	
Frequency	
Duration	
Reported weather conditions	
Affect on the complainant	
Investigation	
Did the Complaint occur during business hours	
Was Odour or complaint detected by Staff at the time of complaint	
Weather condition (Environment Canada - Hamilton A)	
What mitigation measures were being utlized at time of complaint	
Other	
Contingency Measures	
Measures used to mitigate the complaint	
Agencies notified	
Community Report Details	
Completed by	
Name	
Title	
Date	

Items relate to odour complaints only

Appendix D

Sample Training Signature Page

Appendix D

Fugitive Odour Best Management Practices Plan

Training Signature Page

Name (Print)	Signature	Date Trained	Supervisor's Signature

ghd.com

The Power of Commitment

Appendix E

Noise Assessment Report

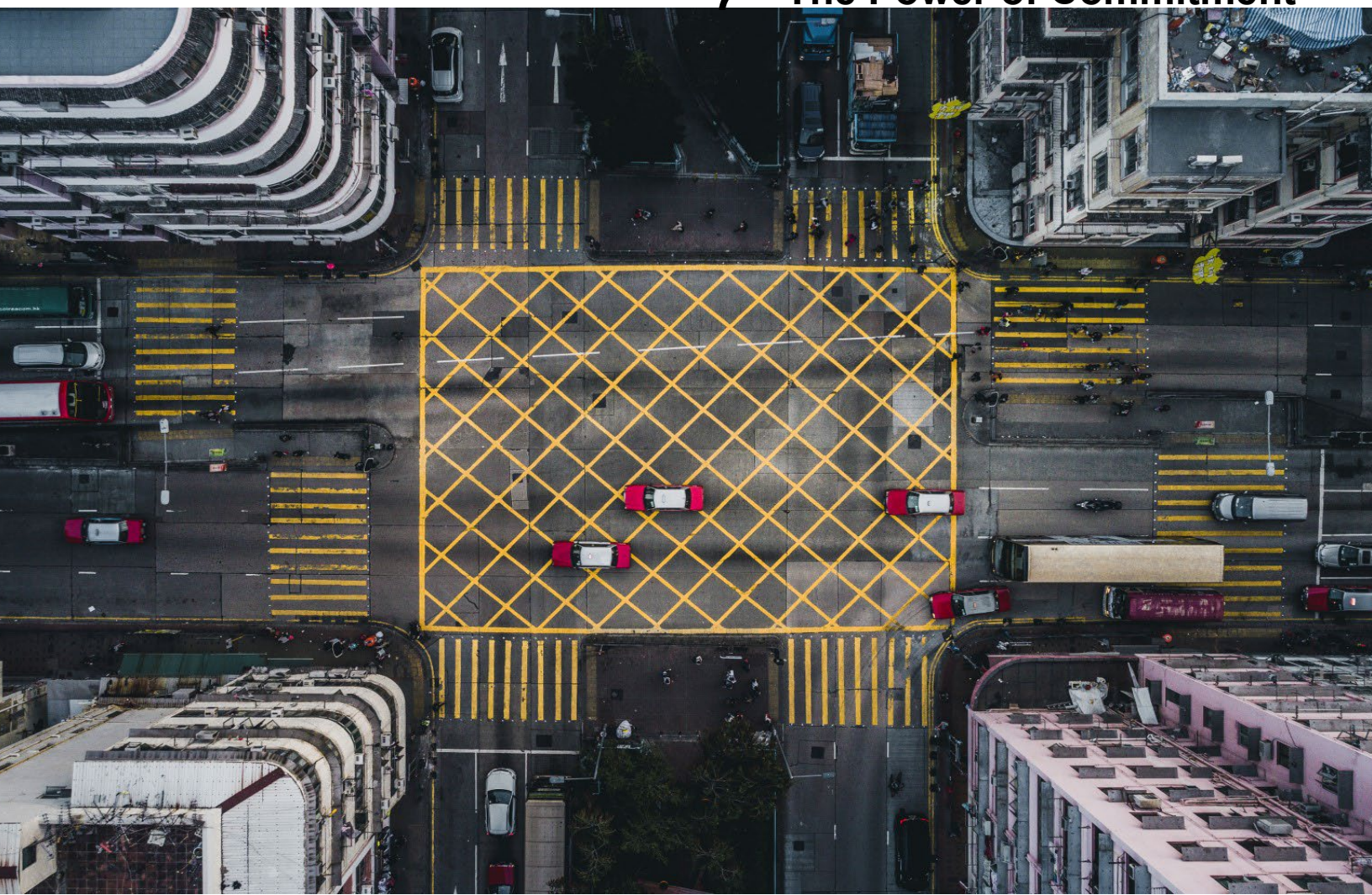
Noise Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

Brooks Road Environmental

March 26, 2024

→ The Power of Commitment



Project name		Brooks Road Landfill Expansion					
Document title		Noise Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524-RPT-11					
File name		12561524-RPT-11-Noise Report - Brooks Road Landfill Capacity Expansion Environmental Screening Assessment Report					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3		Mike Masschaele	Ryan Loveday		Erika Brown		11/23/2023
S4	FINAL	Mike Masschaele	Ryan Loveday		Blair Shoniker		Mar.26/24

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Contents

Figure index

Table index

Appendices

1. Introduction

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent). The location of the Site is shown in Figure 1.1.

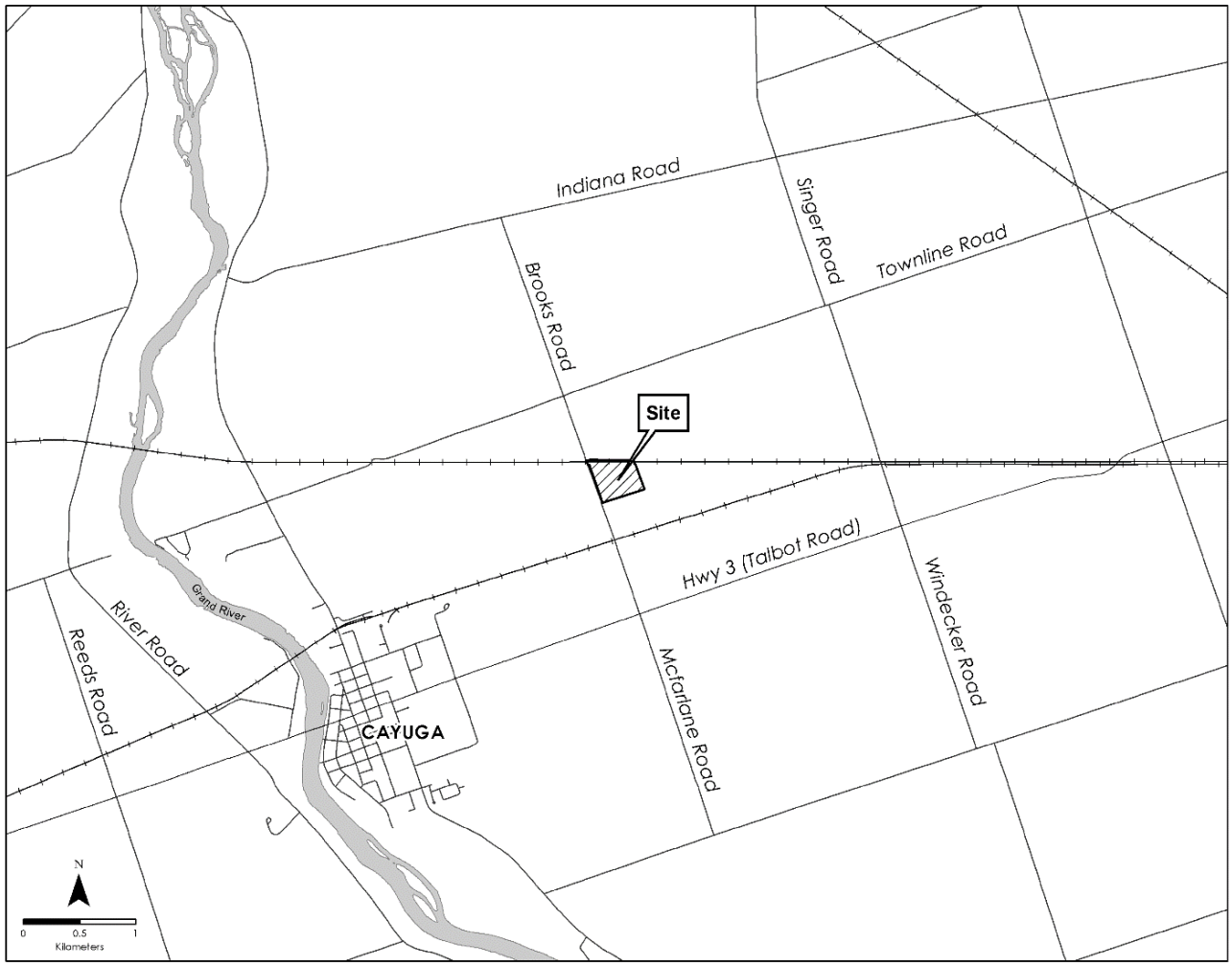


Figure 1.1 Location of the Proposed Undertaking

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302 (Landfill ECA), has an approved annual fill rate of 250,000 tonnes per year and a total capacity of 1,045,065 cubic metres (m^3) (including waste and cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA) and industrial sewage works ECA No. 1122-BKUPSM (Industrial Sewage ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (CofA, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021. Under the current ECA, the Site is licenced to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3-hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an

amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

In order to meet the growing demand from waste generators and customer for a safe and reliable waste management facility for their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils), Brooks Road Environmental is proposing to expand the capacity of the Brooks Road Landfill by 219,400 m^3, adding capacity for approximately two years. This expansion will be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (an increase in the peak elevation to 225.66 mAMSL including final cover), as well as increasing the existing landfill footprint to expand the Site horizontally, as shown in Figure 1.2.

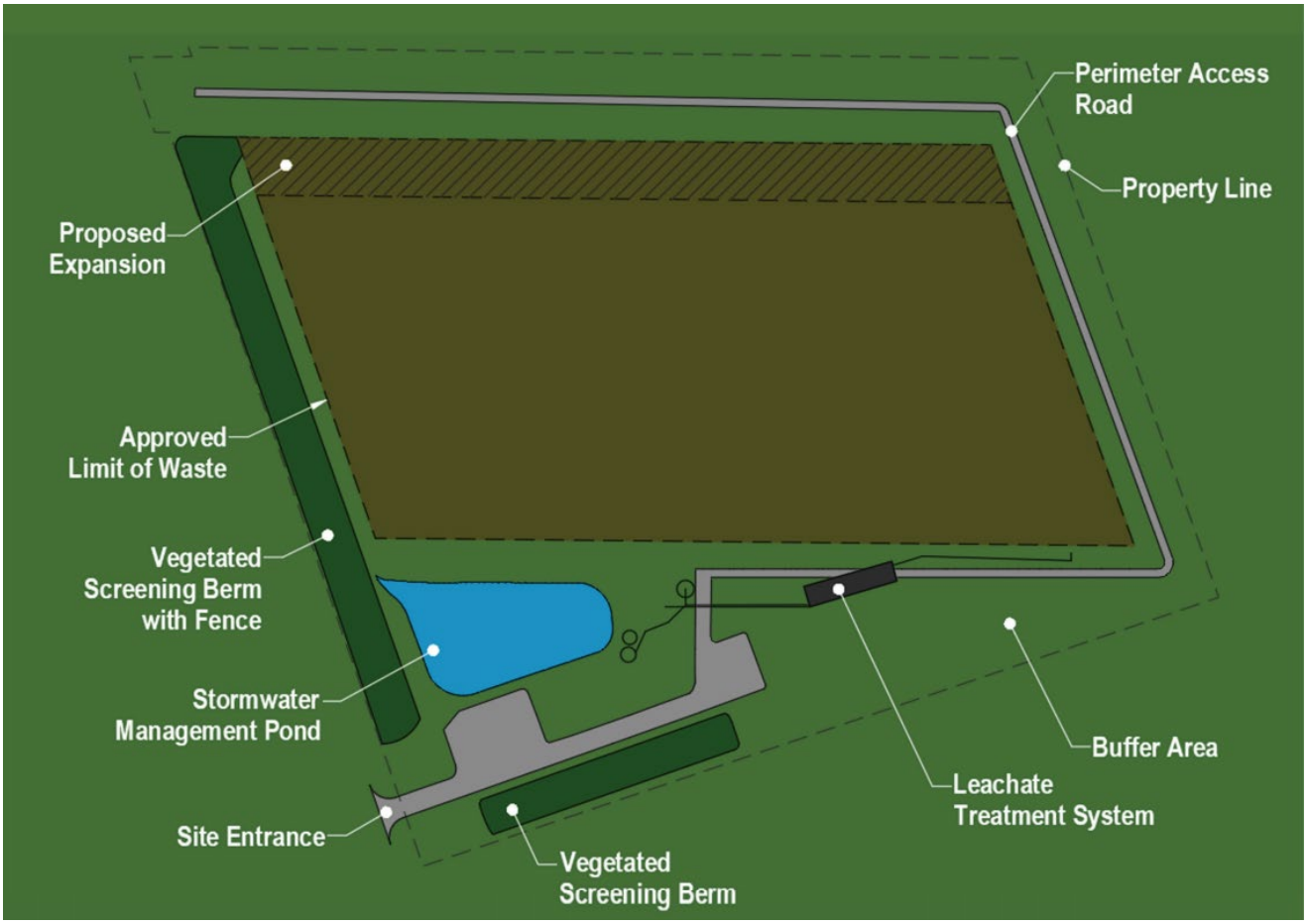


Figure 1.2 Proposed Capacity Expansion Concept

The proposed expansion would amend the approved ECA to allow for landfill volume expansion by 219,400 m^3, allowing for receipt of an approved maximum daily quantity (1,000 tonnes per day) throughout the year, maintaining the approved rate of 250,000 tonnes per year. The proposed change to the total landfill capacity requires additional landfill infrastructure and changes to the currently approved landfill volume, footprint, and final contours.

The proposed Brooks Road Landfill Site capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *EA Act*, as follows:

A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:

1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process an application will be made to amend the existing ECA No. A110302.

GHD has prepared a Noise assessment on behalf of BRE for the proposed undertaking. This report documents the following as it relates to the Noise environment:

– Baseline/existing conditions (i.e., what exists in the absence of the proposed project)
– Potential effects on the environment, mitigation measures, and net effects
– Future monitoring requirements to be implemented

The Study Areas reviewed for the Noise assessment were as follows (see Figure 1.3):

– **Site Study Area (SSA)** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
– **Local Study Area (LSA)** – the area within the vicinity of the Site extending approximately 1,000 m in all directions

The Study Area is rural in character and surrounded by agricultural fields. There are no existing industries within the Study Area other than the Facility that may contribute to the background noise levels. The nearest residential dwelling is approximately 232 m northwest of the existing property boundary. There are approximately 14 existing one-storey (1.5 m above grade) and two-storey (4.5 m above grade) residential dwellings within the Study Area.

Figure 1.3 Noise Study Area

2. Screening Criteria Checklist

At the beginning of the Environmental Screening, the Screening Criteria Checklist (provided as Schedule I, pp 67 – 69, to the "Guide to Environmental Assessment Requirements for Waste Management Projects") is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of "environment" contained in the *Ontario Environmental Assessment Act.*

As noted in the Guide:

"*The Screening Criteria are presented in the form of a checklist with the option of a "Yes" or "No" response. Mitigation measures **are not** to be considered in concluding whether there is "No" potential environmental effect. That is, the proponent is required to answer "Yes" even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a "Yes" is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required. Where a "yes" has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that no environmental effects are anticipated, it is recommended that additional information is provided in the Environmental Screening Report in order to support the "no effects" conclusion*."

Each criterion is based on a question which is prefaced with the phrase, "*Might the Project*…" Table 2.1 was completed as the first step of the Environmental Screening Process and is a summary of the criteria for the Noise discipline. Further descriptions of the criteria for which a "Yes" response was indicated in the Screening table are discussed in Section 4 of this report.

Table 2.1 Screening Criteria Checklist

	Criterion	YES	NO	Additional Information
	Might the project…			
3. Air and Noise				
3.4	Cause negative effects from the emission of noise?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in noise emissions associated with continued operation of the Site.

3. Existing Conditions

The following subsections describe the existing conditions that are found within the SSA and LSA of the proposed project.

3.1 Methodology

3.1.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Noise Study Team to determine existing Noise conditions within the Study Areas. The following sources of secondary information were collected and reviewed:

- Review of Historic Noise Complaints
- Review of current zoning plans, definitions and land use designations
- Field Observations and Investigations
- Review of local traffic data
- MECP technical guidelines and standards
- March 27, 2020 Amended Environmental Compliance Approval #A110302
- Design and Operations Report Vertical Expansion – Rev. 1, Brooks Road Landfill Site, 2270386 Ontario Inc., Prepared by GHD, June 15, 2021
- Acoustic Assessment Report (AAR) and Best Management Practices Plan (BMP) for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment, Prepared by GHD, June 14, 2021

3.1.2 Process Undertaken

GHD has describe the processes and steps taken in chronological order as required to best describe the methodology used for this assessment.

3.1.3 Historic Noise Complaints

Brooks Road Landfill has not received any formal noise complaints for the previous operations on-site after a review of all formal complaint records provided since September 2015 which is based on the records provided by BRE Site operators. During a recent open house event in June of 2022 one written comment from a local resident was received indicating that there was a concern with the noise from tracked vehicles.

3.1.4 Review of Zoning

The Comprehensive Zoning By-Law for Haldimand County identifies the Site as "MD – Disposal Industrial Zone," which is suitable for a municipal sanitary landfill site. The surrounding land uses are zoned Agricultural use.

A zoning map is provided in Appendix A.

3.1.5 Site Review

Previous data collected during the Vertical Capacity Expansion EA and Fill Rate Amendment was reviewed. The Study Area is rural in character and surrounded by agricultural fields. There are no existing industries within the Study Area other than the Facility that may contribute to the background noise levels.

During the Vertical Capacity Expansion EA, a Site visit was conducted for the purpose of determining noise impact exposure off-Site. Off-Site residential dwelling locations were reviewed and the height of structures for noise impact exposure analysis was determined.

The nearest residential dwelling is approximately 232 metres (m) northwest of the existing property boundary. There are approximately 14 existing one-storey (1.5 m above grade) and two-storey (4.5 m above grade) residential dwellings within the Study Area as identified on Figure 3.1.

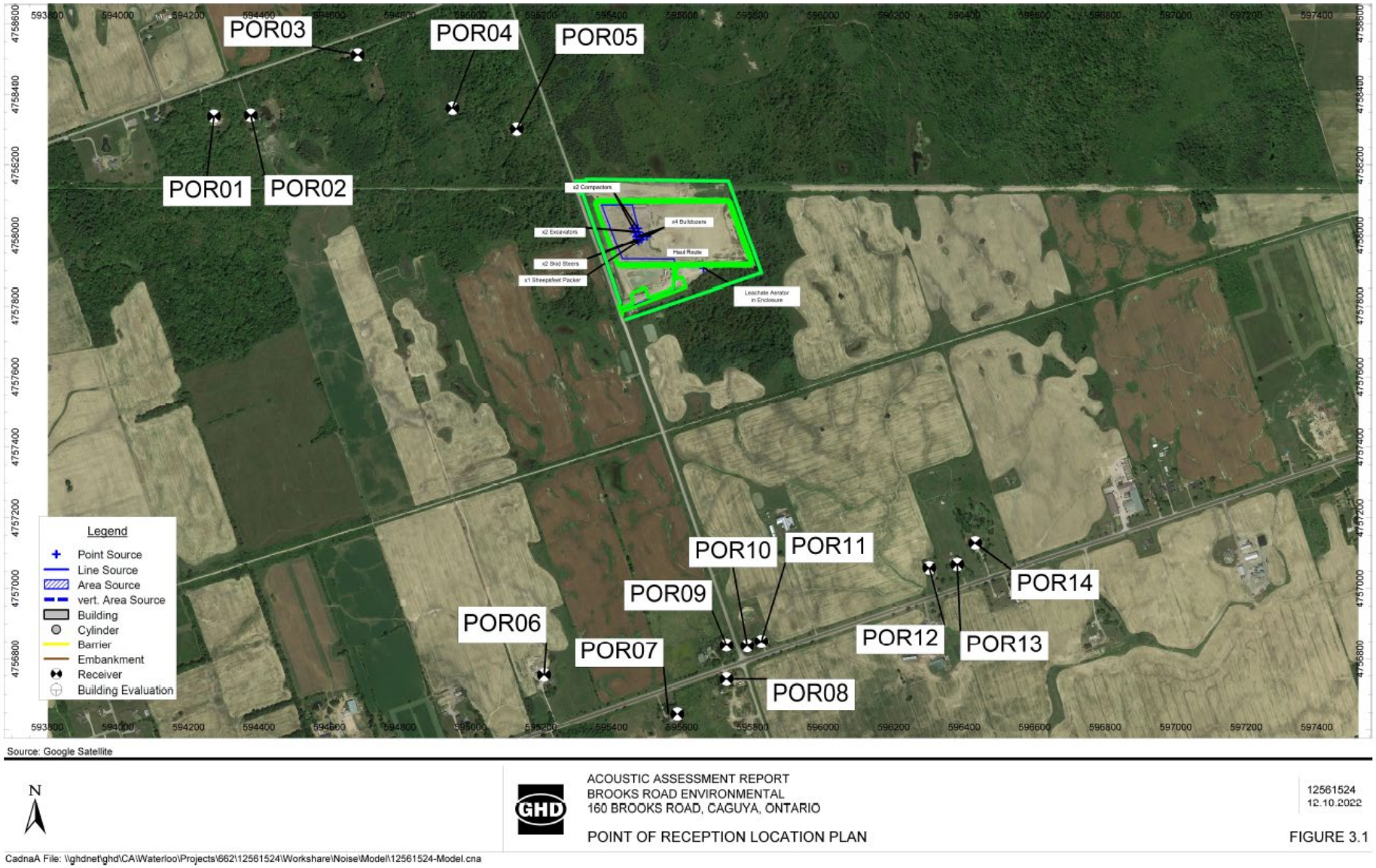


Figure 3.1 Noise Sensitive Receiver Locations

3.2 Description of Existing Conditions

3.2.1 Local Traffic Data

There are three roads located within the Study Area including:

1. Townline Road – is a two-lane dirt rural road with minimal local traffic only
2. Brooks Road – is a two-lane road with minimal local traffic and primarily used by Brooks Road Landfill
3. Highway 3 – is a two-lane road with significant 24-hour road traffic

Traffic data was obtained from the local traffic authority and the Ministry of Transportation. Townline Road and Brooks Road experience low traffic volumes based on site observations and also confirmed by the traffic authority. Highway 3 traffic volumes are elevated and subject of analysis.

MECP's Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) software is the approved road traffic model that is currently used in the province of Ontario to evaluate noise generated from road traffic. However, the model does not graphically generate contours and cannot be used to evaluate large areas and multiple road corridors simultaneously. ORNAMENT modeling predictions are also limited to noise predictions less than 500 m from the source and a minimum traffic volume of 40 vehicles per hour is required to evaluate an individual roadway.

Due to these model limitations, CADNA A was selected for the purposes of this Study as the preferred modeling software for analysis of road traffic generated background noise existing conditions. In addition, the CADNA A modeling software is better suited to handle multiple noise sources and can generate contour plots with imported base maps.

Annual Average Daily Traffic (AADT) values are the only reported data for less travelled roads, which presents a problem when estimating daytime and nighttime background noise levels as the values do not provide a distribution for the two time periods. GHD used recommendations for traffic breakdown for provincial highways and regional roads as outlined in the ORNAMENT guidance document to address this issue. The most current road traffic volumes were obtained from Haldimand County and the Ministry of Transportation (MTO). The following AADT values were available for road segments within the Study Area:

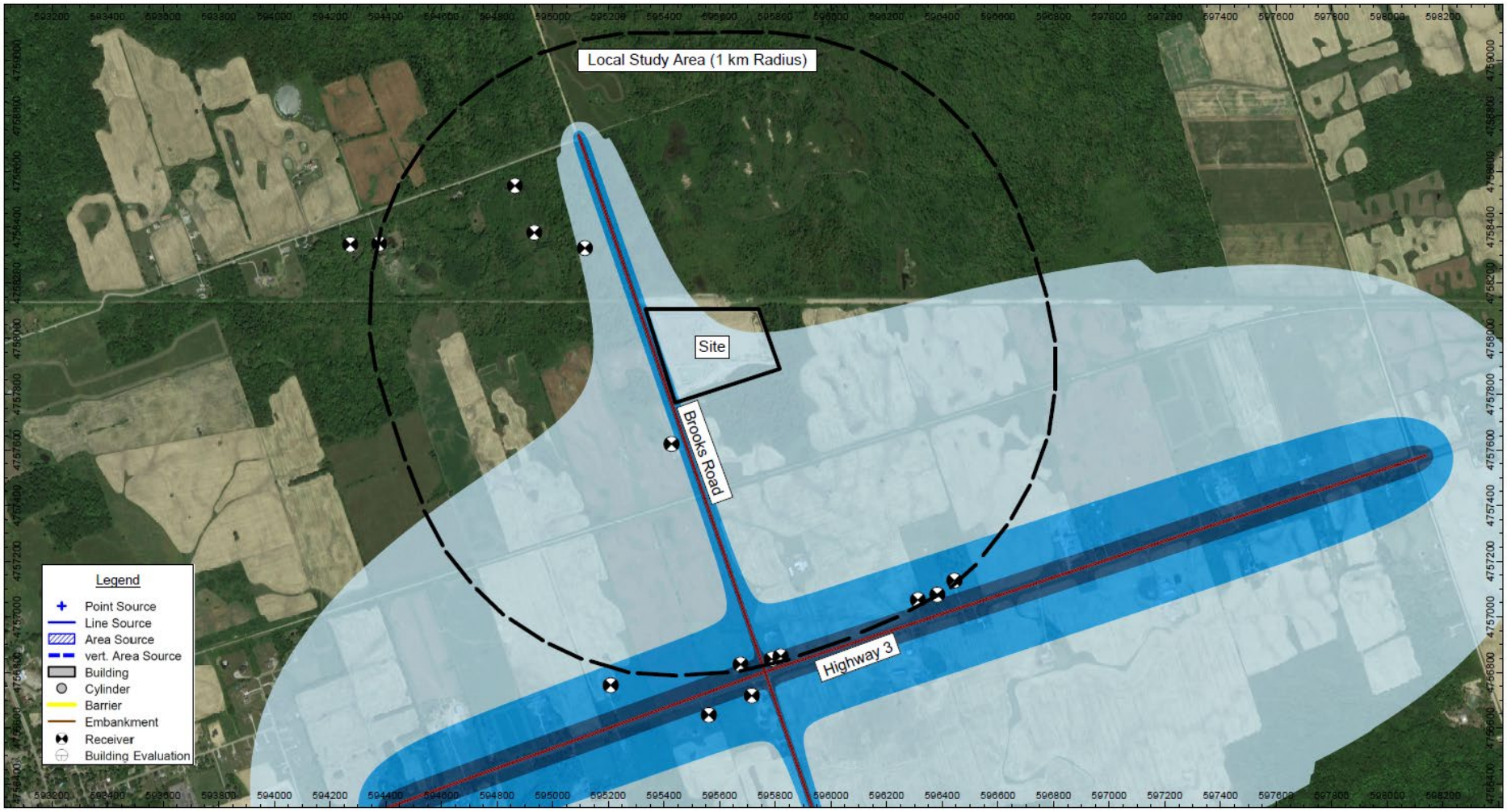
– Highway 3 (MTO, 2016) – 3,250 vehicles / day
– Brooks Road (Haldimand County, 2019) – 131 vehicles / day

The existing noise conditions within the Study Area were quantified using the industry standard CADNA A software and the road traffic data provided by the regulatory authorities. The US Department of Transportation Federal Highway Administration Traffic Noise Model (TNM) calculation standard was used in CADNA A to quantify the noise levels.

Vehicular road traffic generates noise that consists of mechanical noise from the engine and brakes, friction noise created from wheel contacting the road surface, and aerodynamic wind noise. Traffic volume, speed, road composition, gradient and surface type will affect the overall traffic noise that can be generated. Proximity and line-of-sight to the road corridor are most consequential for quantifying the off-Site noise exposure conditions.

The model calculates the predicted equivalent sound level (Leq) respective of the defined daytime (7 a.m. to 11 p.m.) and nighttime (11 p.m. to 7 a.m.) periods.

Figure 3.2A and Figure 3.2B present the road traffic sound level contours within the Study Area for the daytime and nighttime periods, respectively.



Source: Google Satellite

N

Legend

> 30.0 dB dBA
> 40.0 dB dBA
> 50.0 dB dBA

Notes:
Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

NOISE ASSESSMENT REPORT
BROOKS ROAD ENVIRONMENTAL
BRIOOKS ROAD LANDFILL- 160 BROOKS ROAD, CAYUGA, ONTARIO

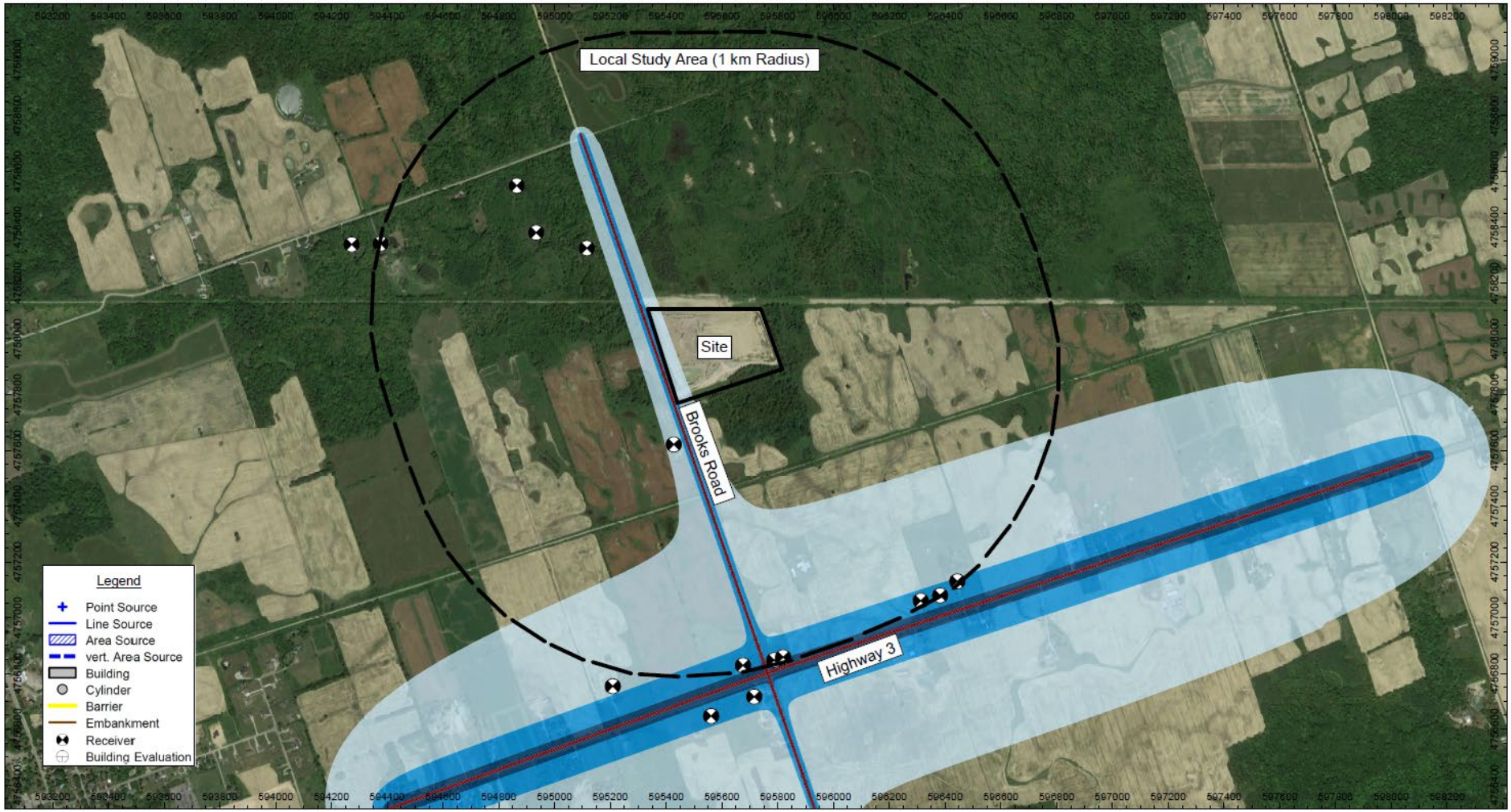
ROAD TRAFFIC SOUND LEVEL CONTOURS - DAY

12561524
17.10.2022

FIGURE 3.2A

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Tech\Traffic 2022\2022 Road Traffic Model V01.cna

Figure 3.2A Road Traffic Sound Level Contours (Daytime)



Source: Google Satellite

N

Legend

> 30.0 dB dBA
> 40.0 dB dBA
> 50.0 dB dBA

Notes:
Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

GHD

NOISE ASSESSMENT REPORT
BROOKS ROAD ENVIRONMENTAL
BRIOOKS ROAD LANDFILL- 160 BROOKS ROAD, CAYUGA, ONTARIO

ROAD TRAFFIC SOUND LEVEL CONTOURS - NIGHT

12561524
17.10.2022

FIGURE 3.2B

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\12561524\Tech\Traffic 2022\2022 Road Traffic Model V01.cna

Figure 3.2B Road Traffic Sound Level Contours (Night-time)

3.2.2 Off-Site Haul Routes

Highway 54 to Highway 3 is primarily used to reach Brooks Road and the off-Site haul route will not change regardless of the capacity modification. Any potential traffic increase to support the proposed increased landfill capacity will be evaluated using the noise model based on the future road traffic data.

3.2.3 MECP Technical Guidelines and Standards

The Noise character of the Study Area was defined in accordance with the MECP guidelines NPC-300 "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning," October 2013.

As stated in the guideline:

A "Class 1 Area" means an area with an acoustic environment typical of a major population centre, where the background noise is dominated by the urban hum.

"Class 2 Area" means an area with an acoustic environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

– Absence of urban hum between 19:00 and 23:00 hours
– Evening background sound level defined by natural environment and infrequent human activity
– No clearly audible sound from stationary sources other than from those under impact assessment

"Class 3 Area" means a rural area with an acoustic environment that is dominated by natural sounds having little or no road traffic, such as the following:

– A small community with less than 1,000 population
– Agricultural area
– A rural recreational area such as a cottage or a resort area
– A wilderness area

The urban sound level limits are 5 A-weighted decibels (dBA) greater in comparison to the rural limits to account for the elevated background sound level or the urban hum due to road traffic or adjacent industrial/commercial activities.

Landfill activities and on-Site operations are compared directly against a daytime one-hour Leq sound level limit of 55 dBA for landfill operations that are limited to 7 a.m. to 7 p.m. under the "Noise Guidelines for Landfill Sites" (N-1), October 1998.

3.2.4 2021 ECA and Existing Sensitive Receptors

The 2021 ECA amendment application that was prepared for the vertical expansion fill rate amendment and leachate treatment system confirmed that the Study Area immediately surrounding the Site is a mixed acoustic Class 2 and Class 3 area, depending on the proximity of the sensitive receiver to the adjacent road corridors and traffic volumes.

Acoustic Class 2 areas are defined by NPC-300 as a Noise environment with elevated daytime noise levels. Acoustic Class 3 areas are defined by NPC-300 as rural areas with an acoustic environment that is dominated by natural sounds having little or no road traffic.

The nine residential dwellings located along Highway 3 are considered to be Class 2 receivers and the five residential dwellings situated away from the corridor are considered to be Class 3 receivers. However, N-1 is the applicable regulatory Guideline for compliance assessment purposes for this Facility and the proposed capacity increase.

The nearest residential dwelling is approximately 232 m from the property boundary. It should be noted that a shredder system is no longer in use at the Landfill.

3.2.5 Landfill Existing Conditions

Brooks Road Landfill is proposing to increase the total landfill capacity by 219,400 m^3 maintaining the current daily approved fill rate. With this increase in mind, the equipment currently utilized On-Site is expected to continue. Therefore, the significant environmental noise sources at the Landfill include the following is considered a maximum volume to allow for flexibility in site operations:

– 2x Leachate Aerator in an Enclosure (24/7 steady state operation) (91.4 dBA)
– 3x Bulldozers (daytime operation only) (106.3 dBA)
– 2x Compactors (daytime operation only) (106.5 dBA)
– 1x Rock Truck (daytime operation only) (105 dBA)
– 2x Excavators (daytime operation only) (106.5 dBA)
– 2x Skid Steers (daytime operation only) (109.1 dBA)
– 1x Sheepsfoot Packer (daytime operation only) (106.5 dBA)

On-Site haul route truck activities are summarized below:

Table 3.1 On Site Vehicle Volumes

Type of Vehicle	Day 7a.m.- 7 p.m. (Trips/hour)	Evening 7p.m.- 11 p.m. (Trips /hour)	Night 11 p.m.- 7 a.m. (Trips /hour)
On-Site Haul Route (Source TR2)	16	0	0

These noise sources generate continuous steady state mechanical noise and will be the subject of analysis for the evaluation. These noise sources are input into an industry standard Noise model that includes all significant On-Site structures (buildings, equipment, storage tanks and silos).

Computer Aided Noise Abatement Modeling Software (CADNA A), version 2023, is based on the ISO 9613-2 standard "Noises – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation." The CADNA model is the industry standard for environmental noise modeling in Ontario.

The worst-case cumulative Site-wide sound levels estimated at the receptor(s) included attenuation effects due to geometric divergence, atmospheric attenuation, barriers/berms, ground absorption and directivity, as applicable significant noise sources at off-Site buildings were input into the model as intervening structures.

Cadna A modelling assumptions applied include the following:

– Noise Sources | All sources were modelled using the 1/1 octave band data from manufacturer's sound level data or reference materials
– Noise Source Elevation | The heights of the noise sources were modelled at the tallest point to represent the worst-case line of sight and emission of noise
– Ground Absorption | The model included water (G=0), soft/porous ground (G=1), and gravel/hard ground (G=0.25)
– Receptor elevation | POR receptor heights were modelled appropriately to represent the worst-case elevation based on one or two-storey residences at the worst-case compass directions from the Site as no houses are present
– Time-weighted Adjustment | Time-weighted adjustments for sources that do not operate continuously were utilized
– Tonality | A +5 dBA adjustment was applied for tonal sources if applicable
– Foliage | Foliage attenuation was not considered in our analysis as a conservative assumption

Table 3.2 Noise Modelling Parameters

Item	Model Parameters	Model Setting
1	Temperature	10°C
2	Relative humidity	70%
3	Wind speed	Downwind condition; wind speed of 3 m/s
4	Max. Search Radius (m)	2500 m
5	Noise propagation model	CadnaA (DataKustik 2023)
6	Standard	ISO 9613
7	Terrain parameters	Flat topography was assumed
8	Reflection parameters	2 orders of reflection

In order to predict the future worst-case noise impacts from the Project activities, representative octave band noise data was used, measured from construction/processing equipment similar to what is noted to be required for the Project. This data was obtained from the United Kingdom's Department of Environment Food and Rural Affairs (DEFRA) Update of Noise Database for Prediction of Noise on Construction and Open Sites, 2005 and 2006 (common source used globally). The United States Department of Transportation, Federal Highway Administration (FHWA) document FHWA Roadway Construction Noise Model User's Guide, 2006 was used as a supplemental document to obtain sound level data for equipment not listed by DEFRA.

The existing Landfill noise contours are presented on **Figure 3.3**. The noise impacts predicted at the 14 residential dwellings are below the 55 dBA noise limit (blue contour plot) defined in Guideline N-1. The future off-Site environmental noise impact from the Brooks Road Landfill Facility will be modelled using this industry standard acoustical model methodology to evaluate the capacity modifications in terms of the net effects.

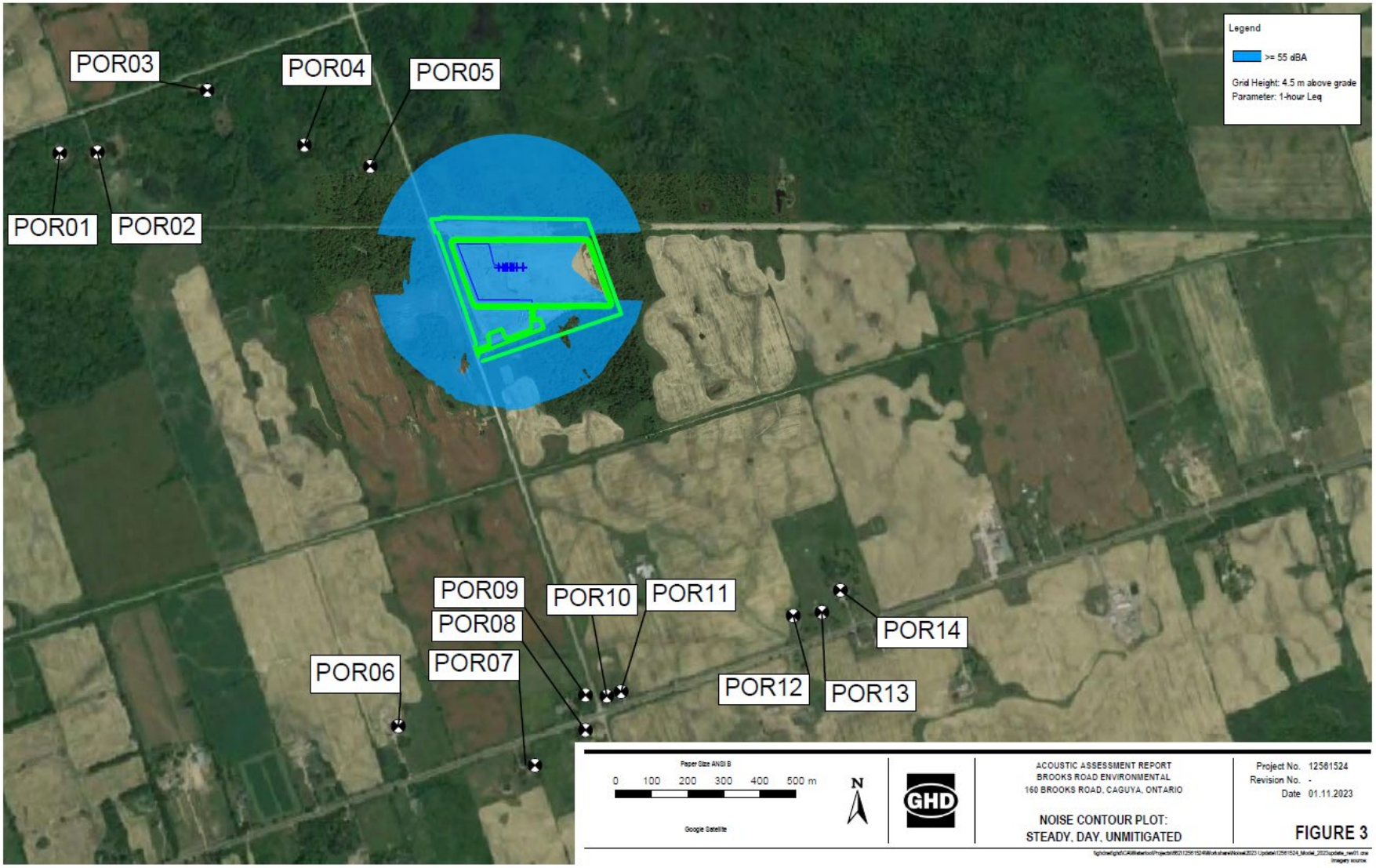


Figure 3.3 Noise Contours (Existing Landfill Conditions)

4. Potential Effects, Mitigation Measures & Net Effects

A Project Description, which includes proposed engineering design figures, was prepared so that potential environmental effects and mitigation measures could be identified. The following subsections provide a general summary of the proposed undertaking.

4.1 Description of Project Components and Activities

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This would be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours. The former railway property would continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in Table 4.1.

Table 4.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	220.75224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted north by 30 m. East and west ditches will extend north to maintain full perimeter ditch.

Design Component	Existing Landfill	Proposed Capacity Expansion
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Methodology and Investigations

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2.0** of this report.

4.2.1 Steady State Sound Level Impact Assessment

The worst-case assessment of steady-state noise sources at the selected points-of-reception was based on measured sound pressure levels. Cadna A Noise Modelling Software (CadnaA), version 2023, was used to model the potential impacts of the significant noise sources. Cadna A calculates sound level emissions based on the ISO 9613-2 standard "Noises – Attenuation of Sound during Propagation Outdoors".

The worst-case cumulative Facility-wide attenuated sound levels estimated at the receptor(s) included attenuation affects due to geometric divergence, atmospheric attenuation, barriers/berms, ground absorption and directivity, as applicable for all significant noise sources. Off-site buildings were input as intervening structures.

4.2.2 Future Landfill Operation Sound Levels

In order to consider future compliance of noise levels from the Site, an evaluation was carried out on the on the predicted sound levels that will be associated with the proposed capacity increase. The criteria for landfilling-related sound levels are established in the MECP guidelines for Site[1], and are as follows:

– 55 dBA for daytime operations (7 am to 7 pm)
– 45 dbA for nighttime operations (7 pm to 7 am)

The assessment considered the potential changes in existing truck traffic routes on-Site and on the haul route to support the proposed capacity increase.

These noise sources are input into an industry standard Noise model that includes all significant on-Site structures (buildings, equipment, storage tanks and silos). Computer Aided Noise Abatement Modeling Software (CADNA A), version 2023, is based on the ISO 9613-2 standard “Noises – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation.” The CADNA model is the industry standard for environmental noise modeling in Ontario.

The worst-case cumulative site-wide sound levels estimated at the receptor(s) included attenuation effects due to geometric divergence, atmospheric attenuation, barriers/berms, ground absorption and directivity, as applicable significant noise sources at off-site buildings were input into the model as intervening structures.

[1] MECP’s NPC-300 “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning,” October 2013.

In order to predict the future worst-case noise impacts from the Project activities, representative octave band noise data was used, measured from construction/processing equipment similar to what is noted to be required for the Project. This data was obtained from the United Kingdom's Department of Environment Food and Rural Affairs (DEFRA) Update of Noise Database for Prediction of Noise on Construction and Open Sites, 2005 and 2006 (common source used globally). The United States Department of Transportation, Federal Highway Administration (FHWA) document FHWA Roadway Construction Noise Model User's Guide, 2006 was used as a supplemental document to obtain sound level data for equipment not listed by DEFRA.

Final (near closure) landfill topography was selected to evaluate the worst-case noise impact exposure for off-site residences based on the final vertical expansion. The final landfill topography elevates the source height and documents the worst-case position of the noise sources relative to the off-site receivers based on line-of-sight. Representative noise specifications were used for all mobile equipment such as trucks and bulldozers and applied to the On-Site travel routes based on the cell development design concept.

Landfill activities and supporting equipment are compared directly against a daytime one-hour Leq sound level limit of 55 dBA for landfill operations for all PORs.

4.3 Noise Net Effects

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a "Yes" answer was given in the Screening Criteria Checklist) for those Noise criteria which might be affected by the project as identified in Section 2. The effects assessment describes how existing environmental conditions in the Study Area(s) would change as a result of the construction and operation of the proposed undertaking.

As described in Section 2, a "Yes" was applied to the following Noise criteria:

Table 4.2 Air and Noise Net Effects

	Criterion	YES	NO	Additional Information
	Might the project…			
3. Air and Noise				
3.4	Cause negative effects from the emission of noise?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in noise emissions associated with continued operation of the Site.

With respect to the above criteria/criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.3.1 Potential Effects on Noise Environment

The proposed capacity increase will result in noise emissions associated with truck movements to/from the Site and on-Site landfill equipment requirements. Fourteen off-Site residential dwellings will be potentially impacted from the existing Landfill activities. The predicted noise impact range is 42 to 53 dBA (rounded). POR5 is the most impacted at 53 dBA. All residential dwellings are below the 55 dBA noise limit.

From a potential noise impact exposure perspective, the future conditions for additional capacity are near identical and the only difference is the potential for truck traffic on the haul route up to 16 trucks per hour during daytime operations only and the elevated height of the tracked vehicles at the worst-case elevation when approaching cell closure.

Noise contours for the proposed Future Conditions are presented on Figure 4.1.

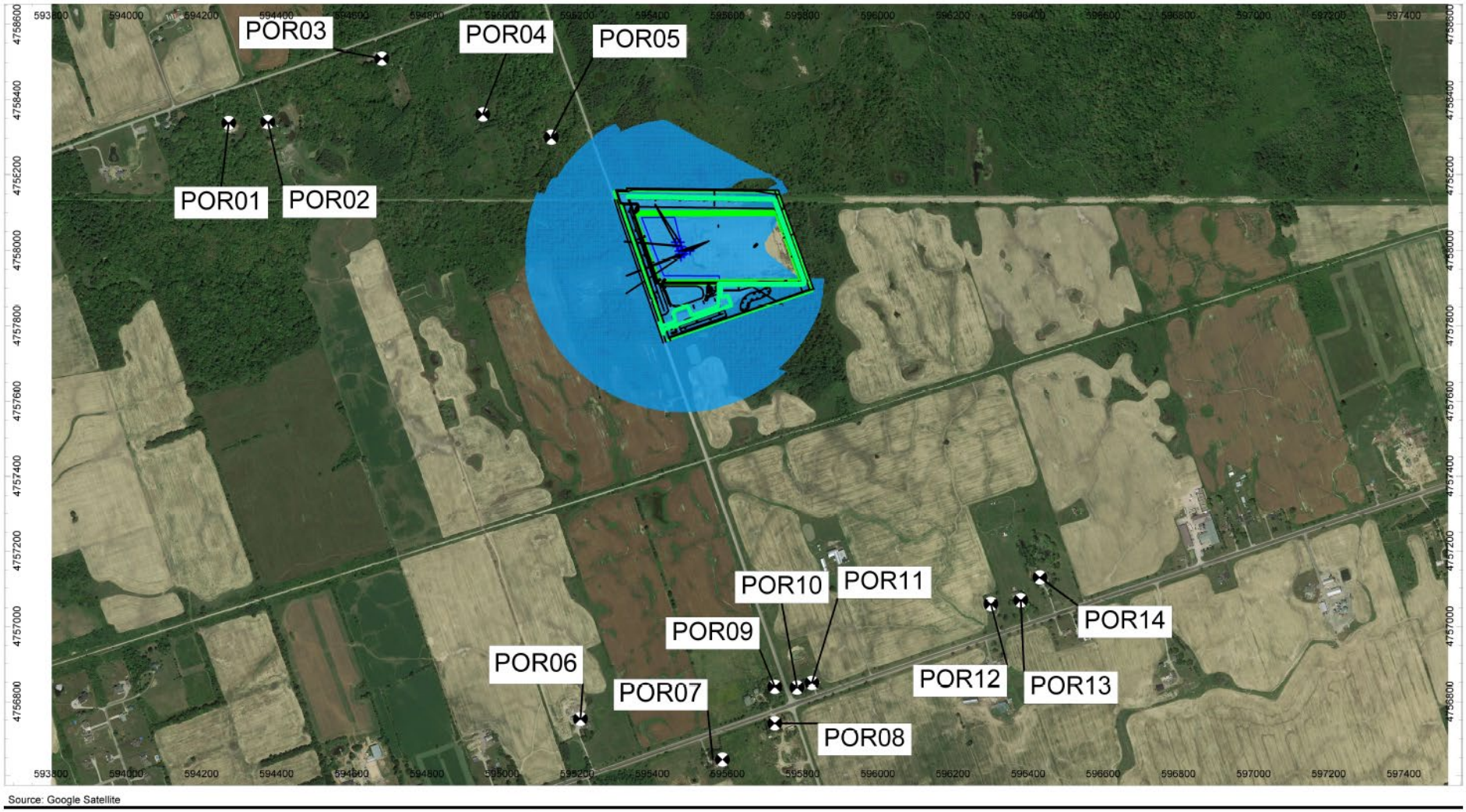


Figure 4.1 Noise Contours (Future Landfill Conditions)

4.3.2 Mitigation Measures

Based on the description of the proposed capacity increase provided in **Section 1** and the characterization of Noise Existing Conditions within the Study Areas described in **Section 3**, there are no mitigation measures recommended to be incorporated into the future conditions designs in order to avoid or minimize impacts from Noise. Mitigation measures are not required because the predicted off-Site noise impact meets the applicable 55 dBA regulatory noise limit.

As all residential dwellings are below the 55 dBA noise limit, no specific mitigation measures are required. The implementation of Best Management Practices (BMPs), as recommended in the Vertical Capacity Expansion EA such as barriers and/or berms at Landfill perimeter and administrative controls that limit On-Site landfilling activities will serve to minimize noise impacts from the Site.

The site also has a Noise Best Management Practice Plan (BMPP) that Facility staff adhere to which was developed in January 2021. The BMPP details the following recommended activities to minimize noise emissions on site:

4.3.3 Equipment Inspection and Maintenance Procedures

As a minimum, the following activities or events shall be inspected and recorded in the inspection logs:

– Monthly inspection of haul routes and roadways will be carried out and maintenance will be performed within 1 month or as soon as conditions would allow.
– Unpaved roads and regularly travelled portions of the site will be re-graded as required.
– All on-site BRE and contractor heavy mobile equipment is to be inspected before first use and annually afterwards to comply with NPC-115 equipment guidelines.
– All heavy mobile equipment shall be kept in good working order and fitted with working mufflers if required. Effective Noise control depends on machinery being in good condition and fitted with working mufflers.

4.3.4 Best Practices and Control Measures for Landfilling Activities

Landfill operators, machine operators and contractors are recommended to review and follow the practices and controls as outlined below:

– All heavy mobile equipment activities will be limited to daytime hours (07:00 to 19:00 hours).
– All heavy mobile equipment shall be kept in good working order as deterioration may increase equipment sound levels.
– Vehicle movements are recommended to stay within movements areas and reduce the use of back-up alarms, where practical. This should coincide with safety considerations.
– If alternate hauling route is proposed by BRE, a qualified individual should be consulted and approve the change.
– Administrative controls are required to eliminate uncontrolled tailgate banging and the use of experienced equipment operators.
– Where equipment back-up alarms will be used near areas that are potentially environmentally sensitive, alternative alarms should be used to reduce sound levels and annoyance. Ambient adjustable, strobe light or broadband alarms are options to consider.
– Landfilling activities should be limited to daytime hours (07:00 to 19:00 hours).

It is noted that due to improvements in operations and change in waste acceptance type has limited the Landfill's issues with pests over the last 2 years and have never used a audible pest control system. Should pest control devices or similar activities be utilized in the future these systems will be assessed for noise to ensure no negative off-site noise impacts prior to operation.

4.3.5 Recordkeeping

Records shall be kept of when and how Noise control measures are implemented and when complaints, if any, are received. Example of a complaint form is provided in Appendix B. The form will be updated every 5 years or upon employee turnover. As a minimum, the following activities will take place if a complaint is received:

- Complaints or concerns expressed directly to contractors or site personnel should be communicated immediately to the Site Manager so the formal complaint process can be initiated and followed up.
- The complaint form will provide the description of the complaint, environmental conditions, operations at time of incident, and description of all responses and follow up actions.
- Reporting will be conducted with the intent to manage any potential Noise issues through operational changes to construction and landfilling.
- If the complaint is valid or persistent (i.e., not an upset condition), investigation through sound level measurements will be conducted and reported.
- On an annual basis, the complaint records will be reviewed, and any unfavourable trends will be examined further to identify corrective actions and included in the annual report.

4.3.6 Net Effects

Similar to the Vertical Capacity Expansion EA and Fill Rate Amendment), the 14 residences that were anticipated to experience a change in the predicted off-Site noise impact due to the previously approved landfill expansion, may continue to hear landfill activities; however, even with the increased capacity, no change from the noise analysis completed as part of the Vertical Capacity Expansion EA and Fill Rate Amendment will occur. With existing mitigation measures and best practices, all residential dwellings are below the 55 dBA noise limit.

5. Monitoring Requirements and Additional Approvals

To ensure that the mitigation measures identified in **Section 4.0** are implemented as envisioned, a strategy and schedule was developed for monitoring environmental effects. With these mitigation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the proposed undertaking.

5.1 Monitoring Requirements

No monitoring requirements are needed for on-going noise compliance.

5.2 Additional Approvals

No additional approvals are required outside of the proposed ECA amendment for the daily capacity increase.

6. Conclusion

The BRE Facility is located in a mixed acoustical Class 2 and Class 3 area based on the MECP NPC 300 guideline and depending on the proximity of the off-Site residential dwellings to Highway 3. Nine residential dwellings located along Highway 3 are considered to be Class 2 receivers and the five residential dwellings situated away from the

corridor are considered to be Class 3 receivers. Guideline N-1 is the applicable regulatory criteria for compliance assessment purposes for the Facility and the proposed capacity increase requires that the BRE Facility achieve a noise limit of 55 dBA at all off-Site residential dwellings of concern. The Landfill is limited to daytime only operations from 7 a.m. to 7 p.m. The Existing Conditions at the BRE Facility are below the 55 dBA noise limit.

The capacity increase considers one future conditions evaluation which will remain well below the Guideline N-1 noise limit of 55 dBA at all existing sensitive points of reception.

7. References

Department of Environment Food and Rural Affairs (DEFRA). 2005/2006. Update of Noise Database for Prediction of Noise on Construction and Open Sites"

Appendix A – Supporting Information for a Noise Assessment Report or Vibration Assessment Report Required by a Basic Comprehensive C of A" as specified in the MECP guidance entitled "Basic Comprehensive Certificates of Approval (Air) – User Guide, April 2004"

NPC-103, "Procedures, August 1978"

NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound, October 1995"

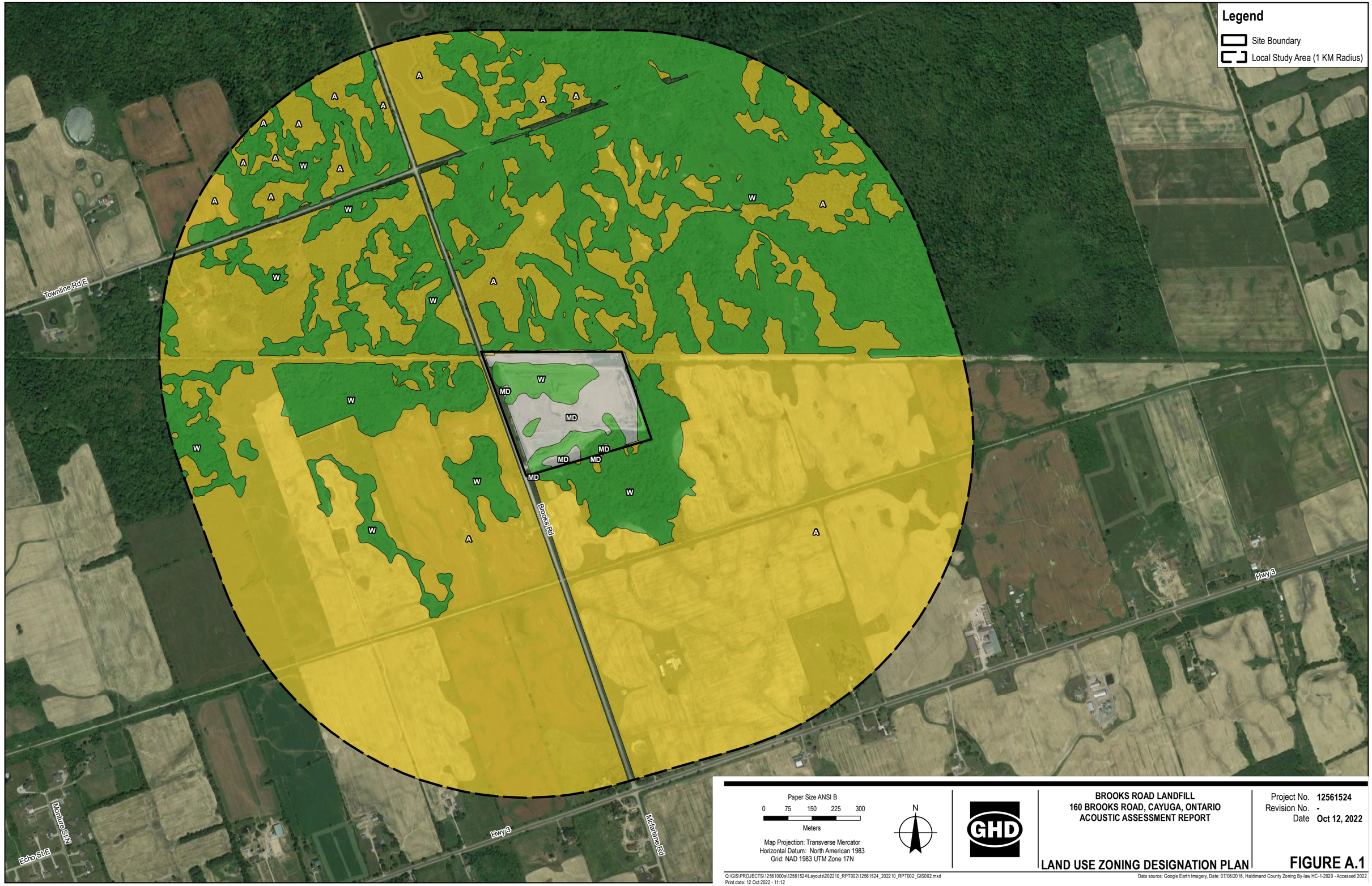
NPC-300, "Stationary and Transportation Sources – Approval and Planning", August 2013

N-1, "Noise Guidelines for Landfill Sites, October 1998"

Appendices

Appendix A

Zoning Map



Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
ACOUSTIC ASSESSMENT REPORT

Project No. **12561524**
Revision No. **-**
Date **Oct 12, 2022**

LAND USE ZONING DESIGNATION PLAN

FIGURE A.1

Q:\GIS\PROJECTS\12561000s\12561524\Layouts\202210_RPT002\12561524_202210_RPT002_GIS002.mxd
Print date: 12 Oct 2022 - 11:12

Data source: Google Earth Imagery, Date: 07/08/2018, Haldimand County Zoning By-law HC-1-2020 - Accessed 2022

Appendix B

Noise Complaint Form

Noise Complaint Form Brooks Road Landfill, Haldimand, Ontario	Form Last Updated August 18, 2020

1. Complaint information	Date & Time:
Name:	Phone
Address:	
Complaint Method (In-Person / Phone / Email / Other_____)	
2A. Complaint Description	Noise Source Visible? (Yes / No)
Description of Noise:	
2B.Location	Location of Annoyance: (Inside / Outside)
Description of Location: *What location are you hearing the noise from? When did you hear the noise?*	
Other Comments	
3A. Employee Receiving Complaint	Date & Time:
Name:	Title:
Phone:	
4. Environmental Conditions	
Weather Description	
Precipitation (Rain, Hail, Snow, None, Other:_____)	
Wind Direction	
Other Comments	
5. Complaint Investigations and Corrective Actions	
Activities at Time if Incident:	
Unusual Occurrence (Yes/No):	
If yes, describe:	
Need to Monitor? (Yes / No)	
Corrective Actions:	

Note: This form is reviewed and updated annually

Other Comments:

Appendix F

Natural Environment Assessment Report

Natural Environment Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

Brooks Road Environmental

March 15, 2024

→ **The Power of Commitment**

Project name		Brooks Road Landfill Expansion					
Document title		Natural Environment Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524					
File name		12561524-RPT-9-Natural Environment Assessment Report					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	Amy Douglas	Laura Lawlor	On File	Blair Shoniker	On File	11/23/2023
S4	0	Amy Douglas	Laura Lawlor		Blair Shoniker		03/26/2024

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Contents

Figure index (in-text)

Figure index (following text)

Table index

Appendices

1. Introduction

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent). The location of the Site is shown in **Figure 1.1**.

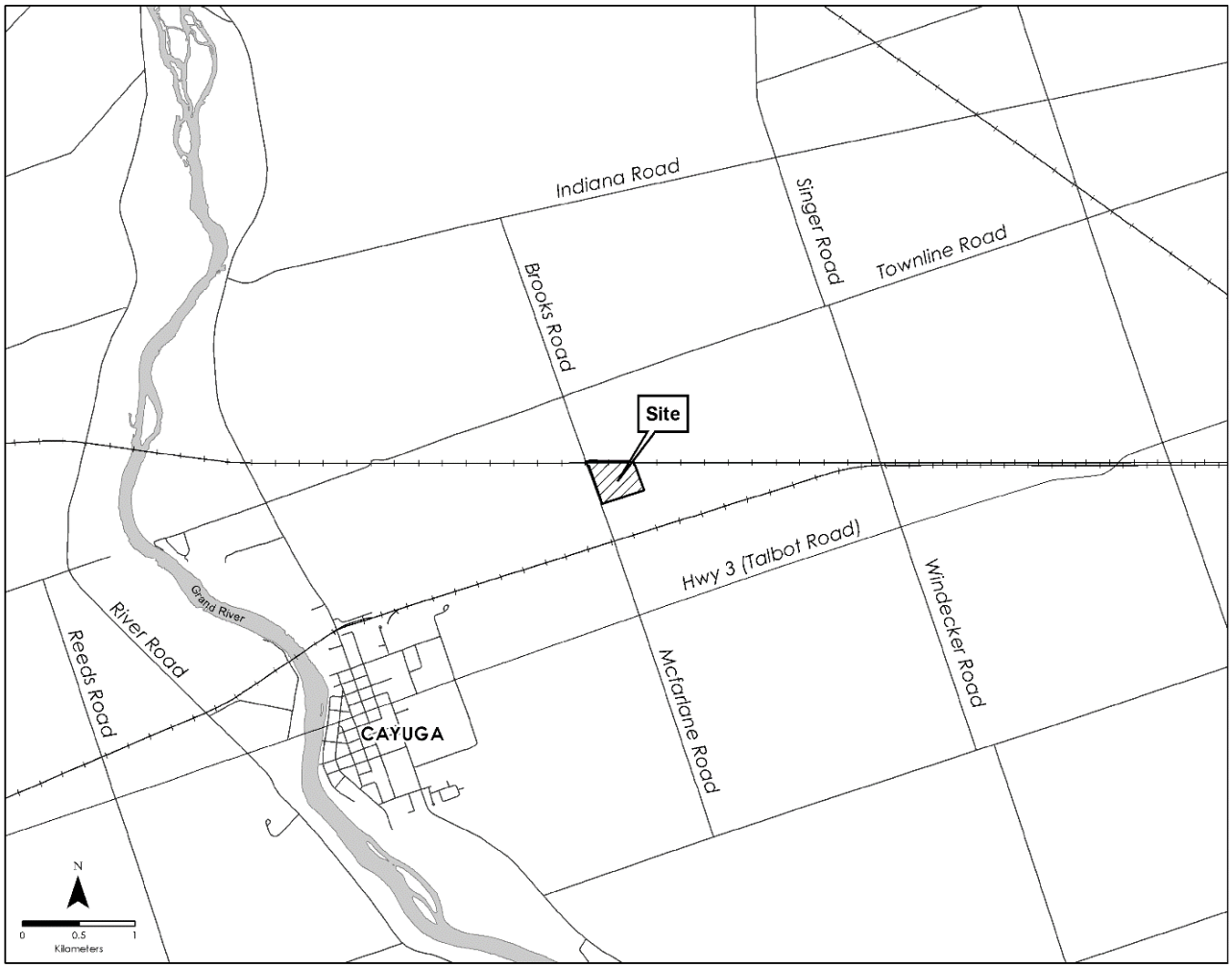

Figure 1.1 Location of the Proposed Undertaking

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302, has an approved annual fill rate of 250,000 tonnes per year and a total capacity of 1,045,065 cubic metres (m^3) (including waste and cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (CofA, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021. Under the current ECA, the Site is licenced to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3-hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by

the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

In order to meet the growing demand from waste generators and customer for a safe and reliable waste management facility for their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils), Brooks Road Environmental is proposing to expand the capacity of the Brooks Road Landfill by approximately 219,400 m^3, adding capacity equal to approximately two additional years. This expansion would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally, as shown in **Figure 1.2**.

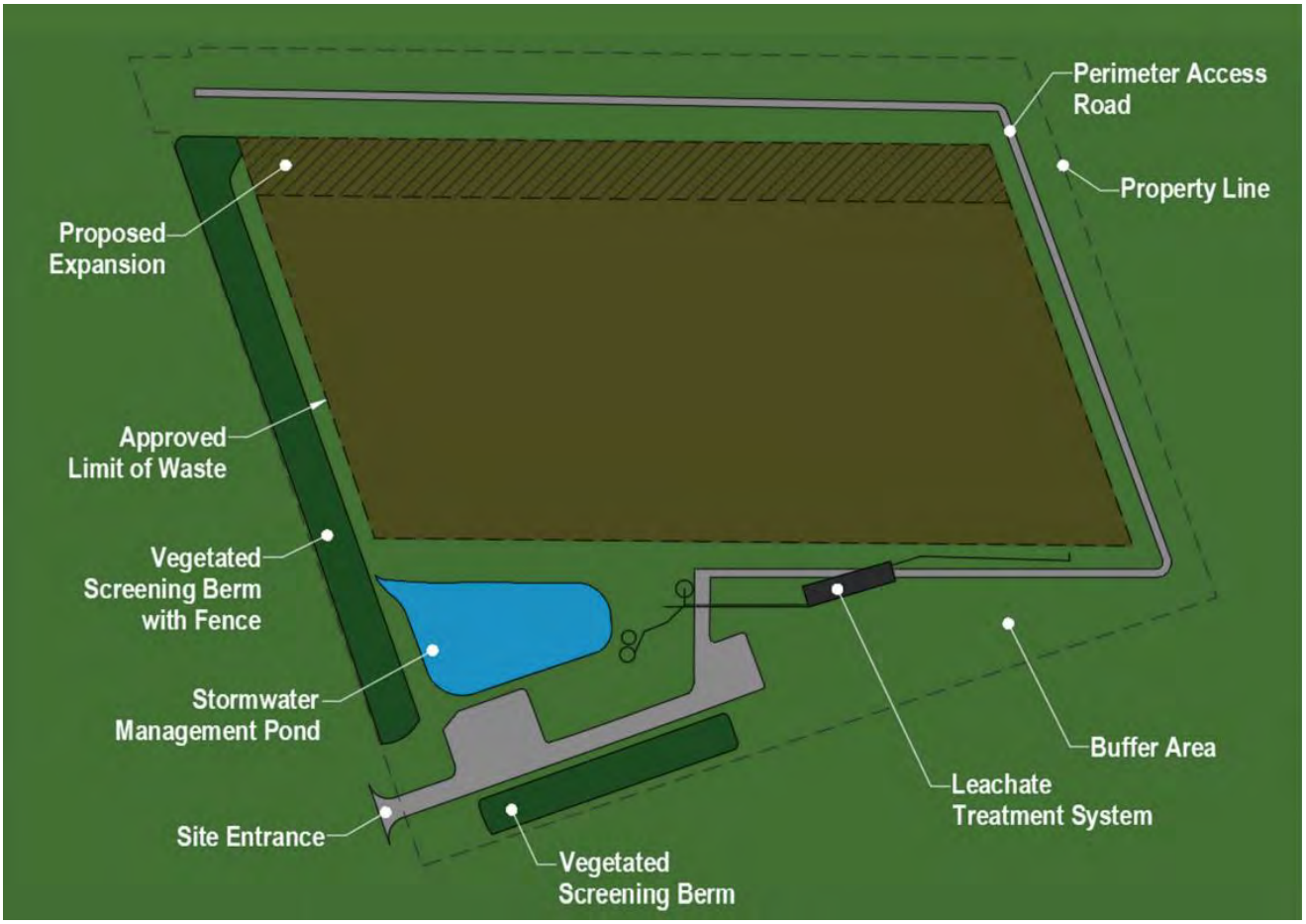

Figure 1.2 Proposed Capacity Expansion Concept

The proposed expansion would amend the approved ECA to allow for landfill volume expansion by approximately 219,400 m^3, allowing for receipt of an approved maximum daily quantity (1,000 tonnes per day) throughout the year, maintaining the approved rate of 250,000 tonnes per year. The proposed change to the total landfill capacity requires additional landfill infrastructure and changes to the currently approved landfill volume, footprint, and final contours.

The proposed Brooks Road Landfill Site capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *EA Act*, as follows:

A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:

1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process an application will be made to amend the existing ECA No. A110302.

GHD has prepared a Natural Environment assessment on behalf of BRE for the proposed undertaking. This report documents the following as it relates to the Natural Environment:

– Baseline/existing conditions (i.e., what exists in the absence of the proposed project)
– Potential effects on the environment, mitigation measures, and net effects
– Future monitoring requirements to be implemented

The Study Areas reviewed for the Natural Environment assessment were as follows (see **Figure 2**):

– Site Study Area (SSA) – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended
– Local Study Area (LSA) – all lands and waters within a 1-kilometre (km) radius of the SSA boundaries

The lands surveyed within the LSA, surrounding the SSA, are referred to throughout this report as three areas: North Lands, East Lands, and West Lands.

2. Screening Criteria Checklist

At the beginning of the Environmental Screening, the Screening Criteria Checklist (provided as Schedule I, pp 67 – 69, to the "Guide to Environmental Assessment Requirements for Waste Management Projects") is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of "environment" contained in the *Ontario Environmental Assessment Act*

As noted in the Guide:

"*The Screening Criteria are presented in the form of a checklist with the option of a "Yes" or "No" response. Mitigation measures **are not** to be considered in concluding whether there is "No" potential environmental effect. That is, the*

proponent is required to answer "Yes" even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a "Yes" is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required. Where a "yes' has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that no environmental effects are anticipated, it is recommended that additional information is provided in the Environmental Screening Report in order to support the "no effects" conclusion."

Each criterion is based on a question which is prefaced with the phrase, "*Might the Project*…". **Table 2.1** was completed as the first step of the Environmental Screening Process and is a summary of the criteria for the Natural Environment discipline. Further descriptions of the criteria for which a "Yes" response was indicated in the Screening table are discussed in **Section 4** of this report.

Table 2.1 Screening Criteria Checklist

	Criterion Might the project…	YES	NO	Additional Information
4.0 Natural Environment				
4.1	Cause negative effects on endangered, threatened or special concern species of flora or fauna or their habitat?	X		The provincial Species at Risk Ontario (SARO) and federal *Species at Risk Act* (SARA) list numerous endangered, threatened, and special concern species of flora or fauna within the SSA and LSA. Some of these species (e.g., barn swallow [*Hirundo rustica*]) have been observed within the SSA.
4.2	Cause negative effects on protected natural areas such as Areas of Natural and Scientific Interest (ANSIs), Environmentally Sensitive Areas, or other significant natural areas?		X	As there are no ANSIs, Environmentally Sensitive Areas, or other significant natural areas within the SSA the proposed expansion is not expected to cause a negative effect.
4.3	Cause negative effects on designated wetlands?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on designated wetlands. Provincially Significant Wetlands (PSWs) are present within the southern boundary of the SSA and throughout the LSA.
4.4	Cause negative effects on wildlife habitat, populations, corridors, or movement?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on wildlife habitats, populations, corridors, or movements. It should be noted MNRF have identified Wildlife Activity Area (white-tailed deer wintering area) as being present within the SSA and LSA.
4.5	Cause negative effects on fish or their habitat, spawning, movement, or environmental conditions (e.g., water temperature, turbidity, etc.)?		X	The proposed landfill expansion would not result in negative effects on fish or their habitat, spawning, movement, or environmental conditions (e.g., water temperature, turbidity, etc.) due to lack of presence within the SSA.
4.6	Cause negative effects on locally important or valued ecosystems or vegetation?		X	The proposed landfill expansion would not result in negative effects on locally important or valued ecosystems or vegetation.
4.7	Increase bird hazards within the area that could impact surrounding land uses (e.g., airports)?		X	The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations. This is unlikely to cause an increase in bird hazards.

3. Existing Conditions

The following subsections describe the existing conditions that are found within the SSA and the LSA of the proposed project.

3.1 Methodology

3.1.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Natural Environment Study Team to determine existing Natural Environment conditions within the Study Areas. The sources reviewed are outlined in **Table 3.1**.

Table 3.1 Secondary Source Information Reviewed

Source	Information Reviewed
Ministry of Northern Development, Mines, Natural Resources and Forestry (MNRF)	– Species at Risk (SAR) – Natural Heritage Features data layers from Land Information Ontario – Aquatic Resource Area (ARA) Survey Points
Ministry of Environment, Parks and Conservation (MECP)	– SAR in Ontario
Fisheries and Oceans Canada (DFO)	– 2022 SAR fish, mussel, and critical habitat maps for the Study Areas
Grand River Conservation Authority (GRCA)	– Fisheries Management Plan (2001) – Wetlands map layer
Niagara Peninsula Conservation Authority (NPCA)	– Wetlands map layer
GHD Limited (GHD)	– Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment (February 2017)
Conestoga Rovers and Associates (CRA)	– Scoped Environmental Impact Study Former Railway Corridor Lands North of Brooks Road Landfill, Haldimand County, ON (December 2013)
Ontario Breeding Bird Atlas (OBBA)	– Breeding bird data for the Study Areas
Ontario Butterfly Atlas (OBA)	– Species records for the Study Areas
Ontario Reptile and Amphibian Atlas (ORAA)	– Species records for the Study Areas

3.1.2 Consultation

The Guelph District Ministry of Northern Development, Mines, Natural Resources and Forestry[1] (MNRF), the Ministry of Environment, Conservation and Parks (MECP), the Grand River Conservation Authority (GRCA), and the Niagara Peninsula Conservation Authority (NPCA) were consulted on March 2, 2022, to request available natural heritage information, aquatic records, relevant wildlife records and Species at Risk (SAR) records. A response was received from MNRF and NPCA on March 4, 2022, from GRCA on March 8, 2022, and from MECP on September 13, 2022.

[1] The Ministry of Natural Resources and Forestry (MNRF) amalgamated with the Ministry of Northern Development and Mines in June 2021 to form the provincial Ministry of Northern Development, Mines, Natural Resources and Forestry (herein referred to interchangeably as MNRF).

Additional information provided by the agencies was incorporated into this report. Agency correspondence is included in **Appendix A**.

Although there was no direct consultation with the agencies during the preparation of this *Natural Environment Assessment Report*, the MNRF, GRCA, and NPCA were consulted extensively during the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017). GRCA and NPCA also participated in a site walk with GHD ecologists to confirm wetland boundaries in the North Lands on July 5, 2013. GRCA conducted an additional site walk with GHD ecologists on June 12, 2014, to confirm the wetland boundaries of the East Lands.

A meeting was held with the Mississauga's of the Credit First Nation (MCFN) on July 19, 2022, and provided an opportunity for GHD to answer questions the MCFN had regarding the proposed capacity expansion of the Brooks Road Landfill.

3.1.3 Species at Risk Screening

Prior to conducting the field surveys, a screening of SAR with potential to be present within the Study Areas was completed. The term SAR is used to encompass species that are listed as Endangered (END), Threatened (THR), or Special Concern (SC) under the provincial *Endangered Species Act* (ESA; 2007) or under the federal *Species at Risk Act* (SARA; 2002). Only species listed as THR and END receive protection under the ESA. SC species may be protected under other policy instruments such as those for Significant Wildlife Habitat (OMNR 2000). With the exception of migratory birds protected by the *Migratory Bird Convention Act* (MBCA; 1994) and aquatic species, SARA generally does not apply on non-federal lands.

3.1.4 Field Investigations

GHD staff conducted various field investigations within the North and East Lands throughout 2020 to 2022 to identify natural environment habitats, and species and features present within the Study Areas (**Table 3.2**). Field surveys were conducted within the LSA that were directly adjacent to the SSA (up to 150 m radius or limited to the right-of-way of Brooks Road) to accurately characterize the neighbouring habitat and natural features present. No wildlife species surveys were conducted within the SSA due to active operation of the landfill and limited suitable habitat; however, incidental observations were collected at all field visits and are discussed in **Section 3.2.7**.

Table 3.2 Field Investigations

Field Investigation	Dates
Ecological Land Classification and Vegetation Inventory	July 10, 2022 (East Lands) June 28, 2021 (North Lands)* June 29, 2020 (North Lands)*
Amphibian Surveys	April 12, May 11, and June 15, 2022 (North, East, and West Lands) March 25, April 13, and June 28, 2021 (North Lands)* May 28, 2020; June 29, 2020 (North Lands)*
Breeding Bird Surveys	June 10, June 27, and July 10, 2022 (East Lands)
Songmeter recording	June 13 to July 10, 2022 (North Lands)
Incidental Species Observations	Collected during all field visits
Notes	
* Completed as part of ECA monitoring of the North Lands which are provided here for a more fulsome characterization of the Study Areas (GHD 2021, 2022).	

Data collection focused on assessing vegetation and wildlife habitat characteristics within the Study Areas. Methodology for each field survey is provided below.

3.1.5 Aquatic Community Surveys

The MNRF were consulted for aquatic community information. Aquatic community surveys were not completed during this round of Study Area investigations due to:

- The footprint of the SSA, from the natural environment perspective, is coincident with the existing property boundary
- Semi-aquatic species such as Blanding's turtle will be considered to have assumed presence (based on local records)
- Water discharged from Site is governed by an ECA that is not anticipated to change because of these activities
- Additional Site controls and mitigation measures at this property boundary which limit natural environment interactions with the Site and surrounding areas are employed following the recommendations of the recent Vertical Expansion EA

Previous aquatic community surveys include a rapid habitat assessment conducted along the roadside on October 28, 2016, where property access was permitted. This investigation aimed to determine the presence and type of fish habitat within the LSA. Parameters collected included stream channel dimensions, flow characteristics including evidence of groundwater discharge, substrates, instream/in-water cover opportunities, riparian and instream vegetation, and the presence of physical barriers to fish movement and disturbances (past and present). Findings of this aquatic habitat assessment are presented in the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017).

3.1.6 Ecological Land Classification and Botanical Inventory

Vegetation communities within the East Lands were mapped and described following the *First Approximation – ELC System for Southern Ontario* (Lee et al. 1998) and the *Southern Ontario ELC Scheme* (Draft; Lee et al. 2008). A botanical inventory (including a search for rare plant species) was completed for each ELC unit where access permitted within the LSA. The vegetation inventory was compiled and refined by incidental observations recorded throughout all field visits.

3.1.6.1 Wetland Boundaries

Wetland boundaries were delineated by GHD, GRCA, and NPCA in the North Lands on July 5, 2013. GHD and GRCA delineated the wetland boundaries in the East Lands on June 12, 2014. Wetland delineations of the Study Areas were prepared following Ontario Wetland Evaluation System (OWES) methods (MNR 1994; MNR 2013). 2022 ELC mapping confirmed those wetland boundaries delineated in 2013 and 2014.

3.1.7 Calling Amphibian Surveys

Calling amphibian surveys were conducted according to the Marsh Monitoring Protocol (BSC 2009) and were carried out at six stations within wetlands in the North, East, and West Lands. Surveys commenced a half hour after sunset and consisted of listening at each station for three minutes after two minutes of silence. During the survey, any frogs or toads heard calling were documented and a measure of 1, 2, or 3 for the abundance of each species within 50 metres (m) of the survey point, 50 – 100 m of the survey point, or greater than 100 m of the survey point was applied.

3.1.8 Breeding Bird Surveys

Breeding bird surveys were conducted on June 10, June 27, and July 10, 2022, within the East Lands. This was conducted during the breeding season when most birds are on their territories engaged in breeding activities. Surveys were conducted between 5:00 and 11:00 a.m. A point count methodology was utilized, where a point count location was surveyed for five minutes, and all species seen and heard were recorded. Breeding evidence was recorded to determine if the species was a possible, probable, or confirmed breeder following protocols of the Ontario Breeding Bird Atlas (Cadman et al. 2007). Locations of the Breeding Bird Survey (BBS) stations were identified in the *Terrestrial*

and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment (GHD 2017).

A songmeter (SM1) was also installed in the North Lands to collect audio recordings of breeding bird occurrences outside of the survey periods. The songmeter collected recordings for five minutes of every hour for three hours after sunrise and three hours after sunset during from June 13, 2022, until July 11, 2022. This captured breeding bird presence during the time of the day when vocal calling was highest for songbird species. Audio recordings were analyzed by avian ecologists to determine species presence.

3.1.9 Incidental Wildlife Observations

Observations and signs of wildlife were recorded, including browse, tracks, trails, scat, burrows, remains, nests, and vocalizations.

3.2 Description of Existing Conditions

The LSA was dominated by agricultural lands under active row crops, forests, and wetlands. A photographic log is presented in **Appendix B**.

3.2.1 Designated Areas

The LSA contains natural landscape features of provincial significance (**Figure 3**).

The North Cayuga Slough Forest is an Area of Natural and Scientific Interest (ANSI), located in the northwest portion of the LSA and the Brooks Road/Townline Road intersection. This 1,214 ha landscape feature is composed of a diverse complex of woodlands, vernal pools and sloughs which are bordered by swamps (GRCA 1997). The sloughs are a result of the Beverly and Toledo silty clay plains and the Lincoln clay plains. Generally, the area is dominated by imperfectly to poorly drained lacustrine silty clay and heavy clay. The upland areas are dominated by sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*) and red oak (*Quercus rubra*). Red maple (*A. rubrum*), swamp white oak (*Q. bicolour*) and black ash (*F. nigra*) typically dominate the low, wet basins. Field communities are characterized by hawthorns (*Crataegus spp.*), southern arrowwood (*Viburnum dentatum*) and narrow-leaved meadowsweet (*Spirea alba*), representing some of the many transitional environments between the distinct upland and low land areas. This area is of special importance due to its textbook clay-plain sediments and sand ridges which lead to the very distinct vegetation patterns. Previous studies have documented that 14 vegetation species and four bird species that are rare nationally, provincially and/or regionally occur in the area. This area is also home to a heronry (GRCA 1997). Of the 14 rare vegetation species, only two were observed in the LSA. These species are discussed further in **Section 3.2.8**.

The North Cayuga Swamp Wetland Complex is a provincially significant wetland (PSW) complex that is also present within the SSA and throughout the LSA in general (**Figure 4**). This wetland complex is made up of numerous individual wetlands dominated by swamp with some marsh wetlands. The PSW extends to the northernmost portion of the SSA and incorporates the wetland elements of the North Cayuga Slough Forest. The complex vegetation community is characterized by thicket swamps of narrow-leaved meadowsweet, buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex vericillata*), or speckled alder (*Alnus incana ssp. rugosa*) with red maple, gray dogwood (*Cornus foemina ssp. racemosa)*, highbush blueberry (*Vaccinium corymbosum*), and willows (*Salix spp.*) as associates (NPCA 2010). The soil is a clay, loam, or silt composition.

Majority of the LSA is white-tailed deer (*Odocoileus virginianus*) wintering area as delineated by the MNRF (**Figure 3**). Online mapping shows the majority of the SSA is also included in this delineation; however, given the SSA's fencing and lack of suitable habitat it is unlikely to be used by white-tailed deer for wintering.

3.2.2 Aquatic Communities

Consultation with the MNRF identified Pike Creek as present within the LSA; approximately 500 m west of the SSA. Pike Creek has a warm thermal regime with the following species identified: black crappie (*Pomoxis nigromaculatus*),

bluegill (*Lepomis macrochirus*), bluntnose minnow (*Pimephales notatus)*, brook stickleback (*Culaea inconstans*), brown bullhead (*Ameiurus nebulosus)*, central mudminnow (*Umbra limi)*, common shiner (Luxilus cornutus), creek chub (*Semotilus atromaculatus*), gizzard shad (*Dorosoma cepedianum*), golden shiner (*Notemigonus crysoleucas),* green sunfish (*Lepomis cyanellus)*, largemouth bass (*Micropterus salmoides*)**,** logperch (*Percina caprodes*), northern pike (*Esox Lucius*), pumpkinseed (*Lepomis gibbosus)*, rock bass (*Ambloplites rupestris*), sunfishes (*Centrarchidae spp.),* and white sucker (*Catostomus commersonii*). Pike Creek does not drain from or into the SSA, therefore was not subject to field investigations.

3.2.3 Vegetation Communities and Flora

3.2.3.1 Vegetation Communities

In June 2022, GHD conducted a vegetation inventory and Ecological Land Classification (ELC) of select areas within the LSA which included the East and North Lands. This inventory and classification builds upon field visits completed between 2013 and 2015 for the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017).

During the 2013 – 2015 EA surveys, a species of interest detected during field activities was pumpkin ash (*Fraxinus profunda*), which is ranked as S2 provincially and is a regionally rare species in the Haldimand-Norfolk County. It is found in swampy areas with standing water for most of the year. A single specimen in poor condition was found along the south base of the abandoned rail line to the east of the landfill property (within the LSA). During 2022 this species was not observed and was likely located outside the selected field areas surveyed.

Another species of interest that was detected in past field investigations conducted by others was black gum (*Nyssa sylvestre*). A small stand of black gum was found in the SSA by Natural Resource Solutions Inc. (NRSI) in 2004 at the southeast corner of the landfill prior to clearing activities. The stand of black gum was identified by GHD on the landfill property during 2016 field investigations (GHD 2017). The trees were found to be tagged and located in the direct vicinity of active landfilling activities, without any tree protection measures. Black gum is a provincially rare species (S3) in Ontario, but within Haldimand-Norfolk County black gum is considered common. Presence of these trees was not confirmed in 2022 surveys; however, wildlife exclusion fence installed around the on-Site wetlands in the southeast corner of the landfill restricts work in this area.

ELC mapping was prepared following Ecological Land Classification for Southern Ontario: A First Approximation (Lee et al. 1998) and is presented on **Figure 5**. To complete the classification, ELC-certified ecologists conducted field visits to assess the landform and parent material, soil, and vegetation present. Through assessment of these characteristics, classification of the ecological communities was completed for the North, East, and West Lands in 2016 by GHD. The balance of the LSA (up to a 1 km radius from the SSA) was assessed using aerial photography interpretation and knowledge of the area. Confirmation and update to any vegetation communities to the North and East Lands were completed during the summer of 2022. Thirty-nine ecological land classification community classes are represented within the LSA and include aquatic, swamp, marsh, meadow, thicket, forest, transportation and utilities, and cultural systems. The vegetation inventory is presented in **Appendix C**.

3.2.3.1.1 ELC from 2022 Survey

Characteristics of each of the identified community types observed during the summer of 2022 are provided below. These communities are delineated in **Figure 5** as “Field Verified – 2022”.

Upland Communities

AG: Agriculture

Agricultural fields are present throughout the LSA and are actively farmed. At the time of survey, winter wheat (*Triticum aestivum*), corn (*Zea mays ssp. mays*), and soybean (*Glycine max*) crops were planted within the AG fields of the East and West Lands. Small wetland and drainage areas were present throughout the actively farmed agriculture fields.

CVI_1: Transportation

This area is composed of roadways, a decommissioned rail line from which rail ties have been removed, and an active rail line.

CVI_2: Disposal and Recycle

This is the Brooks Road Landfill Site, which is in active operation.

CVR_4: Rural Property

This is a rural property with residential and accessory structures.

CUL: Cultural

This classification is applied to the disturbed and actively managed areas of the clay stockpile. No vegetation is present.

FODM3-1: Dry-Fresh Poplar Deciduous Forest

The dry-fresh poplar deciduous forest is located along the edge of the existing waste disposal area. The topography is relatively flat with moist soil. Trembling aspen (*Populus tremuloides*) dominates the semi closed canopy of this community, with red maple, red oak (*Quercus rubra*), and various shrub species also present within the unit. The sub-canopy, understory and ground layer are dominated by typical upland species such as riverbank grape (*Vitis riparia*), buckthorn (*Rhamnus spp*.), dogwood (*Cornus spp.*), pasture rose (*Rosa carolina*), goldenrod, and bedstraw (*Galium sp*.).

FODM9: Fresh-Moist Oak- Maple-Hickory Deciduous Forest

This forest type is located west of Brooks Road and in close proximity to swamps and is a dense deciduous community composed of shagbark hickory (*Carya ovata*), red maple, sugar maple (*Acer saccharum*), balsam poplar (*Populous balsamifera*), silver maple (*Acer saccharinum*), red oak, white pine (*Pinus strobus*), American beech (*Fagus grandifolia*), ironwood (*Ostrya virginiana*), and swamp white oak (*Quercus bicolor*). Due to the large area of this unit, ground vegetation varied throughout the area and included sensitive fern (*Onoclea sensibilis*), bracken fern (*Pteridium aquilinum*), spotted jewelweed (*Impatiens capensis*), Canada mayapple (*Podophyllum peltatum*), highbush cranberry (*Viburnum trilobum*), garlic mustard (*Alliaria petiolata*), trout lily (*Erythronium americanum*), Canada thistle (*Cirsium arvense*), black raspberry (*Rubus occidentalis*), woodland strawberry (*Fragaria vesca*), and lesser burdock (*Arctium minus)*.

FODM9-4: Fresh-Moist Shagbark Hickory Deciduous Forest

This low forested area is adjacent to one of the slough wetlands and is dominated by shagbark hickory with ironwood, white ash, red oak, red maple, and swamp white oak being present. The soil in this area is moist with a rolling topography. The groundcover includes goldenrod species, trout lily, running strawberry bush (*Euonymus obovatus*), ostrich fern (*Matteuccia struthiopteris*), and other herbaceous species.

THD: Deciduous Thicket

A small pocket of deciduous thicket was observed north of the existing fence line and is dominated by a gray dogwood (*Cornus racemosa)* with patchy canopy coverage of white ash (*Fraxinus americana)*, elm (*Ulmus spp.*), hawthorn (*Crataegus ssp*.), and red maple (*Acer rubrum)*. The ground layer is dominated by timothy grass (*Phleum pratense*), common milkweed (*Asclepias syriaca*), goldenrod (*Solidago sp.*), Canada bluegrass (*Poa compressa*), common cinquefoil (*Potentilla simplex*), oxeye-daisy (*Leucanthemum vulgare*), deptford pink (*Dianthus armeria*), and woodland sedge (*Carex blanda*).

THDM2-4: Gray Dogwood Deciduous Shrub Thicket

This mid-age transitional community is present in multiple locations throughout the LSA and is typically associated with the drier edges of wetlands. The area is similar to the cultural thicket (CUT1) community but is characterized by a dominant shrub cover of gray dogwood. Other community species indicative of an upland environment includes white ash, hawthorn, and goldenrod.

THDM2-11: Hawthorn Deciduous Shrub Thicket

This flat area of mineral soil is located in close proximity to an agricultural field. Hawthorn species dominate this landscape. Very few trees are located within this thicket and other species present include gray dogwood, serviceberry (*Amelanchier sanguinea*), and white pine.

THM: Mixed Thicket

Located to the east of the landfill property, this upland thicket is adjacent to two wetlands. A few large mature white pines have established, and hawthorn, gray dogwood, and European buckthorn are present within the sub canopy.

Wetland Communities

MAMM1: Graminoid Mineral Meadow Marsh

This unit has a broad range of vegetation composition in the shrub and ground vegetation layers. Within the wetland, narrow-leaved cattail (*Typha angustifolia*) and reed-canary grass (*Phalaris arundinacea var. arundinacea*) dominates. Vegetation along the edge of this unit includes common teasel (*Dipsacus fullonum)*, common chicory (*Cichorium intybus)*, red clover (*Trifolium pratense*), cow parsnip (*Heraleum maximum*), goldenrod, bird's-foot trefoil (*Lotus tenuis)*, serviceberry, gray dogwood, reed-canary grass, and oxeye daisy.

MAMM1-3: Reed–canary Grass Graminoid Mineral Meadow Marsh

Located directly to the east of Brooks Road and on the south-west corner of the landfill property, this marsh is dominated by reed-canary grass and very little other vegetation except for a small pocket of narrow-leaved cattail located within a ditch.

MAMM2-5: Purple Loosestrife Forb Mineral Meadow Marsh

Purple loosestrife (*Lythrum salicaria*), large-fruited bur-reed (*Sparganium eurycarpum*), buttonbush (*Cephalanthis occidentalis*), and wool grass (*Scirpus cyperinus*) create a dense understory in this community. This community provides a transition between the bur-reed mineral shallow marsh and a meadowsweet mineral deciduous thicket swamp (SWTM5-7) present in the LSA, north of the SSA.

MAMM3: Mixed Mineral Meadow Marsh

This marsh is located directly beside an agriculture field and receives surface water flow from the surrounding agricultural area due to its low elevation. Graminoid and forb species dominate, and the composition includes European reed grass (*Phragmites australis ssp. Australis)*, goldenrod, bird's-foot trefoil, common teasel, reed-canary grass, Queen Anne's lace (*Daucus carota*, and purple loosestrife. Narrow-leaved cattail, narrow-leaved meadowsweet (*Spiraea alba),* awl fruited sedge (*Carex stipata*), fowl mannagrass (*Glyceria striata),* broadleaf arrowhead (*Sagittaria latifolia*), duckweed (*Lemna minor*), and large-fruited bur-reed are also present within the understory layer.

MASO1-1: Cattail Organic Shallow Marsh

The cattail organic shallow marsh is a small community located at the base of the old rail line to the east of the landfill property. The marsh is comprised of organic soils and is dominated by narrow-leaved cattail. The other vegetation consisted of bog hemp (*Boehmeria cylindrica*), greater pond sedge (*Carex riparia*), and spotted jewelweed. This wetland is attached by a small channel which flows south to another wetland (MASO3).

MASO3: Mixed Organic Shallow Marsh

The mixed organic shallow marsh is comprised of organic soils and surface water with maximum depths over 0.5m in some areas. The vegetation community consists of phragmites (*Phragmites australis var. australis*), duckweed, water-plantain (*Alisma spp*.), and enchanter's nightshade (*Circaea canadensis ssp. canadensis*). Willow trees (*Salix spp*.) and shrubs are present throughout the wetland.

SWDM4: Mineral Deciduous Swamp

The mineral deciduous swamp is located within a forest community near agricultural fields. Aerial photographic interpretation was used to determine this habitat. Based on this interpretation, it is expected that this swamp is comprised of mineral soils and many deciduous tree species. Field investigations found red maple, trembling aspen, and balsam poplar. Gray dogwood was observed in the shrub layer, as well as sensitive fern and mosquito bulrush (*Scirpus hattorianus*). The ground layer was comprised of celery buttercup (*Ranunculus sceleratus*), red raspberry (*Rubus idaeus*), fowl mannagrass, and riverbank grape.

SWDM4-5: Poplar Mineral Deciduous Swamp

This habitat is found in multiple locations across the property, typically along the edge of the existing waste disposal facility. It is characterized as a transition between wetland and forest habitats. The majority of the canopy is located along the edge of the existing waste disposal property and is dominated by trembling aspen. Red maple, blue spruce (*Picea pungens)*, sugar maple, pin oak (*Quercus palustris*), white ash, and red oak all compose the tree canopy. Many shrub species, including red osier dogwood, hawthorn, and nannyberry (*Viburnum lentago*), are present within this unit. Spotted jewelweed, sensitive fern*,* narrow-leaved meadowsweet, reed-canary grass, yarrow (*Achillea millefolium*), white sweet clover (*Melilotus albus*), water-plantain, shallow sedge (*Carex lurida*), and common cinquefoil composes the dominant ground vegetation. Standing surface water and buttressed roots are present within the unit.

SWTM2-3: Gray Dogwood Mineral Deciduous Thicket Swamp

The gray dogwood mineral deciduous thicket swamp represents a mid-age transition community between the similarly characterized meadowsweet mineral deciduous thicket swamp (SWTM5-7*)* and the large mixed mineral meadow marsh (MAMM3). It is characterized by a robust sub-canopy dominated by gray dogwood. Specimens of red maple, speckled alder (*Alnus incana*), and common alder (*Alnus glutinosa*) form the canopy layer. The other species constituting the vegetation community are meadowsweet, sensitive fern, reed-canary grass, spotted jewelweed, boneset (*Eupatorium perfoliatum*), pussy willow (*Salix discolor*), and bottle brush sedge (*Carex hystericina*).

SWTM5: Mineral Deciduous Thicket Swamp

The mineral deciduous thicket swamp is present at multiple locations and is composed of primarily shrub species. Aerial photographic interpretation was used to determine this habitat in multiple areas but a field verified unit exits to the east of the landfill property. Species including gray dogwood, serviceberry, red osier dogwood, and hawthorn species are present within this unit. Ground vegetation includes narrow-leaved meadowsweet, sedge, rush, grass, and forb species. Small pockets of narrow-leaved cattail and reed-canary grass are also present.

SWTM5-1: Buttonbush Mineral Deciduous Thicket Swamp

The buttonbush mineral deciduous thicket swamp is surrounded by a large meadowsweet mineral deciduous thicket swamp (SWTM5-7). This community is comprised of thick sub-canopy of buttonbush and willow species. Bladderwort (*Utricularia vulgaris*), cypress-like sedge (*Carex pseudocyperus*), meadowsweet, swamp white oak, rye grass (*Lolium perenne*), soft-stemmed rush (*Juncus effusus*), and blue vervain (*Verbena hastata*) were also present.

SWTM5-7: Meadowsweet Mineral Deciduous Thicket Swamp

The meadowsweet mineral deciduous thicket swamp is characterized by a robust understory composed of obligate and facultative wetland species such as narrow-leaved meadowsweet, gray dogwood, and purple loosestrife. Ground

cover includes moss and fowl meadow grass (*Poa palustris*). The silty clay soil lacked horizons, but mottles were observed within the top 10 centimetres (cm) of the surface.

SWTO4-2: Gray Dogwood Organic Deciduous Thicket Swamp

The gray dogwood organic deciduous thicket swamp is a mid-age community present and is typically associated with wet low-lying habitat. The swamp is characterized by organic soils, deciduous community vegetation, and is driven by a dominant shrub cover of gray dogwood with a various species including sensitive fern, lily of the valley (*Convallaria majalis*), false solomon's seal (*Maianthemum racemosum ssp. racemosum)*, and narrow-leaved meadowsweet, all of which are indicative of a wetland environment.

3.2.3.1.2 ELC from 2016 Survey

Characteristics of each of the identified community types previously reported in the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017) is provided below. These communities are delineated in **Figure 5** outside of the “Field Verified – 2022” hatching.

Upland

MEGM4: Fresh Moist Graminoid Meadow

The fresh moist graminoid meadow is mainly characterized by mineral soil and low growing grass species. Garlic mustard, cow vetch (*Vicia cracca*), goldenrod, blueberry (*Vaccinium sp*.), Bebb's sedge (*Carex bebbi*), reed-canary grass, common teasel, lesser burdock, large-fruited bur-reed, wood sorrel (*Oxalis acetosella*), and other sedge, forb, and grass species are present within this meadow. Serviceberry, hawthorn (*Crataegus spp*.), and European buckthorn present along its periphery. A very small stream also runs through this unit.

MEMM4: Fresh-Moist Mixed Meadow

The fresh-moist mixed meadow is located in an upland area surrounding a pond excavated for agricultural use. The area has disturbed soils and is primarily composed of forb and graminoid species such as reed-canary grass, common milkweed, bird's-foot trefoil, Queen Anne's lace, asters (*Aster spp*.), and common chicory. No trees or shrubs are present.

FODM9-1: Fresh- Moist Oak – Sugar Maple Deciduous Forest

This upland forest interior landscape is surrounded by slough wetlands. Sugar maple, red maple, shagbark hickory, ironwood and swamp white oak compose the canopy of this forest. The understory is composed of fern species (Polypodiidae spp.*),* trout lily, mayapple, garlic mustard, spotted jewelweed, and Canada thistle.

FOMM1-2: Fresh-Moist White Pine-Hardwood Mixed Forest

This raised elevation area compared to the surrounding supports both coniferous and deciduous tree species and associated vegetation. The mineral soil is well drained and mature white pine, sugar maple, and white ash are present within this unit. Trout lily, mayapple, garlic mustard, and Canada thistle are also present.

TAGM1: Fine Mineral Coniferous Plantation

The fine mineral coniferous plantation is a mid-age treed community that reflects the surroundings and historic land use as a tree farm. The canopy is composed exclusively of blue spruce. The dominance within the sub-canopy is roughly divided between blue spruce and gray dogwood. Additional upland species include common teasel, goldenrod species, orchard grass (*Dactylis glomerata)*, broadleaf plantain (*Plantago major)* and common cinquefoil in the understory and as ground cover.

THDM3: Dry-Fresh Deciduous Hedgerow Thicket

This area is located south of the SSA and is situated along a rail bed. It is surrounded by marsh and agricultural fields. It has a raised topography compared to the surrounding landscape and is comprised of hawthorn species, common apple (*Malus pumila*), European buckthorn, amongst others.

Wetland

MAMO1: Graminoid Organic Shallow Marsh

The graminoid organic shallow marsh comprises a small wetland area located adjacent to an agricultural field and on the edge of a forest habitat. Vegetation includes primarily emergent sedge and graminoid species with small willow shrubs located on the periphery of the wetland.

MASO1: Graminoid Organic Shallow Marsh

The graminoid organic shallow marsh is a large wetland area dominated by tall robust vegetation. Standing water was present during multiple field surveys. Species composition is dominated by reed-canary grass, broad leaved water plantain (*Alisma subcordatum*), duckweed, pondweed (*Potamogeton sp*.), Queen Anne's lace, purple loosestrife, and vetch species (*Vicia spp.*).

SWDO3: Organic Deciduous Swamp

Sloughs with deep organic soils are present in most areas of the maple organic deciduous swamp unit. The canopy layer is dominated by red maple, American beech, shagbark hickory, and sugar maple. Small sporadic open water habitats are present, and many wetland sedges, ferns, and aquatic species are present. These include sensitive fern, bracken fern, spotted jewelweed, duckweed, false solomon's seal, narrow-leaved meadowsweet, etc.

SWD: Deciduous Swamp

This swamp is a diverse community comprised of many small tree stands containing deciduous tree species including red maple, shagbark hickory, trembling aspen, ironwood, hawthorn species, and burr oak (*Quercus macrocarpa*). Shrub species include gray dogwood, red osier dogwood, and serviceberry, among others.

SWT: Thicket Swamp

This swamp is a diverse community with small tree stands. It contains small patches of deciduous trees including trembling aspen, red maple, American beech, and ironwood. Shrub species dominate the landscape and include gray dogwood, red osier dogwood, and serviceberry, among others.

SWT02: Willow Organic Deciduous Thicket Swamp

The willow organic deciduous thicket shrub wetland is a small wetland with organic soil and an open water feature surrounded by willow tree and shrub species. This wetland overflows across a farmed field into a marsh wetland during the wet season. Other vegetation includes serviceberry, gray dogwood, duckweed, and graminoid species.

OAW: Open Water

Small open water habitats are present within the LSA, located near agriculture fields. These open water habitats were historically created by farmers for irrigation of crops within the surrounding fields. These ponds are uniform in shape and have little aquatic vegetation present.

3.2.3.2 Flora

A total of 139 vascular plants were identified to species level during field investigations, with one identified to genus (hawthorn [*Crataegus sp.*]). Of the species identified, 87 are native, 52 are non-native. 67 of the native species for

which information is available have S-Ranks[2] of 'S5', indicating they are 'secure' in the province. Virginia creeper, southern water-plantain, American reed, and Black walnut have an S-Rank of 'S4?' indicating they are 'apparently secure' in the province, however some uncertainty about the assigned rank exists. 10 species possess a ranking of S4 indicating that they are uncommon but not rare, with some cause for long-term concern due to declines or other factors.

81 of the native species for which information is available have co-efficient of conservatism[3] (CC) values of 0-6, indicating they are tolerant to moderately tolerant of disturbance. Six species possess a ranking of 7-9 which indicates that they have a low tolerance for disturbance.

No SAR plants were identified during the field investigation.

A list of vascular plant species identified during field investigations is provided in **Appendix C**.

3.2.4 Herpetofauna

Herpetofauna encompasses all amphibians and reptiles. Calling amphibian monitoring was conducted and is further discussed in **Section 3.2.4.1**. Reptile-specific field surveys were not conducted during field investigations. However, the Ontario Reptile and Amphibian Atlas was reviewed, and incidental species observations were recorded at each field visit.

Herptile species identified in the Ontario Reptile and Amphibian Atlas as occurring within the Study Areas include:

- American bullfrog (*Lithobates catesbeianus*)
- American toad (*Anaxyrus americanus*)
- Blanding's turtle (*Emydoidea blandingii*)*
- Blue-spotted salamander (*Ambystoma laterale*)
- Dekay's brownsnake (*Storeria dekayi*)
- Eastern gartersnake (*Thamnophis sirtalis sirtalis*)
- Eastern Milksnake (*Lampropeltis triangulum*)
- Eastern red-backed salamander (*Plethodon cinereus*)
- Eastern ribbonsnake (*Thamnophis sauritus*)
- Gray treefrog (*Hyla versicolor*)
- Green frog (*Lithobates clamitans*)
- Midland painted turtle (*Chrysemys picta marginata*)
- Northern leopard frog (*Lithobates pipiens*)
- Northern map turtle (*Graptemys geographica*)
- Northern watersnake (*Nerodia sipedon sipedon*)
- Red-bellied snake (*Storeria occipitomaculata*)
- Red-spotted newt (*Notophthalmus viridescens viridescens*)
- Smooth greensnake (*Opheodrys vernalis*)
- Snapping turtle (*Chelydra serpentine*)
- Spotted salamander (*Ambystoma maculatum*)

[2] Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario.

[3] Rank of 0 to 10 based on plant's degree of fidelity to a range of synecological parameters: (0-3) Taxa found in a variety of plant communities; (4-6) Taxa typically associated with a specific plant community but tolerate moderate disturbance; (7-8) Taxa associated with a plant community in an advanced successional stage that has undergone minor disturbance; (9-10) Taxa with a high fidelity to a narrow range of synecological parameters (Oldham et al., 1995).

– Spring peeper (*Pseudacris crucifer*)
– Western chorus frog (*Pseudacris triseriata*), Carolinian population
– Wood frog (*Lithobates sylvaticus*)

Note: * denotes historical record (pre-2000)

American bullfrog, eastern gartersnake, eastern milksnake, green frog, northern leopard frog, northern watersnake, eastern red-backed salamander, and red-bellied snake were observed during 2020 – 2022 field investigations. Additional calling amphibians recorded in the LSA are detailed in **Section 3.2.4.1**. Blanding's turtle, snapping turtle, and Dekay's brownsnake were observed during 2013 – 2015 LSA field surveys (GHD 2017).

3.2.4.1 Calling Amphibian Surveys

Six calling amphibian stations were surveyed in the North, East, and West Lands according to the Great Lakes Marsh Monitoring Protocol (BSC 2009) in spring 2022 (**Figure 6**). All stations had detections of calling amphibians. Results of the calling amphibian surveys during 2020 – 2022 can be found in **Appendix D**.

The composition of species detected during the amphibian surveys is representative of the amphibian population in the adjacent areas, where suitable habitat exists. Surveys in the North and East Lands confirmed the presence of American bullfrog, American toad, gray treefrog, green frog, northern leopard frog, spring peeper, and western chorus frog. Surveys in the West Lands confirmed the presence of the same species, with the exception of American bullfrog. In total, eight species of calling amphibians were documented in the LSA.

Each of the species recorded during 2020 – 2022 calling amphibian surveys had been previously documented in the vicinity as part of the *Terrestrial and Aquatic Environment Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment* (GHD 2017). No species listed under the provincial ESA or the federal SARA were recorded during calling amphibian surveys.

3.2.5 Birds

Breeding bird surveys were conducted on June 10, June 27, and July 10, 2022, in the East Lands. A total of 61 species were detected during the surveys, 44 of which displayed evidence of breeding. A list of the species detected with evidence of breeding is provided in **Appendix E**.

The SM1 recorder was deployed in the North Lands from June 10 – July 10, 2022, at the location identified on **Figure 6**. For consistency, the recordings were analyzed by the avian ecologist who completed the in-field breeding bird surveys. A list of all species detected by the SM1 is provided in **Appendix E**. The SM1 could only document presence of singing species and cannot provide visual observation of species.

In total, 71 species of birds were observed in the LSA and SSA during 2022 breeding bird surveys by GHD ecologists. Four of these species are SAR: barn swallow, eastern wood-pewee (*Contopus virens),* Canada warbler (*Cardellina canadensis*), and wood thrush (*Hylocichla mustelina*). Least bittern (*Ixobrychus exilis)* was heard vocalising within the East Lands in 2014 (GHD 2017). This species was not detected during the 2022 surveys within the LSA or SSA. Species at risk are discussed in greater detail in **Section 3.2.8**.

3.2.6 Mammals

Mammal-specific field surveys were not conducted as part of the project, but incidental observations were recorded. During field investigations big brown bat (*Eptesicus fuscus*), eastern cottontail (*Sylvilagus floridanus*), northern raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), white-tailed deer (*Odocoileus virginianus*), and unidentified bats were observed.

3.2.7 Incidental Wildlife Observations

Wildlife observations were collected during each field visit in addition to breeding bird and amphibian surveys. A list of incidental faunal species observations can be found in **Table 3.3**.

Table 3.3 Incidental wildlife observed within the Study Areas from 2020 to 2022

Species Observed		S-Rank	Conservation Status	
Common Name	**Scientific Name**		**SARO**	**SARA**
Amphibians				
American bullfrog	*Lithobates catesbeianus*	S4	N/A	N/A
Red-backed salamander	*Plethodon cinerus*	S5	N/A	N/A
Birds				
American robin	*Turdus migratorius*	S5B	N/A	N/A
American woodcock	*Scolopax minor*	S4B	N/A	N/A
Barn swallow	*Hirundo rustica*	S5	Threatened	Threatened
Canada goose	*Branta canadensis*	S5	N/A	N/A
Chipping sparrow	*Spizella passerina*	S5B	N/A	N/A
Common grackle	*Quiscalus quiscula*	S5B	N/A	N/A
Common yellowthroat	*Geothlypis trichas*	S5B	N/A	N/A
Eastern towhee	*Pipilo erythrophthalmus*	S4B	N/A	N/A
Great blue heron	*Ardea herodias*	S4	N/A	N/A
Gray catbird	*Dumetella carolinensis*	S4B	N/A	N/A
Indigo bunting	*Passerina cyanea*	S4B	N/A	N/A
Killdeer	*Charadrius vociferus*	S5B, S5N	N/A	N/A
Mourning dove	*Zenaida macroura*	S5	N/A	N/A
Northern cardinal	*Cardinalis cardinalis*	S5	N/A	N/A
Red-winged blackbird	*Agelaius phoeniceus*	S4	N/A	N/A
Song sparrow	*Melospiza melodia*	S5B	N/A	N/A
Swamp sparrow	*Melospiza georgiana*	S5B	N/A	N/A
Turkey vulture	*Cathartes aura*	S5B	N/A	N/A
Wild turkey	*Meleagris gallopavo*	S5	N/A	N/A
Yellow warbler	*Setophaga petechia*	S5B	N/A	N/A
Unidentified duck	N/A	N/A	N/A	N/A
Unidentified gull	Laridae spp.	N/A	N/A	N/A
Crustaceans				
Unidentified terrestrial crayfish	N/A	N/A	N/A	N/A
Insects				
Monarch	*Danaus plexippus*	S2N, S4B	Special Concern	Special Concern
Mammals				

Species Observed		S-Rank	Conservation Status	
Common Name	**Scientific Name**		**SARO**	**SARA**
Big brown bat	*Eptesicus fuscus*	S5	N/A	N/A
Eastern cottontail	*Sylvilagus floridanus*	S5	N/A	N/A
Northern raccoon	*Procyon lotor*	S5	N/A	N/A
Red fox	*Vulpes vulpes*	S5	N/A	N/A
Striped skunk	*Mephitis mephitis*	S5	N/A	N/A
White-tailed deer	*Odocoileus virginianus*	S5	N/A	N/A
Unidentified bat	N/A	N/A	N/A	N/A
Reptiles				
Eastern gartersnake	*Thamnophis sirtalis sirtalis*	S5	N/A	N/A
Eastern milksnake	*Lampropeltis triangulum*	S4	N/A	N/A
Northern watersnake	*Nerodia sipedon sipedon*	S5	N/A	N/A
Red-bellied snake	*Storeria occipitomaculata*	S5	N/A	N/A
Notes				
S-Rank: Sub-national Rank S2: Very rare in Ontario; usually between 5-20 occurrences S4: Common in Ontario: apparently secure, usually more than 100 occurrences S5: Very common in Ontario, demonstrably secure B: Breeding species N: Non-breeding species SARO: Species at Risk in Ontario (provincial) SARA: Species at Risk Act (federal)				

3.2.8 Species at Risk

Numerous SAR have been observed within the Study Areas or have been flagged through agency correspondence or background review as having the potential occur within the Study Areas (**Table 3.4**). Incidental observations of all species, including any SAR encountered, were collected during field investigations and were detailed previously in **Table 3.3**. SAR species-specific surveys were not completed for a number of reasons including:

– Natural areas within the SSA are very small and limited to a small section of the southern boundary of the SSA. This area provides little available habitat for any of the listed SAR based on its proximity to the Site operations, small size, and presence of a chain link fence at the SSA boundary.

– Mitigation measures currently in place to dissuade wildlife access/use of the landfill property include:

- Chain link fence is present around the perimeter of the property which dissuades larger reptile and mammal access to the SSA
- Silt fence along the perimeter of the property is an effective deterrent for small reptiles, mammals, and amphibian access to the SSA
- Daily landfilling activities (e.g., noise, human presence, heavy machinery) also provide deterrents for use of the SSA by wildlife

Operational practices (i.e., daily cover) further act to deter wildlife use of the SSA.

Table 3.4 Species at Risk Summary

Species		Observed within the Local Study Area	Conservation Status	
Common Name	**Scientific Name**		**SARO**	**SARA**
Birds				
Bank swallow	*Riparia riparia*	No	Threatened	Threatened
Barn swallow	*Hirundo rustica*	Yes*	Threatened	Threatened
Bobolink	*Dolichonyx oryzivorus*	No	Threatened	Threatened
Canada warbler	*Cardellina canadensis*	Yes	Special Concern	Threatened
Cerulean warbler	*Setophaga cerulea*	No	Threatened	Endangered
Chimney swift	*Chaetura pelagica*	No	Threatened	Threatened
Eastern meadowlark	*Sturnella magna*	No	Threatened	Threatened
Eastern wood-pewee	*Contopus virens*	Yes	Special Concern	Special Concern
Golden-winged warbler	*Vermivora chrysoptera*	No	Special Concern	Threatened
Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum pratensis*	No	Special Concern	Special Concern
Least bittern	*Ixobrychus exilis*	Yes^	Threatened	Threatened
Red-headed woodpecker	*Melanerpes erythrocephalus*	No	Endangered	Endangered
Wood thrush	*Hylocichla mustelina*	Yes	Special Concern	Threatened
Yellow-breasted chat	*Icteria virens*	No	Endangered	Endangered
Insects				
Monarch	*Danaus plexippus*	Yes	Special Concern	Special Concern
Mammals				
Eastern small-footed myotis	*Myotis leibii*	No	Endangered	N/A
Little brown myotis	*Myotis lucifugus*	No	Endangered	Endangered
Northern myotis	*Myotis septentrionalis*	No	Endangered	Endangered
Tri-coloured bat	*Perimyotis subflavus*	No	Endangered	Endangered
Reptiles				
Blanding's turtle – Great Lakes/St. Lawrence population	*Emydoidea blandingii*	Yes^	Threatened	Threatened
Eastern ribbonsnake	*Thamnophis sauritus*	No	Special Concern	Special Concern
Midland painted turtle	*Chrysemys picta marginata*	No	Under consideration	Special Concern
Eastern milksnake	*Lampropeltis triangulum*	Yes*	Not at risk	Special Concern
Northern map turtle	*Graptemys geographica*	No	Special Concern	Special Concern
Snapping turtle	*Chelydra serpentina*	Yes^	Special Concern	Special Concern
Vascular Plants				
American chestnut	*Castanea dentata*	No	Endangered	Endangered
Black ash	*Fraxinus nigra*	Yes^	Endangered	N/A
Butternut	*Juglans cinerea*	No	Endangered	Endangered
Eastern flowering dogwood	*Cornus florida*	No	Endangered	Endangered

Species		Observed within the Local Study Area	Conservation Status	
Common Name	Scientific Name		SARO	SARA
Notes				
* Observed within the SSA ^ Observed within the LSA during 2013 – 2015 surveys (GHD 2017) SARO: Species at Risk in Ontario (provincial) SARA: Species at Risk Act (federal)				

Background review found 29 SAR which have historically been recorded in the Study Areas. Twenty-four species with a moderate or high likelihood of occurrence within the LSA are discussed further. The complete list of SAR and their potential to occur is provided in **Appendix F**.

3.2.8.1 Endangered Species

Birds

Red-headed woodpecker (*Melanerpes erythrocephalus*) is a provincially and federally designated endangered species with a moderate likelihood of occurrence within the LSA due to suitable habitat being present.

Yellow-breasted chat (*Icteria virens virens*) is a provincially and federally endangered species and has a moderate likelihood of occurrence as suitable habitat is present within the LSA.

Mammals

Little brown myotis (*Myotis lucifugus*), tri-colored bat (*Perimyotis subflavus*), and northern myotis (*Myotis septentrionalis*) are all provincially and federally endangered species with a high likelihood of occurrence within the LSA due to the presence of suitable habitat (i.e., trees for roosting). Eastern small-footed myotis (*Myotis leibii*) is provincially endangered, not listed federally, and has a moderate likelihood of occurrence within the LSA due to suitable habitat (i.e., rocky areas for roosting) potentially being present.

Vascular Plants

American chestnut (*Castanea dentata*) is listed as endangered provincially and federally. This species has a moderate likelihood of occurrence as suitable habitat is present within the LSA; however, was not detected during any of the field investigations.

Black ash (*Fraxinus nigra*) is listed as endangered provincially and not listed federally. Protection under the ESA has been suspended until January 26, 2024, under O. Reg 23/22 in order to document a proper approach and consultation with all parties. This species was observed by GHD in 2016 in the LSA and has a moderate likelihood of occurrence as suitable habitat is present; however, was not detected during any of the field investigations within the SSA.

Butternut (*Juglans cinerea) is a provincially and federally endangered species.* Butternut has a moderate likelihood of occurrence as suitable habitat is present within the LSA; however, was not detected during any of the field investigations.

Eastern flowering dogwood (*Cornus florida) is a provincially and federally endangered species.* Eastern flowering dogwood has a moderate likelihood of occurrence as suitable habitat is present within the LSA; however, was not detected during any of the field investigations.

3.2.8.2 Threatened Species

Birds

Bank swallow (*Riparia riparia*) is a provincially and federally threatened species. They have a moderate likelihood of occurrence as potentially suitable habitat is present within the LSA.

Barn swallow (*Hirundo rustica*) is a provincially and federally threatened species. Barn swallows were observed throughout the Study Areas on multiple occasions and have a high likelihood of occurrence within the Study Areas due to suitable foraging habitat.

Cerulean warbler (*Setophaga cerulea)* is a provincially threatened and federally endangered species with a moderate likelihood of occurrence within the LSA due to the presence of potentially suitable habitat.

Least bittern (*Ixobrychus exilis*) is a provincially and federally threatened species with a high likelihood of occurrence within the LSA due to the presence of suitable habitat. Least bittern was observed vocalising in the East Lands during 2014 surveys (GHD 2017).

Reptiles

Blanding's turtle (*Emydoidea blandingii*) is a provincially and federally threatened species. A Blanding's turtle was observed on Brooks Road in the vicinity of the entrance of the landfill, on June 12, 2014, during wetland delineation with GRCA (GHD 2017). This species has a high likelihood of occurrence within the LSA due to suitable habitat being present.

3.2.8.3 Special Concern Species

These species do not receive protection under the ESA or SARA; however, populations and habitats of ESA-listed special concern species may be considered Significant Wildlife Habitat. Impacts to these species should be avoided where possible by avoiding natural habitat features beyond the SSA.

Birds

Canada warbler (*Cardellina canadensis*) is a provincially designated special concern species, and a federally designated threatened species. Canada warbler was detected in the North Lands via the SM1 and has a high likelihood of occurrence within the LSA.

Eastern wood-pewee (*Contopus virens*) is a provincially and federally designated special concern species. Eastern wood-pewee was detected on multiple occurrences during the breeding bird surveys. This species has a high likelihood of occurrence due to suitable habitat being present within the LSA.

Wood thrush (*Hylocichla mustelina*) is a provincially designated special concern species, and a federally designated threatened species. Wood thrushes were detected on during the breeding bird surveys and SM1 audio recordings. They have a high likelihood of occurrence within the LSA due to suitable habitat being present.

Insects

Monarch (*Danaus plexippus*) is listed as special concern provincially and federally and was observed within the LSA. This species is considered to have a high likelihood of occurring as their larval foodplant, common milkweed, is present within the Study Areas.

Reptiles

Eastern ribbonsnake (*Thamnophis sauritus*) are a provincially and federally designated special concern species. *They* have a high likelihood of occurrence as suitable habitat is present within the LSA.

Midland painted turtle (*Chrysemys picta marginata*) is a federally designated special concern species and is currently under consideration for provincial designation. Midland painted turtles have a high likelihood of occurrence within the LSA as suitable habitat is present.

Eastern milksnake (*Lampropeltis triangulum*) is listed as not at risk provincially but is listed as special concern federally. Eastern milksnake was observed within the SSA and have a high likelihood of occurring within the LSA due to suitable habitat being present. Wildlife exclusion fencing has since been installed to limit the presence of wildlife within the SSA and is maintained as part of mitigation measures associated with the 2019 facility expansion (Notice of Approval EA File number 03-08-02 (Approval), issued in 2019 under the *Environmental Assessment Act*).

Northern map turtle (*Graptemys geographica)* is listed as special concern provincially and federally. This species has a high likelihood of occurring within the LSA due to suitable habitat being present.

Snapping turtle (*Chelydra serpentina)* is listed as special concern provincially and federally. A snapping turtle was observed within the LSA during 2013 field investigations (GHD 2017) and has a high likelihood of occurring within the LSA due to suitable habitat being present.

3.3 Summary of Existing Conditions

The LSA is a mix of agricultural, woodlands, wetlands and roads, the features of which have been investigated or characterized as required for various Site development activities of the past 10 years. Updated habitat characterization and species information has been completed to support the proposed capacity expansion Streamlined EA. This *Natural Environment Assessment Report* has presented the existing conditions of the natural environment including vegetation communities and flora, wildlife, species of conservation concern and SAR, and designated areas within the Study Areas.

Within the SSA and LSA there are provincially significant wetlands (North Cayuga Swamp Wetland Complex), white-tailed deer wintering areas, and lands regulated by the GRCA and the NPCA. Within the LSA there is also an ANSI (North Cayuga Slough Forest). Thirty-nine ecological land classification community classes are represented within the LSA and include aquatic, swamp, marsh, meadow, thicket, forest, transportation and utilities, and cultural systems. Species composition consists of common native and non-native trees, shrubs, and herbaceous species.

Targeted surveys for calling amphibians and breeding birds were conducted, with observed incidental species recorded during every field visit. Through these surveys, several provincially listed SAR were recorded:

– Barn swallow (*Hirundo rustica*) – threatened
– Black ash (*Fraxinus nigra*) – endangered (observed in LSA during 2016 surveys [GHD 2017])
– Blanding's turtle (*Emydoidea blandingii*) – threatened (observed in LSA during 2014 surveys [GHD 2017])
– Canada warbler (*Cardellina canadensis*) – special concern
– Eastern wood-pewee (*Contopus virens*) – special concern
– Least bittern (*Ixobrychus exilis*) – threatened (observed in LSA during 2014 surveys [GHD 2017])
– Monarch (*Danaus plexippus*) – special concern
– Snapping turtle (*Chelydra serpentina*) – special concern (observed in LSA during 2013 surveys [GHD 2017])
– Wood thrush (*Hylocichla mustelina*) – special concern

Numerous other SAR species have the potential to use habitats within the Study Areas. Endangered or threatened species such as red-headed woodpecker, yellow-breasted chat, SAR bats, American chestnut, black ash, butternut, eastern flowering dogwood, bank swallow, bank swallow, cerulean warbler, least bittern, and Blanding's turtle have requirements under the ESA and the SARA. Provincial special concern species such as Canada warbler, eastern wood-pewee, wood thrush, monarch, eastern ribbonsnake, northern map turtle, and snapping turtle, and their populations and habitats may qualify as Significant Wildlife Habitat.

4. Potential Effects, Mitigation Measures & Net Effects

A Project Description, which includes proposed engineering design figures, was prepared so that potential environmental effects and mitigation measures could be identified. The following subsections provide a general summary of the proposed undertaking.

4.1 Description of Project Components and Activities

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This would be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours, as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours. The former railway property would continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in **Table 4.1**.

Table 4.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted by 30 m. East and west ditches will extend to maintain full perimeter ditch.
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Methodology and Investigations

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2** of this report.

4.2.1 Net Effects Assessment Methodology

The assessment of the proposed capacity expansion was conducted in two steps:

– **Step 1: Confirm Screening Criteria and Indicators/Measures**
Prior to undertaking the net effects assessment, the Natural Environment screening criteria, indicators, and measures were reviewed and confirmed for application to the proposed capacity expansion.

– **Step 2: Undertake the Net Effects Analysis**
With the screening criteria, indicators, and measures confirmed through the preceding step, a net effects analysis of the proposed capacity expansion was carried out consisting of the following activities:

- Identify potential effects (based on measures) on the Natural Environment;
- Develop and apply avoidance/mitigation/compensation/enhancement measures; and
- Determine net effects on the Natural Environment.

4.2.2 General Assumptions

The following evaluation was carried out under the assumption that the September 2022 Design and Operations Report (GHD 2022) for the Brooks Road Landfill Site depicts the most up-to-date conceptual design for the proposed capacity expansion. Should the conceptual design change, the need for mitigation and the potential for net effects would need to be reassessed.

4.2.3 Screening Criteria and Indicators

Table 4.2 presents the screening criteria and indicators relevant to the Natural Environment.

Table 4.2 Screening Criteria and Indicators Relative to the Natural Environment

Screening Criteria	Indicators	Rationale	Data Sources
Negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat	– Predicted impact on flora and fauna including rare (vulnerable), threatened, or endangered species – Predicted impact on flora and fauna habitat (terrestrial and aquatic)	Increased capacity of the landfill may disturb the functioning of natural flora and fauna habitats (terrestrial and aquatic), including rare, threatened, or endangered species	– Site surveys – Published data sources
Negative effects on designated wetlands	– Predicted changes in water quality – Predicted impact on wetland habitat – Predicted impact on flora and fauna	Increased capacity of the landfill may disturb the functioning of designated wetlands and other aquatic habitats and species, including rare, threatened, or endangered species	– Site surveys – Published data sources

Screening Criteria	Indicators	Rationale	Data Sources
Negative effects on wildlife habitat, populations, corridors, or movement	– Predicted impact on wildlife habitat – Predicted impact on wildlife populations – Predicted impact on habitat linkages within the Local Study Area	Increased capacity of the landfill may disturb the functioning of natural wildlife habitats, cause a population increase or decrease, or impact habitat linkages (affecting wildlife corridors or movement)	– Site surveys – Published data sources

4.3 Natural Environment Net Effects

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a "Yes" answer was given in the Screening Criteria Checklist) for those Natural Environment criteria which might be affected by the project as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Areas would change as a result of the construction and operation of the proposed undertaking.

As described in **Section 2** (**Table 2.1**), a “Yes” was applied to the following Natural Environment criteria:

– Cause negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat?
– Cause negative effects on designated wetlands?
– Cause negative effects on wildlife habitat, populations, corridors, or movement?

With respect to the above criteria, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.3.1 Potential Effects on the Natural Environment

4.3.1.1 Cause Negative Effects on Rare (Vulnerable), Threatened or Endangered Species of Flora or Fauna or their Habitat

There are several rare (vulnerable), threatened or endangered species of flora and fauna or their habitat within the LSA and/or SSA. The proposed capacity expansion could have a negative effect on these species and/or habitats, potentially causing the species to become extirpated (i.e., locally extinct).

4.3.1.2 Cause Negative Effects on Designated Wetlands

The proposed capacity expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on designated wetlands. PSWs are present on all sides of the Site and are also located within the southeastern boundary of the SSA. The proposed capacity expansion could cause negative effects to the PSWs through changes in water quality, impacts to wetland habitat, and impacts to flora and fauna species.

4.3.1.3 Cause Negative Effects on Wildlife Habitat, Populations, Corridors, or Movement

The proposed capacity expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on wildlife habitats, populations, corridors, or movements. The MNRF’s NHIC mapping delineates Wildlife Activity Area (WAA; white-tailed deer wintering area) throughout most of the SSA and LSA. The proposed capacity expansion will not reduce the available WAA.

4.3.2 Mitigation Measures

There are a number of existing mitigation measures in place to dissuade wildlife access to the existing landfill Site and to prevent human/wildlife conflicts. Chain link fence is present around the perimeter of the property, which dissuades larger reptile and mammal access to the Site. Based on the proximity to the PSW, a wildlife exclusion fence was installed in December 2021 within the chainlink fence as an effective deterrent for small reptile, amphibian, and mammal access to the Site. Also, in December 2021, a new silt fence was installed along the northern perimeter of the property and at several locations around the Site where run-off potential is high. There are also very limited natural areas on the landfill Site itself and daily landfilling activities (e.g., noise, human presence, heavy machinery) also provide deterrents for wildlife use of the Site. Other operational practices (i.e., daily cover) further act to deter wildlife use of the Site.

General Best Management Practices (BMPs) for continued operation of the landfill should include:

– Notify Site operators and delivery contractors of the presence of reptiles and amphibians in the surrounding areas. This includes visual identification tools for SAR common to the area.
– Any wildlife incidentally encountered during Site operation activities will not be knowingly harmed and will be allowed to move away from the area on its own if at all possible.
– In the event that an animal encountered during Site operation activities does not move from the area, or is injured, the Site Supervisor will be notified.
– In the event that the animal is a known or suspected SAR, the Site Supervisor will contact MNRF SAR biologists for advice.
– Wildlife exclusion fence and erosion and sediment controls shall be maintained until all disturbed areas of the Site, including the pond and swales, have fully stabilized and vegetated areas have achieved 70 percent of the native background density of growth. The condition of all swales, culverts, vegetation, infiltration basin outlet, and outflow channels leading to the Brooks Road drainage ditch and off Site will be noted at regular intervals.

4.3.3 Net Effects

The proposed capacity expansion will migrate the northern landfill perimeter north by approximately 30 m. This land is already within the Site boundary and within the chainlink, wildlife exclusion, and silt fences; as such, net effects are anticipated to be negligible. **Table 4.3** details the potential effects, mitigation measures, and net effects on the Natural Environment.

Table 4.3 Natural Environment Potential Effects, Mitigation Measures, and Net Effects

Screening Criteria	Indicators	Potential Effects	Mitigation Measures	Net Effects
Negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat	Predicted impact on flora and fauna including rare (vulnerable), threatened, or endangered species	Potential to cause species to become extirpated (i.e., locally extinct)	Chainlink and wildlife exclusion fence to prevent fauna entering Site No clearing to be conducted outside of the Site boundary	No net effects to flora and fauna within the Site and Local Study Areas
	Predicted impact on flora and fauna habitat	Clearing and grubbing may cause destruction to flora and fauna habitat	No clearing or grubbing to be conducted outside of the Site boundary	No net effects to flora and fauna habitat within the Site and Local Study Areas

Screening Criteria	Indicators	Potential Effects	Mitigation Measures	Net Effects
Negative effects on designated wetlands	Predicted changes in water quality	Water quality could deteriorate with the migration of sediment from the landfill into the wetland	Silt fence is installed in areas of possible sediment migration	No net effects to water quality in designated wetlands within the Site and Local Study Areas
	Predicted impact on wetland habitat	Wetland habitat could deteriorate with the migration of sediment from the landfill into the wetland	Silt fence is installed in areas of possible sediment migration	No net effects to wetland habitat in designated wetlands within the Site and Local Study Areas
	Predicted impact on flora and fauna	Migration of sediment from the landfill into the wetland may have a negative impact on flora and fauna	Silt fence is installed in areas of possible sediment migration	No net effects to flora and fauna in designated wetlands within the Site and Local Study Areas
Negative effects on wildlife habitat, populations, corridors, or movement	Predicted impact on wildlife habitat	WAA (white-tailed deer wintering area) is present throughout most of the SSA and LSA and the increased footprint may reduce the available WAA	Existing chainlink and wildlife exclusion fence prevent fauna entering Site. The proposed expansion is confined to the fenced Site	No net effects on wildlife habitat within the Site and Local Study Areas
	Predicted impact on wildlife populations	The proposed capacity increase may lead to reduced or increased wildlife populations	The proposed expansion is confined to the existing Site boundary	No net effects on wildlife populations within the Site and Local Study Areas
	Predicted impact on habitat linkages within the Local Study Area	The proposed capacity increase may impact habitat linkages in the Local Study Area	The proposed expansion is confined to the existing Site boundary	No net effects on habitat linkages within the Site and Local Study Areas

5. Monitoring Requirements and Additional Approvals

To ensure that the mitigation measures identified in **Section 4** are implemented as envisioned, a strategy and schedule was developed for monitoring environmental effects. With these mitigation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the proposed undertaking.

5.1 Monitoring Requirements

5.1.1 Calling Amphibian Monitoring

Calling amphibians are recommended to be monitored annually to confirm there is no migration of sediment from the proposed capacity expansion (i.e., from grading throughout the SSA, capping of the landfill) is not causing negative impacts to the wildlife inhabiting the surrounding wetlands. Monitoring should focus on Locations 1 through 4, as the potential impacts to the natural environment at Locations 5 and 6 are considered to be negligible given their distance from the SSA. These annual monitoring events should be conducted during Year 1, Year 2, and every three years following for a minimum of 4 monitoring events, commencing in the first year of construction. When conducted in

accordance with the Marsh Monitoring Protocol (BSC 2009), the results will build upon the findings detailed in **Section 3.2.4.1**.

5.1.2 Surface Water Quality Monitoring

The Site currently implements a surface water monitoring program based on the requirement of ECA No. A110302. The surface water monitoring program includes water quality monitoring and surface water flow measurements. This program consists of a network of nine monitoring stations (one on-Site and eight off-Site) indicated in **Figure 6** and is conducted to confirm run-off is not causing negative impacts to the wetland. Water quality monitoring and surface water flow measurements at all of the surface water stations take place on a quarterly basis (generally March, May, August, December) with an attempt to correlate the surface water monitoring with rainfall events. Continuation of this program provides a reasonable monitoring effort for potential effects monitoring. Further information on surface water quality monitoring is available in the *Design and Operations Report* (GHD 2022).

5.1.3 Fencing Inspections

The following measures will be conducted to mitigate potential effects associated with the perimeter wildlife exclusion/silt fence and confirm that it is effective:

– Routine inspections of the integrity of the perimeter wildlife exclusion/silt fence. Inspections are to be conducted quarterly with copies of the inspection reports maintained on-Site for 2 years
– Incidental observations of wildlife exclusion/silt fence or perimeter chainlink fence disrepair and/or evidence of wildlife attempting to enter the SSA should be reported immediately to the Site Supervisor or Site Manager and addressed in a timely fashion
– Any fencing disrepair is to be addressed by BRE in a timely fashion

5.2 Additional Approvals

No additional approvals are anticipated for Natural Environment outside of the EA process.

6. Conclusion

The provincially significant North Cayuga Swamp Wetland Complex, white-tailed deer wintering areas and lands regulated by the GRCA and the NPCA are present within the LSA and SSA. The North Cayuga Slough Forest (ANSI) is also present within the LSA.

The Study Areas present at Brooks Road Landfill have historically contained numerous SAR species, with several provincially listed SAR species recorded within the LSA and/or SSA. Several Endangered or Threatened SAR species have the potential to use habitats within the Study Areas and have requirements under the ESA and the SARA. Provincial special concern species and their populations and habitats may qualify as Significant Wildlife Habitat.

The proposed capacity expansion will migrate the northern active landfill perimeter north by approximately 30 m. Given that land is already within the Site boundary and subject to mitigation measures (i.e., chainlink, wildlife exclusion, and silt fences), net effects are anticipated to be negligible.

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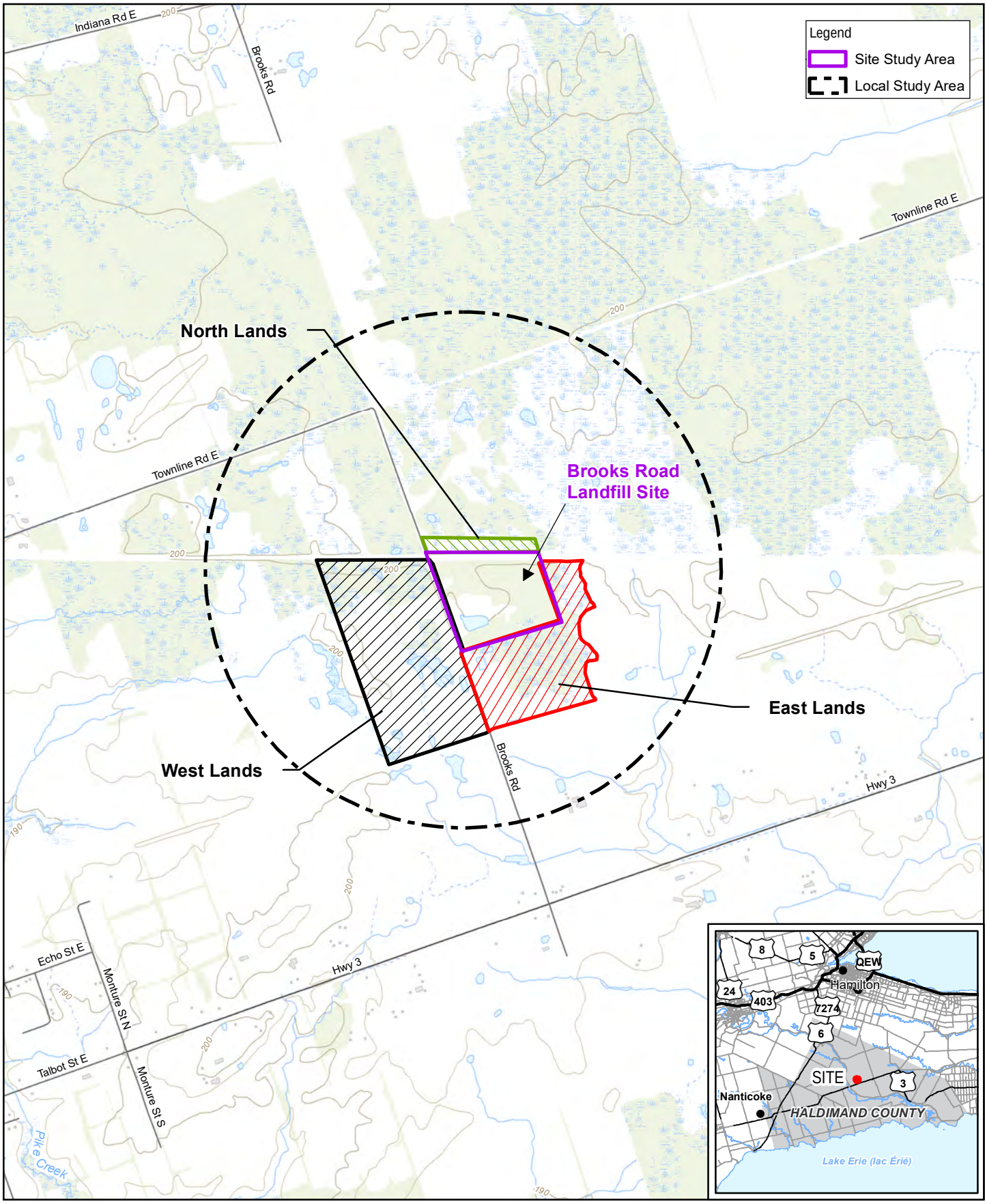
Figures



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GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

Project No. 12561524
Revision No. -
Date Dec 8, 2022

SITE LOCATION MAP

FIGURE 2

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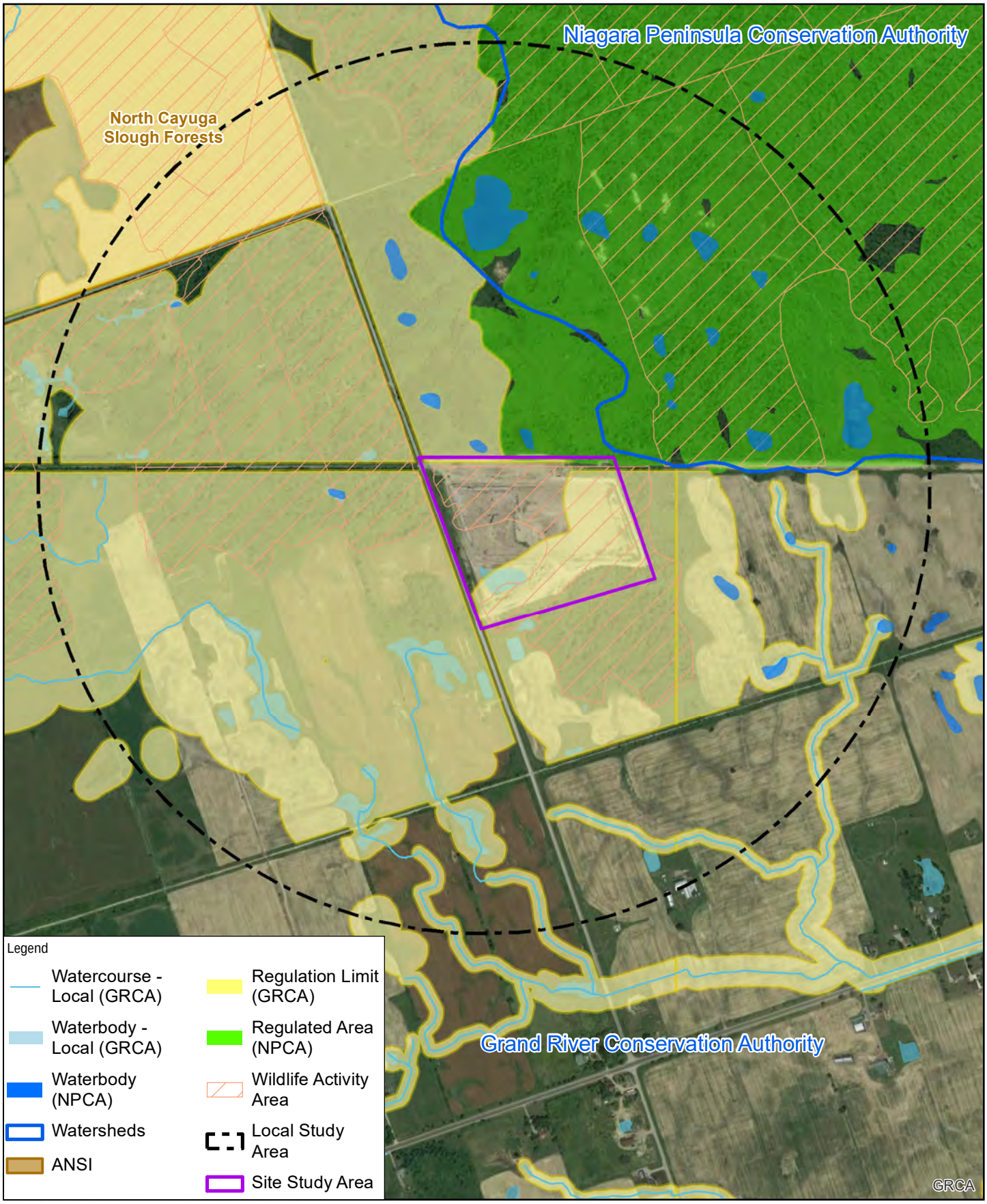

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

DESIGNATED AREAS

Project No. 12561524
Revision No. -
Date Dec 8, 2022

FIGURE 3

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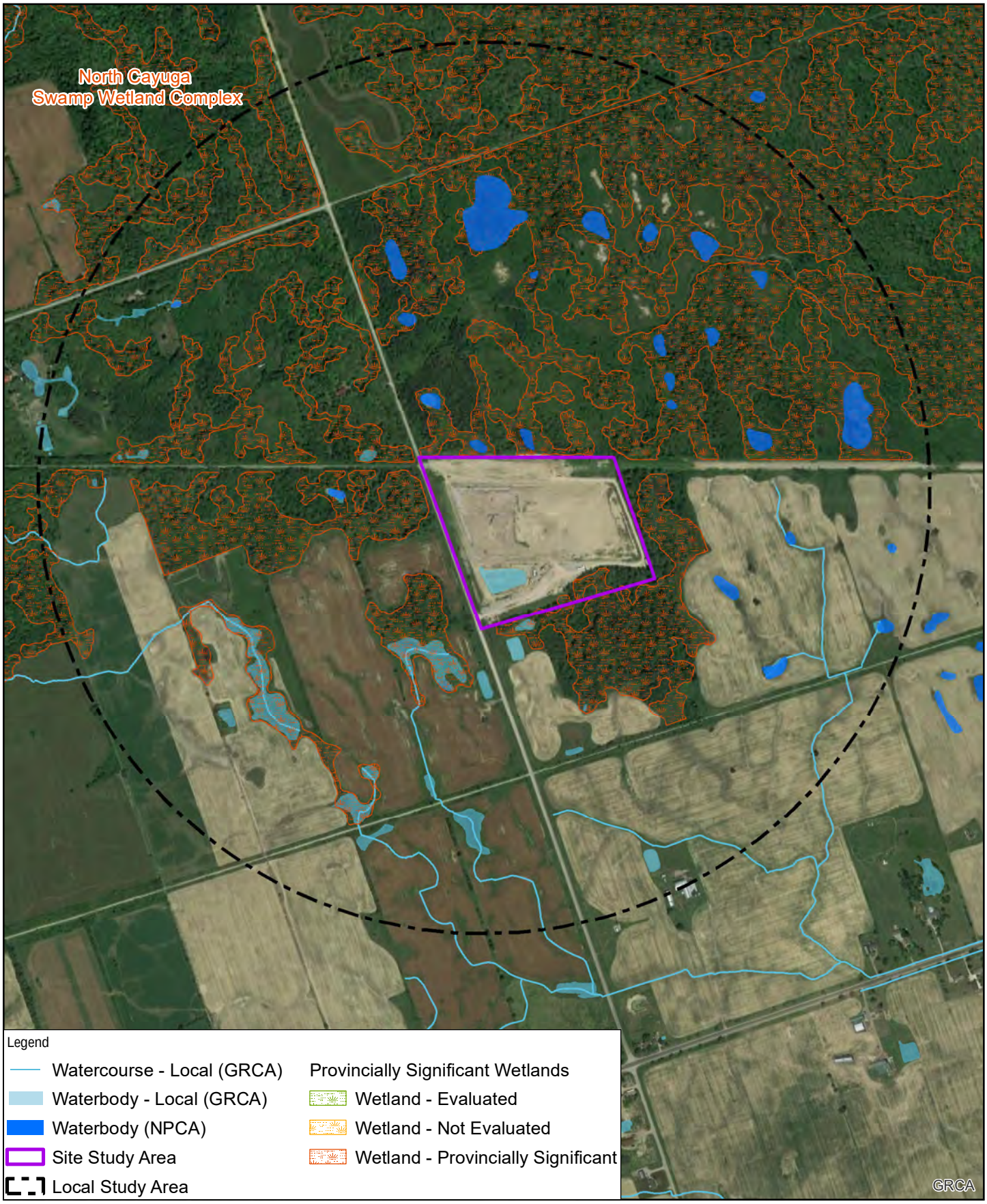

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BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

Project No. 12561524
Revision No. -
Date Dec 8, 2022

PROVINCIALLY SIGNIFICANT WETLANDS

FIGURE 4

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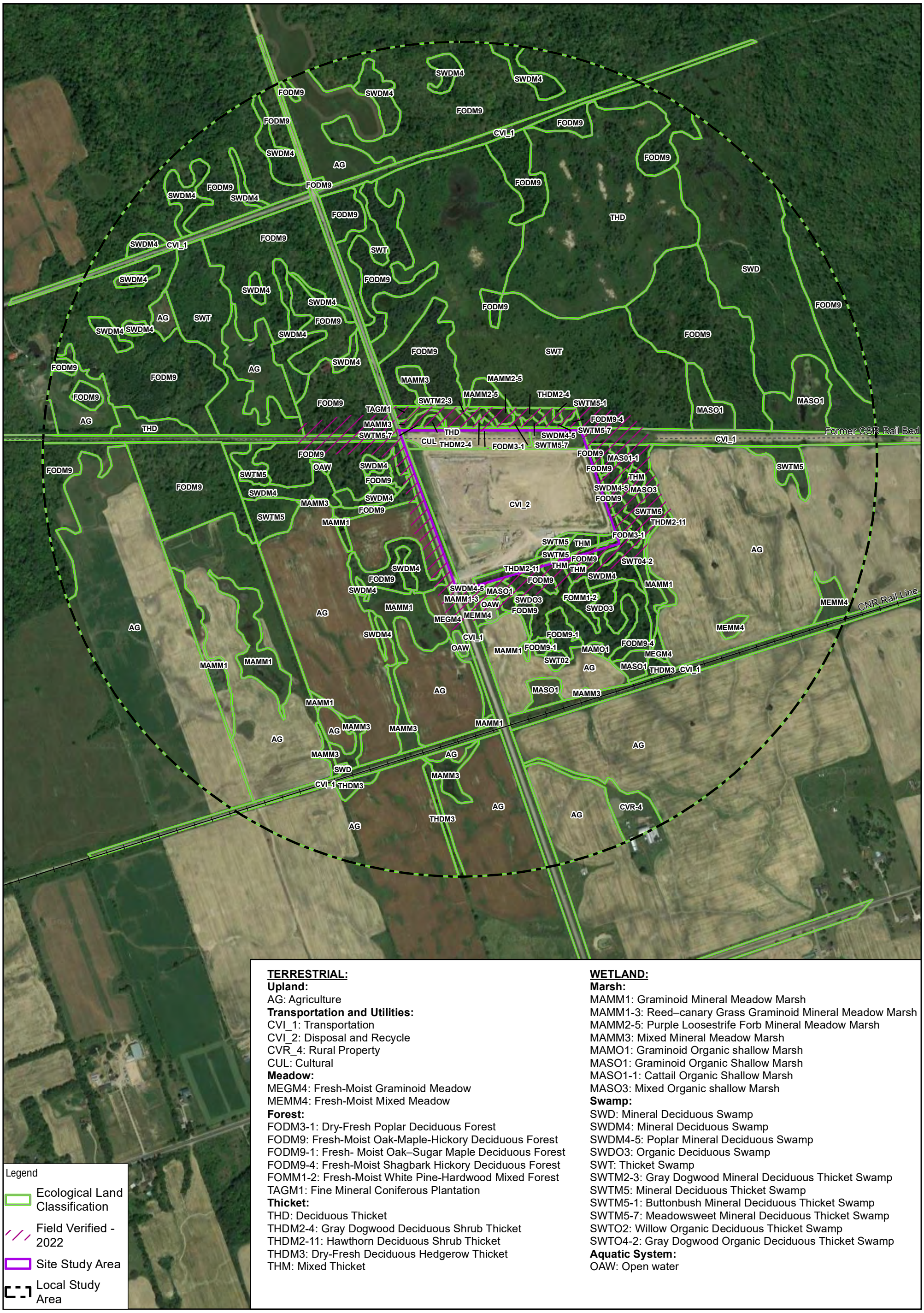


TERRESTRIAL:

Upland:
AG: Agriculture

Transportation and Utilities:
CVI_1: Transportation
CVI_2: Disposal and Recycle
CVR_4: Rural Property
CUL: Cultural

Meadow:
MEGM4: Fresh-Moist Graminoid Meadow
MEMM4: Fresh-Moist Mixed Meadow

Forest:
FODM3-1: Dry-Fresh Poplar Deciduous Forest
FODM9: Fresh-Moist Oak-Maple-Hickory Deciduous Forest
FODM9-1: Fresh- Moist Oak–Sugar Maple Deciduous Forest
FODM9-4: Fresh-Moist Shagbark Hickory Deciduous Forest
FOMM1-2: Fresh-Moist White Pine-Hardwood Mixed Forest
TAGM1: Fine Mineral Coniferous Plantation

Thicket:
THD: Deciduous Thicket
THDM2-4: Gray Dogwood Deciduous Shrub Thicket
THDM2-11: Hawthorn Deciduous Shrub Thicket
THDM3: Dry-Fresh Deciduous Hedgerow Thicket
THM: Mixed Thicket

WETLAND:

Marsh:
MAMM1: Graminoid Mineral Meadow Marsh
MAMM1-3: Reed–canary Grass Graminoid Mineral Meadow Marsh
MAMM2-5: Purple Loosestrife Forb Mineral Meadow Marsh
MAMM3: Mixed Mineral Meadow Marsh
MAMO1: Graminoid Organic shallow Marsh
MASO1: Graminoid Organic Shallow Marsh
MASO1-1: Cattail Organic Shallow Marsh
MASO3: Mixed Organic shallow Marsh

Swamp:
SWD: Mineral Deciduous Swamp
SWDM4: Mineral Deciduous Swamp
SWDM4-5: Poplar Mineral Deciduous Swamp
SWDO3: Organic Deciduous Swamp
SWT: Thicket Swamp
SWTM2-3: Gray Dogwood Mineral Deciduous Thicket Swamp
SWTM5: Mineral Deciduous Thicket Swamp
SWTM5-1: Buttonbush Mineral Deciduous Thicket Swamp
SWTM5-7: Meadowsweet Mineral Deciduous Thicket Swamp
SWTO2: Willow Organic Deciduous Thicket Swamp
SWTO4-2: Gray Dogwood Organic Deciduous Thicket Swamp

Aquatic System:
OAW: Open water

Paper Size ANSI B
0 50 100 150 200
Meters
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

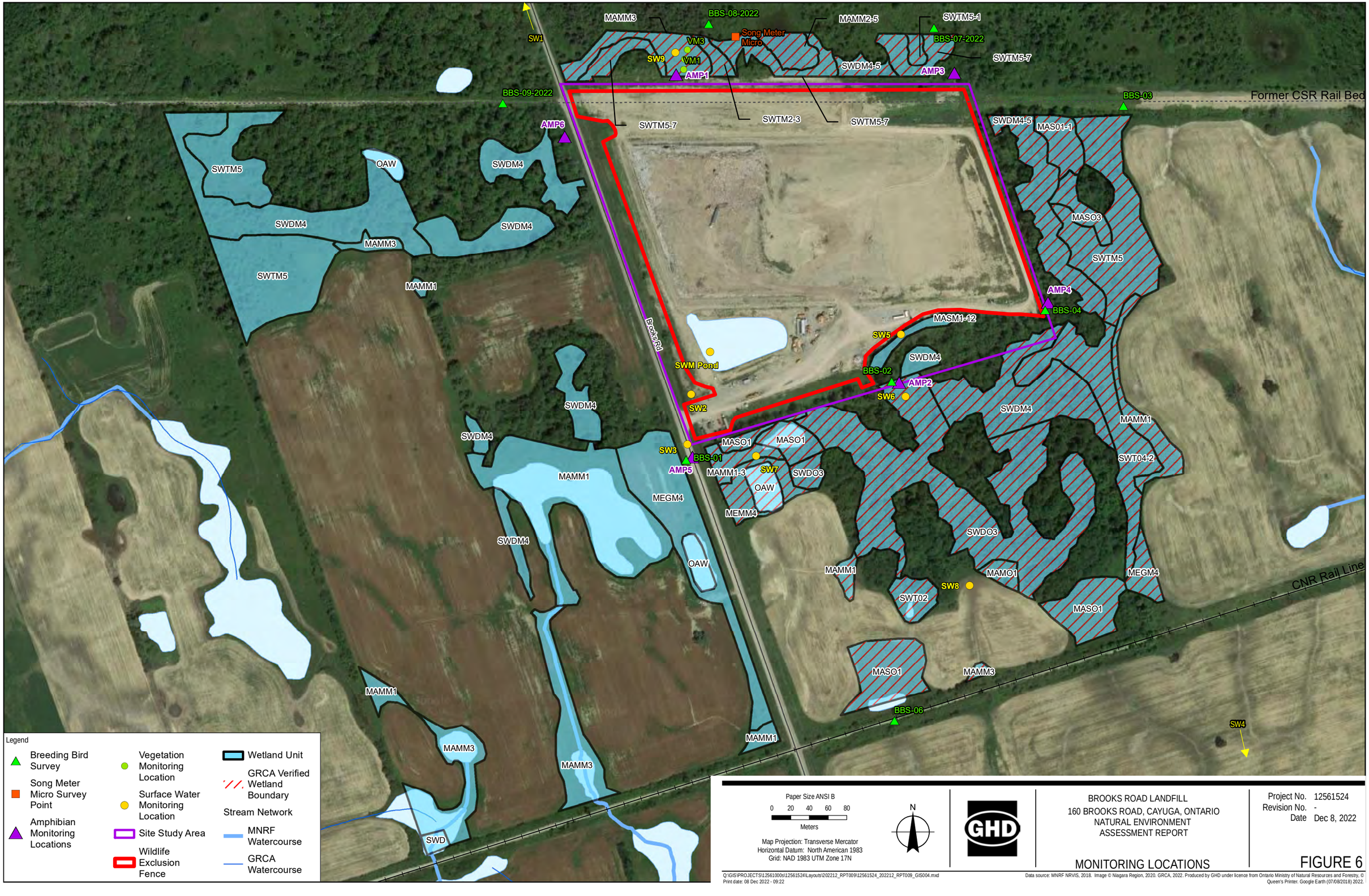
BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT

ECOLOGICAL LAND CLASSIFICATION

Project No. 12561524
Revision No. -
Date Dec 8, 2022

FIGURE 5

Q:\GIS\PROJECTS\12561000s\12561524\Layouts\202212_RPT009\12561524_202212_RPT009_GIS005.mxd
Print date: 08 Dec 2022 - 09:24


SW1
MAMM3
BBS-08-2022
MAMM2-5
SWTM5-1
Song Meter Micro
VM3
BBS-07-2022
SW9
VM1
SWTM5-7
AMP1
SWDM4-5
AMP3
BBS-09-2022
BBS-03
Former CSR Rail Bed
AMP6
SWTM5-7
SWTM2-3
SWTM5-7
SWDM4-5
MAS01-1
SWTM5
OAW
SWDM4
SWDM4
SWDM4
MASO3
MAMM3
SWTM5
SWTM5
MAMM1
AMP4
BBS-04
MASM1-12
Brooks Rd
SW5
SWM Pond
SWDM4
BBS-02
AMP2
SW6
SW2
SWDM4
SWDM4
MAMM1
MASO1
MASO1
SW3
BBS-01
SWT04-2
AMP5
MAMM1-3
SW7
SWDO3
OAW
MEGM4
MEMM4
SWDO3
SWDM4
OAW
MAMM1
MAMO1
MEGM4
SW8
CNR Rail Line
SWT02
MASO1
MASO1
MAMM3
BBS-06
SW4
MAMM1
MAMM3
MAMM3
MAMM1
SWD
Legend
Breeding Bird Survey
Song Meter Micro Survey Point
Amphibian Monitoring Locations
Vegetation Monitoring Location
Surface Water Monitoring Location
Site Study Area
Wildlife Exclusion Fence
Wetland Unit
GRCA Verified Wetland Boundary
Stream Network
MNRF Watercourse
GRCA Watercourse
Paper Size ANSI B
0 20 40 60 80
Meters
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N
N
GHD
BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
NATURAL ENVIRONMENT
ASSESSMENT REPORT
MONITORING LOCATIONS
Project No. 12561524
Revision No. -
Date Dec 8, 2022
FIGURE 6
Q:\GIS\PROJECTS\12561000s\12561524\Layouts\202212_RPT009\12561524_202212_RPT009_GIS004.mxd
Print date: 08 Dec 2022 - 09:22
Data source: MNRF NRVIS, 2018. Image © Niagara Region, 2020. GRCA, 2022. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer. Google Earth (07/08/2018) 2022.

Appendices

Appendix A

Agency Correspondence

From: Sabourin, Nate (NDMNRF)
To: Amy Douglas
Cc: Dickson, Cheryl (NDMNRF); Kearney, Jocelyn (NDMNRF)
Subject: RE: Background Information Request - Cayuga
Date: Friday, March 4, 2022 1:23:13 PM
Attachments: image007.png
image008.png
image009.png
image010.png
image011.png
N CayugaFI2010_av.pdf

Good Afternoon,

I hope this email finds you well. I have attached the information that we have on file for the North Cayuga Swamp Wetland Complex (PSW).

Additionally, there is also some fisheries information available for Pike Creek that is near this site. This fisheries information will also be accessible through Land Information Ontario.

"*Pike Creek:*
Thermal Regime: warm
ARA Fish Community Summary:
Black Crappie, Bluegill, Bluntnose Minnow, Brook Stickleback, Brown Bullhead, Central Mudminnow, Common Shiner, Creek Chub, Gizzard Shad, Golden Shiner, Green Sunfish, Largemouth Bass, Logperch, Northern Pike, Pumpkinseed, Rock Bass, Sunfishes, and White Sucker."

Please let me know if there is anything else that you require.

Have a great day,

Nate Sabourin
A/Integrated Resource Management Technical Specialist
Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF)
Guelph District Office
1 Stone Road W, Guelph, ON N1G 4Y2
(705) 346-0727 | Nate.Sabourin@ontario.ca

_____
To meet with our staff please be sure to call ahead and make an appointment.
For general information visit: www.ontario.ca/ndmnrf

From: Amy Douglas <Amy.Douglas@ghd.com>
Sent: March 2, 2022 10:53 AM
To: Scientific Collection Permits Guelph (NDMNRF) <scp.guelph@ontario.ca>
Subject: Background Information Request - Cayuga

Good morning,

GHD would like to request the following list of background information from the Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) to assist in the Brooks Road Landfill Project, if available. The project area is located at 160 Brooks Road, Cayuga, Ontario, N0A 1E0 (**Figure 1**).

Through an initial review of Natural Heritage Information Centre (NHIC), Land Information Ontario (LIO), and other databases, we have identified the following Natural Areas within the vicinity of our study area:

– North Cayuga Swamp Wetland Complex (Evaluated – Provincial)
– Wooded Area (NDMNRF)
– Mixed Wader Nesting Colony (Wildlife Concentration Area, NHIC)
– White-tailed Deer Wintering Area (Stratum 2; Wildlife Values Area, Provincial Natural Heritage [PNH])
– Growth Plan Natural Heritage System (PNH)

We are seeking any additional information such as existing fisheries data, Natural Heritage Information, Wetland Evaluation Reports, and any other data you feel is valuable for this assessment.

In fulfillment of this work, GHD is also contacting the Ministry of Environment Conservation and Parks (MECP), the Grand River Conservation Authority (GRCA), and the Niagara Peninsula Conservation Authority (NPCA) to ensure our data is complete.

Please let us know if you have any questions or require any further information. We look forward to your response to our request.

Figure 1 Brooks Road Landfill (160 Brooks Road, Cayuga, Ontario, N0A 1E0)

Thanks in advance.

Amy Douglas

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Ecologist

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From: Theresa Bukovics
To: Amy Douglas
Subject: RE: Background Information Request - Cayuga
Date: Friday, March 4, 2022 9:39:20 AM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png

Hi Amy,

The information that NPCA can provide will be limited as the property is located outside our jurisdiction. That being said, NPCA mapping shows **Provincially Significant Wetland, North Cayuga Swamp Wetland Complex** surrounding the study area at all four directions. Our mapping also identifies a watercourse and a pond at the southern portion of the property.

Hope this helps!
Theresa

From: Amy Douglas <Amy.Douglas@ghd.com>
Sent: March 2, 2022 1:22 PM
To: Adam Aldworth <aaldworth@npca.ca>
Cc: Theresa Bukovics <tbukovics@npca.ca>
Subject: RE: Background Information Request - Cayuga

Thanks Adam.

We've included NPCA in our consultation due to the vey close proximity to the watershed (see updated image with CA boundary) Better to be safe than sorry, right?!

Thanks again for your help with this.

Amy Douglas

M.Sc.
Ecologist

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From: Adam Aldworth <aaldworth@npca.ca>
Sent: Wednesday, March 2, 2022 12:57 PM
To: Amy Douglas <Amy.Douglas@ghd.com>
Cc: Theresa Bukovics <tbukovics@npca.ca>
Subject: RE: Background Information Request - Cayuga

Hi Amy,

Thanks for reaching out. I'd note that the property you've referenced is not within the NPCA's watershed and we therefore are unlikely to have much information to provide.

I've passed your request onto Theresa Bukovics (cc'd). Theresa will get back to you with any information that we may have.

Kind regards,
Adam

Adam Aldworth, BSc, EP
Planning Ecologist | Planning & Regulations
Niagara Peninsula Conservation Authority (NPCA)
250 Thorold Road West, 3rd Floor, Welland, ON, L3C 3W2
905-788-3135, ext. 248
aaldworth@npca.ca
www.npca.ca

From: Amy Douglas <Amy.Douglas@ghd.com>
Sent: March 2, 2022 11:21 AM
To: Adam Aldworth <aaldworth@npca.ca>; Kim Frohlich <kfrohlich@npca.ca>
Subject: Background Information Request - Cayuga

Good morning Adam and Kim,

If required, please forward this email to the appropriate members of your team.

GHD would like to request the following background information from the Niagara Peninsula Conservation Authority (NPCA) to assist in the Brooks Road Landfill Project, if available. The project area is located at 160 Brooks Road, Cayuga, Ontario, N0A 1E0 (**Figure 1**).

Ecology:

- Ecological Land Classification data (if separate from GIS layers)
- Flora and fauna species
- Stream benthic invertebrates data
- Fisheries data
- Any reports/previous ecological studies completed within and in the vicinity of the study area

If possible, GHD also requests to review designs and reports regarding any ongoing NPCA projects within the project limits. Review of any designs will be crucial to ensure that watercourse remediation recommendations integrate with any ongoing NPCA work.

In fulfillment of this work, GHD is also contacting the Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF), the Ministry of Environment Conservation and Parks (MECP), and the Grand River Conservation Authority (GRCA) to ensure our data is complete.

Please let us know if you have any questions or require any further information. We look forward to your response to our request.

Figure 1 Brooks Road Landfill (160 Brooks Road, Cayuga, Ontario, N0A 1E0)

Thanks in advance.

Amy Douglas

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Due to the COVID-19 pandemic, the NPCA has taken measures to protect staff and public while providing continuity of services. The NPCA main office is open by appointment only with limited staff, please refer to the Staff Directory and reach out to the staff member you wish to speak or meet with directly. Our Conservation Areas are currently open, but may have modified amenities and/or regulations.

Updates regarding NPCA operations and activities can be found at Get Involved NPCA Portal, or on social media at NPCA's Facebook Page & NPCA's Twitter page.

From: Trevor Heywood
To: Amy Douglas
Subject: RE: Background Information Request - Cayuga
Date: Tuesday, March 8, 2022 2:31:48 PM
Attachments: image002.png
image003.png
image004.png
image005.png
image006.png

Hi Amy,

There should be a number of background studies for this specific property relating to the refurbishment of the landfill, a proposed expansion of the landfill, and its license renewal.

We have information that:

- Portions of the North Cayuga Swamp Provincially Significant Wetland Complex are located on site and immediately adjacent to it.
- MNDMNRF has portions of the site and adjacent lands mapped as White-tailed deer wintering area
- The site is at the headwater catchment area of Pike Creek, further downstream the watercourse is mapped by DFO for Mapleleaf Mussel (Quadrula quadrula)
- A number of ranked species have potential to be located on or adjacent to the site. One of our watershed ecologists has personally observed Blanding's Turtles (Endangered) at the site. Other potential species include but not limited to
    - Eastern Meadowlark - Threatened
    - Bobolink - Threatened
    - Wood Thrush - Threatened
    - Eastern Flowering Dogwood - Endangered
    - Cerulean Warbler - Endangered

It should also be noted that the site is on the watershed divide between our jurisdiction and that of the Niagara Peninsula Conservation Authority. We recommend reaching out to them as well, if you haven't already.

Regards,

Trevor Heywood
Resource Planner
Grand River Conservation Authority

theywood@grandriver.ca
www.grandriver.ca | Connect with us on social media

From: Amy Douglas <Amy.Douglas@ghd.com>
Sent: Wednesday, March 2, 2022 11:34 AM
To: Grand River Conservation Authority <grca@grandriver.ca>
Subject: Background Information Request - Cayuga

Good morning,

Please forward this email to the appropriate members of your team.

GHD would like to request the following background information from the Grand River Conservation Authority (GRCA) to assist in the Brooks Road Landfill Project, if available. The project area is located at 160 Brooks Road, Cayuga, Ontario, N0A 1E0 (**Figure 1**).

Ecology:

- Ecological Land Classification data (if separate from GIS layers)
- Flora and fauna species
- Stream benthic invertebrates data
- Fisheries data
- Any reports/previous ecological studies completed within and in the vicinity of the study area

If possible, GHD also requests to review designs and reports regarding any ongoing GRCA projects within the project limits. Review of any designs will be crucial to ensure that watercourse remediation recommendations integrate with any ongoing GRCA work.

In fulfillment of this work, GHD is also contacting the Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF), the Ministry of Environment Conservation and Parks (MECP), and the Niagara Peninsula Conservation Authority (NPCA) to ensure our data is complete.

Please let us know if you have any questions or require any further information. We look forward to your response to our request.

***Figure 1 Brooks Road** Landfill (160 Brooks Road, Cayuga, Ontario, N0A 1E0)*

Thanks in advance.

Amy Douglas

M.Sc.
Ecologist

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From: Adams, Tarryn (MECP)
To: Amy Douglas
Cc: Jason Caldwell; Laura Lawlor
Subject: RE: Background Information Request - Cayuga
Date: Tuesday, September 13, 2022 2:26:50 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png

Hello Amy,

I apologize for the delayed response. MECP is continuing to work through a back-log of requests.

The Species at Risk Branch (SARB) has conducted a review of the submission below.

The following additional species are within the vicinity of the site and are not listed below:

American Chestnut	*(Castanea dentata);*
Black Ash	*(Fraxinus nigra);*
Least Bittern	*(Ixobrychus exilis);*
Yellow-breasted Chat	*(Icteria virens).*

No other species at risk occurrences were detected which were not already identified in the submission below.

While this review represents MECP's best currently available information, it is important to note that a lack of information for a site does not mean that SAR or their habitat are not present. There are many areas where the Government of Ontario does not currently have information, especially in areas not previously surveyed. On-site assessments will better verify site conditions, identify and confirm presence of species at risk and/or their habitats.

It is the responsibility of the proponent to ensure that SAR are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities can not avoid impacting protected species and their habitats then the proponent will need to apply for a authorization under the Endangered Species Act.

Regards,

Tarryn Adams
A/Management Biologist, Permissions Section
Species at Risk Branch

Ministry of the Environment, Conservation and Parks (MECP)
Peterborough, ON K9J 3C7

Please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Amy Douglas <Amy.Douglas@ghd.com>
Sent: September 9, 2022 9:18 AM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Jason Caldwell <Jason.Caldwell@ghd.com>; Laura Lawlor <Laura.Lawlor@ghd.com>
Subject: FW: Background Information Request - Cayuga
Importance: High

Good morning,
Following up again on our previous request. Please see email chain below.
This is the third follow up we have sent through since the initial request. If there is anything we can do to speed up this process (as our reporting date is looming) please let us know.

Much appreciated.

Amy Douglas
[she/her]

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-
-
GHD FIRST Emergency Spill Hotline: +1 800 679 9082

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From: Amy Douglas
Sent: Monday, August 29, 2022 3:33 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Subject: RE: Background Information Request - Cayuga

Good afternoon,
Following up on this request (please see email chain below).
Thanks

Amy Douglas

[she/her]

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From: Amy Douglas
Sent: Friday, August 19, 2022 12:26 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Subject: RE: Background Information Request - Cayuga

Good afternoon,
Just following up on this request from March.
Shamus Snell also provided us with a standard confirmation response the day prior to this one coming through on March 3, 2022. However, we understand he is no longer with the SARB.

Thanks for your help.

Amy Douglas
[she/her]

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-
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From: Species at Risk (MECP) <SAROntario@ontario.ca>
Sent: Thursday, March 3, 2022 8:17 AM
To: Amy Douglas <Amy.Douglas@ghd.com>
Subject: RE: Background Information Request - Cayuga

Hi Amy,

Species at Risk Branch (SARB) has received your information request for the Brooks Road Landfill Project. It has been assigned to a biologist and placed in the queue for review. Once they complete their review they will contact you directly with the results of the review.

Please note that we continue to receive a large number of requests so your patience is appreciated while we work towards your request.

Regards.

From: Amy Douglas <Amy.Douglas@ghd.com>
Sent: March 2, 2022 10:37 AM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Subject: Background Information Request - Cayuga

Good morning,

GHD would like to request the following background information from the Ministry of Environmental Conservation and Parks (MECP) to assist in the Brooks Road Landfill Project, if available. The project area is located at 160 Brooks Road, Cayuga, Ontario, N0A 1E0 (**Figure 1**).

Through an initial review of Natural Heritage Information Centre (NHIC), Land Information Ontario (LIO), and other databases, we have identified records for the following Species at Risk (SAR) within the vicinity of our study area:

- Insects
  - Monarch
- Birds
  - Bank swallow
  - Barn swallow
  - Bobolink
  - Canada warbler
  - Cerulean warbler
  - Chimney swift
  - Eastern meadowlark
  - Eastern wood-pewee
  - Golden-winged warbler
  - Grasshopper sparrow *pratensis* subspecies
  - Red-headed woodpecker
  - Wood thrush
- Mammals
  - Eastern small-footed myotis
  - Little brown myotis
  - Tri-coloured bat
  - Northern myotis
- Reptiles
  - Blanding's turtle - Great Lakes/St. Lawrence population

- Eastern ribbonsnake - (Great Lakes population)
- Midland painted turtle
- Milksnake
- Northern map turtle
- Snapping turtle

– Vascular Plants
  - Butternut
  - Eastern flowering dogwood

We are seeking any additional information regarding SAR data, and any other data you feel is valuable for this assessment.

In fulfillment of this work, GHD is also contacting the Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF), the Grand River Conservation Authority (GRCA), and the Niagara Peninsula Conservation Authority (NPCA) to ensure our data is complete.

Please let us know if you have any questions or require any further information. We look forward to your response to our request.

Figure 1 Brooks Road Landfill (160 Brooks Road, Cayuga, Ontario, N0A 1E0)

Thanks in advance.

Amy Douglas

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Appendix B

Natural Environment Photographic Log

Photo 1 - View from within the CVI_1 present on the east side of the Local Study Area. This photo was taken looking west on June 10, 2022 at the location of BBS 3.

Photo 2 - View to the AG fields directly west of Brooks Road. Planted corn was observed within this field. This photo was taken between the locations of AMP 1 and 6 facing south on July 10, 2022.

Natural Environment Photographic Log

Photo 3 - The location can condition where the SM1 meter was deployed in the North Lands. The setup is circled in red.

Photo 4 - The MAMM3 vegetation community that is present in the northwest portion of the North Lands. This photo was taken looking west on July 10, 2022

Natural Environment Photographic Log

Photo 5 - Location from within the MAMM2-5 community in the North Lands. A small open aquatic area was observed within this area which was previously mapped as MASM1-8. This photo was taken looking southeast on July 10, 2022

Photo 6 - View of the interface of one MAMM2-5 with the THDM2-4 communities int the North Lands. This photo was taken looking east on July 10, 2022.

Natural Environment Photographic Log

Photo 7 - View of the MASO3 vegetation community present to the east of the Local Study Area. This photo was taken looking east on July 10, 2022

Photo 8 - The FODM9 vegetation community that is present in the east portion of the Local Study Area that abuts the chain link fence (pictured on the left). This photo was taken looking north on July 10, 2022.

Appendix C

Vascular Plant List

Appendix C
Vascular Plant List
Natural Environment Assessment Report
Brooks Road Landfill

Scientific Name	Common Name	Coefficient of Conservatism (CC)	Wetness Index	Weediness Index	Provincial Status (S-Rank)	ESA Status	SARA Status	Local Status Haldimand (Oldham 1993)	Local Status Haldimand-Norfolk (Oldham 2017)
Dennstaedtiaceae	Bracken Fern Family								
Pteridium aquilinum var. latiusculum	Eastern Bracken Fern	2	3		S5			C	C
Equisetaceae	Horsetail Family								
Equisetum arvense	Field Horsetail	0	0		S5			C	C
Onocleaceae	Sensitive Fern Family								
Matteuccia struthiopteris var. pensylvanica	Ostrich Fern	5	-3		S5			C	C
Onoclea sensibilis	Sensitive Fern	4	-3		S5			C	C
Thelypteridaceae	Marsh Fern Family								
Thelypteris noveboracensis	New York Fern	7	-1		S4S5			C	C
Pinaceae	Pine Family								
Picea abies	Norway Spruce		5	-1	SNA			IR	IR
Picea pungens	Blue Spruce		3		SNA				
Pinus strobus	Eastern White Pine	4	3		S5			C	C
Pinus sylvestris	Scots Pine		3	-3	SNA			IC	IC
Adoxaceae	Moschatel Family								
Viburnum lentago	Nannyberry	4	-1		S5			C	C
Viburnum opulus ssp. trilobum	Highbush Cranberry	5	-3		S5			U	U
Amaranthaceae	Amaranth Family								
Chenopodium album	Common Lamb's-Quarters		3	-1	SNA			IC	IC
Anacardiaceae	Cashew Family								
Rhus typhina	Staghorn Sumac	1	5		S5			C	C
Apiaceae	Carrot Family								
Daucus carota	Wild Carrot		5	-2	SNA			IC	IC
Heracleum maximum	American Cow Parsnip	3	-3		S5			U	U
Apocynaceae	Milkweed Family								
Asclepias incarnata ssp. incarnata	Swamp Milkweed	6	-5		S5			C	C
Asclepias syriaca	Common Milkweed	0	5		S5			C	C
Asteraceae	Aster Family								
Achillea borealis var. borealis	Woolly Yarrow	0	3		S5				C
Ambrosia artemisiifolia	Common Ragweed	0	3		S5			C	C
Arctium minus	Common Burdock		3	-2	SNA			IC	IC
Bidens aristosa	Bearded Beggarticks		-3	-1	SNA				
Bidens frondosa	Devil's Beggarticks	3	-3		S5			C	C
Centaurea stoebe	Spotted Knapweed		5	-3	SNA			IC	IC
Cichorium intybus	Wild Chicory		5	-1	SNA			IC	IC
Cirsium arvense	Canada Thistle		3	-1	SNA			IC	IC
Cirsium vulgare	Bull Thistle		3	-1	SNA			IC	IC
Erigeron canadensis	Canada Horseweed	0	1		S5			C	C
Erigeron strigosus	Rough Fleabane	0	1		S5			U	U
Eupatorium perfoliatum	Common Boneset	2	-4		S5			C	C
Leucanthemum vulgare	Oxeye Daisy		5	-1	SNA				IC
Solidago altissima var. altissima	Tall Goldenrod	1	3		S5			C	C
Solidago canadensis	Canada Goldenrod	1	3		S5			C	C
Solidago juncea	Early Goldenrod	3	5		S5			C	C
Taraxacum officinale	Common Dandelion		3	-2	SNA			IC	IC
Tragopogon dubius	Yellow Goatsbeard		5	-1	SNA			IC	IC
Balsaminaceae	Touch-Me-Not Family								
Impatiens capensis	Spotted Jewelweed	4	-3		S5			C	C
Berberidaceae	Barberry Family								
Podophyllum peltatum	May-Apple	5	3		S5			C	C
Betulaceae	Birch Family								
Alnus glutinosa	European Black Alder		-3	-3	SNA			IC	IC
Alnus incana spp. rugosa	Speckled Alder	6	-5		S5			U	
Ostrya virginiana	Eastern Hop-Hornbeam	4	4		S5			C	C
Boraginaceae	Borage Family								
Echium vulgare	Common Viper's Bugloss		5	-2	SNA			IC	IC
Brassicaceae	Mustard Family								
Alliaria petiolata	Garlic Mustard		0	-3	SNA			IC	IC
Caprifoliaceae	Honeysuckle Family								
Dipsacus fullonum	Common Teasel		3	-1	SNA			IC	IC
Lonicera tatarica	Tartarian Honeysuckle		3	-3	SNA			IC	IC
Lonicera xylosteum	Dwarf Honeysuckle		5	-2	SNA			IR	IR
Caryophyllaceae	Pink Family								
Dianthus armeria ssp. armeria	Deptford Pink		5	-1	SNA			IC	IC
Silene latifolia	White Campion		5	-2	SNA			IC	IC
Celastraceae	Spindle Tree Family								
Euonymus obovatus	Running Strawberry Bush	6	5		S4			C	C
Cornaceae	Dogwood Family								
Cornus racemosa	Grey Dogwood	2	-2		S5			U	U
Cornus stolonifera	Red-Osier Dogwood	2	-3		S5			C	C
Fabaceae	Legume Family								
Lotus tenuis	Narrow-Leaved Bird's-Foot Trefoil		3		SNA				
Medicago lupulina	Black Medick		3	-1	SNA			IC	IC
Melilotus albus	White Sweet-Clover		3	-3	SNA			IC	IC
Trifolium pratense	Red Clover		3	-2	SNA			IC	IC
Vicia cracca	Tufted Vetch		5	-1	SNA			IU	IU
Fagaceae	Beech Family								
Fagus grandifolia	American Beech	6	3		S4			C	C
Quercus alba	White Oak	6	3		S5			C	C
Quercus bicolor	Swamp White Oak	8	-4		S4			C	C
Quercus macrocarpa	Burr Oak	5	1		S5			C	C
Quercus palustris	Pin Oak	9	-3		S4				
Quercus rubra	Northern Red Oak	6	3		S5			C	C
Geraniaceae	Geranium Family								
Geranium maculatum	Spotted Geranium	6	3		S5			C	C
Hypericaceae	St. John's-Wort Family								
Hypericum perforatum ssp. perforatum	Common St. John's-Wort		5	-3	SNA			IC	IC

Appendix C
Vascular Plant List
Natural Environment Assessment Report
Brooks Road Landfill

Scientific Name	Common Name	Coefficient of Conservatism (CC)	Wetness Index	Weediness Index	Provincial Status (S-Rank)	ESA Status	SARA Status	Local Status Haldimand (Oldham 1993)	Local Status Haldimand-Norfolk (Oldham 2017)
Juglandaceae	Walnut Family								
Carya ovata var. ovata	Shagbark Hickory	6	3		S5			C	C
Juglans nigra	Black Walnut	5	3		S4?			C	C
Lamiaceae	Mint Family								
Prunella vulgaris ssp. vulgaris	Common Self-Heal		0	-1	SNA			C	
Lentibulariaceae	Bladderwort Family								
Utricularia vulgaris ssp. macrorhiza	Greater Bladderwort	4	-5		S5			C	C
Lythraceae	Loosestrife Family								
Lythrum salicaria	Purple Loosestrife		-5	-3	SNA			IC	IC
Oleaceae	Olive Family								
Fraxinus americana	White Ash	4	3		S4			C	C
Onagraceae	Evening-Primrose Family								
Circaea canadensis ssp. canadensis	Canada Enchanter's Nightshade	3	3		S5			C	C
Oxalidaceae	Wood Sorrel Family								
Oxalis montana	Common Wood-Sorrel	8	3		S5				
Plantago lanceolata	English Plantain		3	-1	SNA			IC	IC
Plantago major	Common Plantain		3	-1	SNA			IC	IC
Polygonaceae	Buckwheat Family								
Rumex britannica	Great Water Dock	6	-5		S5			C?	C
Ranunculaceae	Buttercup Family								
Ranunculus sceleratus var. sceleratus	Cursed Buttercup		-5		SNA			U	U
Rhamnaceae	Buckthorn Family								
Frangula alnus	Glossy Buckthorn		0	-3	SNA			IU	IU
Rhamnus cathartica	European Buckthorn		0	-3	SNA			IU	IU
Rosaceae	Rose Family								
Agrimonia eupatoria	European Agrimony				SNA				
Amelanchier sanguinea	Round-Leaved Serviceberry	7	5		S5			VU	R
Fragaria vesca	Woodland Strawberry	4	4		S5			U	U
Geum urbanum	Wood Avens		5	-1	SNA			IR	IR
Malus pumila	Common Apple		5	-1	SNA			IC	IC
Potentilla recta	Sulphur Cinquefoil		5	-2	SNA			IC	IC
Potentilla simplex	Old Field Cinquefoil	3	4		S5			C	C
Prunus serotina var. serotina	Black Cherry	3	3		S5			C	C
Rosa carolina	Carolina Rose	6	4		S4			U	U
Rubus idaeus ssp. idaeus	European Red Raspberry		3		SNA				
Rubus occidentalis	Black Raspberry	2	5		S5			C	C
Spiraea alba var. alba	White Meadowsweet	3	-4		S5			C	C
Rubiaceae	Bedstraw Family								
Cephalanthus occidentalis	Common Buttonbush	7	-5		S5			C	C
Galium sylvaticum	Wood Bedstraw		5		SNA				
Salicaceae	Willow Family								
Populus balsamifera	Balsam Poplar	4	-3		S5			U	U
Populus tremuloides	Trembling Aspen	2	0		S5			C	C
Salix discolor	Pussy Willow	3	-3		S5			C	C
Sapindaceae	Maple Family								
Acer rubrum	Red Maple	4	0		S5			C	C
Acer saccharinum	Silver Maple	5	-3		S5			C	C
Acer saccharum	Sugar Maple	4	3		S5			C	C
Ulmaceae	Elm Family								
Ulmus americana	White Elm	3	-2		S5			C	C
Urticaceae	Nettle Family								
Boehmeria cylindrica	Small-Spike False Nettle	4	-5		S5			C	C
Verbenaceae	Vervain Family								
Verbena hastata	Blue Vervain	4	-4		S5			C	C
Vitaceae	Grape Family								
Parthenocissus vitacea	Thicket Creeper	4	3		S5			C	C
Parthenocissus quinquefolia	Virginia Creeper	6	1		S4?			VU	U
Vitis riparia	Riverbank Grape	0	-2		S5			C	C
Alismataceae	Water-Plantain Family								
Alisma subcordatum	Southern Water-Plantain	1	-5		S4?				X
Sagittaria latifolia	Broad-Leaved Arrowhead	4	-5		S5			C	C
Araceae	Arum Family								
Lemna minor	Small Duckweed	2	-5		S5			C	C
Asparagaceae	Asparagus Family								
Convallaria majalis var. majalis	European Lily-Of-The-Valley		5	-2	SNA			IR	IR
Maianthemum racemosum ssp. racemosum	Large False Solomon's Seal	4	3		S5			C	C
Cyperaceae	Sedge Family								
Carex acutiformis	Lesser Pond Sedge		-5		SNA				
Carex bebbii	Bebb's Sedge	3	-5		S5			C	C
Carex blanda	Woodland Sedge	3	0		S5			C	C
Carex comosa	Bearded Sedge	5	-5		S5			U	C
Carex hystericina	Porcupine Sedge	5	-5		S5			U	U
Carex intumescens	Bladder Sedge	6	-4		S5			C	C
Carex lurida	Sallow Sedge	6	-5		S4S5			C	C
Carex pseudocyperus	Cyperus-Like Sedge	6	-5		S5			U	U
Carex stipata var. stipata	Awl-Fruited Sedge	3	-5		S5			C	C
Carex tenera	Tender Sedge	4	-1		S5			C	C
Carex tribuloides var. tribuloides	Blunt Broom Sedge	5	-4		S4			C	C
Carex vulpinoidea	Fox Sedge	3	-5		S5			C	C
Scirpus atrovirens	Dark-Green Bulrush	3	-5		S5			C	C
Scirpus cyperinus	Common Woolly Bulrush	4	-5		S5			U	C
Scirpus hattorianus	Mosquito Bulrush	6	-3		S4				R
Liliaceae	Lily Family								
Erythronium americanum ssp. americanum	Yellow Trout Lily	5	5		S5			C	
Poaceae	Grass Family								
Agrostis capillaris	Colonial Bentgrass		5	-1	SNA				
Bromus inermis	Smooth Brome		5	-3	SNA			IC	IC
Calamagrostis canadensis var. canadensis	Bluejoint Reedgrass	4	-5		S5			C	C

Appendix C
Vascular Plant List
Natural Environment Assessment Report
Brooks Road Landfill

Scientific Name	Common Name	Coefficient of Conservatism (CC)	Wetness Index	Weediness Index	Provincial Status (S-Rank)	ESA Status	SARA Status	Local Status Haldimand (Oldham 1993)	Local Status Haldimand-Norfolk (Oldham 2017)
Dactylis glomerata	Orchard Grass		3	-1	SNA			IC	IC
Glyceria striata	Fowl Mannagrass	3	-5		S5			C	C
Lolium perenne	Perennial Ryegrass		3	-1	SNA			IU	IU
Phalaris arundinacea var. arundinacea	Reed Canary Grass	0	-3		S5			C	C
Phleum pratense ssp. pratense	Common Timothy		3	-1	SNA			IC	IC
Phragmites australis ssp. americanus	American Reed	5	-3		S4?			C	X
Phragmites australis ssp. australis	European Reed		-3		SNA				IC
Poa compressa	Canada Bluegrass	0	2		SNA			C	IC
Poa palustris	Fowl Bluegrass	5	-4		S5			C	C
Sorghum halepense	Johnson Grass		3	-1	SNA				
Typhaceae	Cattail Family								
Sparganium eurycarpum	Broad-Fruited Burreed	3	-5		S5			C	C
Typha angustifolia	Narrow-Leaved Cattail	3	-5		SNA			C	IC

Notes

Co-efficient of Conservatism: This value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific habitat integrity.

Weediness Index: This value, ranging from -1 (low) to -3 (high) quantifies the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator of disturbance.

Wetness Index: This value, ranging from -5 (obligate wetland) to 5 (upland) provides the probability of a species occurring in wetland or upland habitats.

S-Ranks-

S1: Critically Imperiled - Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2: Imperiled - Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3: Vulnerable - Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4: Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5: Secure - Common, widespread, and abundant in the nation or state/province.

SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.

SR: Reported in Ontario, but without persuasive documentation.

SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SE: Exotic; not believed to be a native component of Ontario's flora. Numerical rankings after SE follow designations described above for native species.

SNA: Unranked — Status not assigned.

SU: Unranked — Nation or state/province conservation status not yet assessed.

ESA Status

Endangered Species Act (ESA), 2007. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC

SARA Status

Species at Risk Act (SARA), 2002. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC

Appendix D

Calling Amphibian Surveys

Appendix D-1
2022 Calling Amphibian Surveys
Natural Environment Assessment Report
Brooks Road Landfill

Species	Station 1 (AMP1) North Lands			Station 2 (AMP2) East Lands			Station 3 (AMP3) North Lands		
	April 12, 2022	May 11, 2022	June 15, 2022	April 12, 2022	May 11, 2022	June 15, 2022	April 12, 2022	May 11, 2022	June 15, 2022
American toad (*Anaxyrus americanus*)		B-3 (FC)*			C-1 (1)			B-3 (FC)	
Gray treefrog (*Hyla versicolor*)		B-1 (2)	B-1 (1) C-2 (4) C-3 (FC)		B-1 (2)	B-3 (FC)		B-1 (1)	A-2 (2)
Green frog (*Lithobates clamitans*)		A-1 (1)	A-1 (2) A-2 (3) B-1 (2) C-2 (2)					A-1 (1)	
Northern leopard frog (*Lithobates pipiens*)	B-1 (1)						B-1 (1)	A-1 (1)	
Spring peeper (*Pseudacris crucifer*)	A-3 (FC)*	A-3 (FC) B-1 (2)		C-3 (FC)*	C-3 (FC)*		C-3 (FC)*	A-1 (1) A-3 (FC) B-3 (FC)	
Western chorus frog (*Pseudacris triseriata*)							A-1 (2) A-1 (1)		
Wood frog (*Lithobates sylvaticus*)				C-3 (FC)					

Species	Station 4 (AMP4) East Lands			Station 5 (AMP5) West Lands			Station 6 (AMP6) West Lands		
	April 12, 2022	May 11, 2022	June 15, 2022	April 12, 2022	May 11, 2022	June 15, 2022	April 12, 2022	May 11, 2022	June 15, 2022
American toad (*Anaxyrus americanus*)		A-1 (1)		B-1 (2)	A-3 (FC)*				
Gray treefrog (*Hyla versicolor*)		B-1 (1)*	B-2 (3) C-3 (FC)			B-3 (FC)			C-3 (FC)
Green frog (*Lithobates clamitans*)						A-1 (1) A-2 (5)			
Northern leopard frog (*Lithobates pipiens*)				B-2 (4)					
Spring peeper (*Pseudacris crucifer*)	B-1 (2) C-3 (FC)	B-3 (FC)		B-3 (FC) C-3 (FC)	B-3 (FC)*		C-3 (FC)	B-3 (FC)	
Western chorus frog (*Pseudacris triseriata*)	B-1 (1)	A-1 (1)			B-1 (1)		A-3 (FC)	A-1 (2)	
Wood frog (*Lithobates sylvaticus*)							B-2 (3)		

Notes

Distance: A: Within 50 metres (m) of the survey point; B: 50 - 100 m of the survey point; C: Greater than 100 m of the survey point.

Call level: 1: Calls not simultaneous, number of individuals can be accurately counted; 2: Some calls simultaneous, number of individuals can be reliably estimated; 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated.

Abundance: Numbers in parentheses indicate estimated abundance of species; FC: full chorus (cannot be estimated).

* One group observed on each side of the survey area (i.e., two groups of that distance/call level/abundance within survey area).

Weather Conditions

The initial survey was conducted on April 12, 2022; weather conditions were 7.6 - 10˚C, calm (Beaufort wind scale [BWS] = 0) with scattered cloud cover. There was no precipitation during the surveys, but some haze during the surveys for Stations 1, 5, and 6.
The second survey was conducted on May 11, 2022; weather conditions were 15 - 18˚C, clear with no precipitation. Stations 2, 3, and 4 were calm (BWS = 0), with light air (BWS = 1) for Stations 1, 5, and 6.
The third and final survey was conducted on June 15, 2022; weather conditions were 22 - 23.8˚C, clear and humid, with no precipitation. Station 3 and 4 had light air (BWS = 1), reducing to calm (BWS = 0) for Station 2. A gentle breeze (BWS = 3) picked up for Station 5, reducing to a light breeze (BWS = 2) for Station 1, and light air (BWS = 1) for Station 6.

Appendix D-2
2021 Calling Amphibian Surveys
Natural Environment Assessment Report
Brooks Road Landfill

Species	Station 1 (AMP1) North Lands			Station 2 (AMP2) East Lands		
	March 25, 2021	April 13, 2021	June 28, 2021	March 25, 2021	April 13, 2021	June 28, 2021
American toad (*Anaxyrus americanus*)		A 1 (1) B-1 (1)			B-1 (2) C-2 (3)	
Gray treefrog (*Hyla versicolor*)			B-1 (1) C-2 (2)			B-1 (1) C-2 (3)
Green frog (*Lithobates clamitans*)			B-1 (1)			B-1 (1) C-1 (1)
Northern leopard frog (*Lithobates pipiens*)		B-1 (2) B-1 (1)			B-1 (1) C-1 (1)	
Spring peeper (*Pseudacris crucifer*)	A-3 (FC) B-3 (FC)*			B-1 (2) C-3 (FC)	B-2 (3) C-3 (FC) C-3 (FC)	
Western chorus frog (*Pseudacris triseriata*)	A-1 (2) B-3 (FC)	A-2 (3) A-2 (4)		C-3 (FC)*	C-1 (2)	
Wood frog (*Lithobates sylvaticus*)				C-1 (3)		

Notes

Distance: A: Within 50 metres (m) of the survey point; B: 50 - 100 m of the survey point; C: Greater than 100 m of the survey point.

Call level: 1: Calls not simultaneous, number of individuals can be accurately counted; 2: Some calls simultaneous, number of individuals can be reliably estimated; 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated.

Abundance: Numbers in parentheses indicate estimated abundance of species; FC: full chorus (cannot be estimated).

* One group observed on each side of the survey area (i.e., two groups of that distance/call level/abundance within survey area).

Weather Conditions

The initial survey was conducted on March 25, 2021; weather conditions were 13.5 – 14˚C, calm (Beaufort wind scale [BWS] = 0) with 100% cloud cover. There was no precipitation while surveying Station 1, and a light rain falling during the Station 2 survey. The temperatures observed during the first survey were uncharacteristically warm for early in the season.
The second survey was conducted on April 13, 2021; weather conditions were 7.7 – 9.8˚C, calm (BWS = 0) and clear, with no precipitation.
The third and final survey was conducted on June 28, 2021; weather conditions were 22 – 23˚C with no precipitation. Scattered clouds and a light breeze (BWS = 2) were present while surveying Station 1, changing to clear and still (BWS = 0) for Station 2.

Appendix D-3
2020 Calling Amphibian Surveys
Natural Environment Assessment Report
Brooks Road Landfill

Species	Station 1 (AMP1) North Lands		Station 2 (AMP2) East Lands	
	May 28, 2020	June 29, 2020	May 28, 2020	June 29, 2020
American bullfrog (*Lithobates catesbeianus*)		C-1 (2)		C-2 (3)
Gray treefrog (*Hyla versicolor*)	B-1 (1) B-2 (5)		A-3 (FC)	
Green frog (*Lithobates clamitans*)		A-1 (2) B-1 (1) B-1 (1) C-3 (FC)		C-2 (5)

Notes

Distance: A: Within 50 metres (m) of the survey point; B: 50 - 100 m of the survey point; C: Greater than 100 m of the survey point.

Call level: 1: Calls not simultaneous, number of individuals can be accurately counted; 2: Some calls simultaneous, number of individuals can be reliably estimated; 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated.

Abundance: Numbers in parentheses indicate estimated abundance of species; FC: full chorus (cannot be estimated).

Due to uncertainty during the early COVID-19 pandemic response, only two of the recommended three amphibian calling surveys were conducted in 2020. In addition to the species listed, American toad (*Anaxyrus americanus*) was heard prior to the Station 1 survey in May, near the northwest extent of the Site.

Weather Conditions

The initial survey was conducted on May 28, 2020; weather conditions were 19˚C, with 10% cloud cover, and no precipitation. A light breeze (Beaufort wind scale [BWS] = 2) was observed during the Station 1 survey, which reduced to calm (BWS = 0) for the Station 2 survey.
The second and final survey was conducted on June 29, 2020; weather conditions were 20.4 – 21.1˚C, calm (BWS = 0) with clear skies and no precipitation.

Appendix E

Breeding Bird Surveys and Songmeter Results

Appendix E-1
Breeding Bird Survey Results
Natural Environment Assessment Report
Brooks Road Landfill

Common Name	Scientific Name	Ontario Status	ESA	SARA	BBS 1			BBS 2			BBS 3			BBS 4		
					10-Jun-22	27-Jun-22	10-Jul-22	10-Jun-22	27-Jun-22	10-Jul-22	10-Jun-22	27-Jun-22	10-Jul-22	10-Jun-22	27-Jun-22	10-Jul-22
Alder Flycatcher	*Empidonax alnorum*	S5B														
American Crow	*Corvus brachyrhynchos*	S5B									X				X	X
American Goldfinch	*Spinus tristis*	S5B				S	H	X	S		S		S	S		S
American Kestrel	*Falco sparverius*	S4												X		
American Redstart	*Setophaga ruticilla*	S5B			S	S							S			
American Robin	*Turdus migratorius*	S5B				X	H	S		S	S	X		X		S
Baltimore Oriole	*Icterus galbula*	S4B			S	X	S				S		S			
Barn Swallow	*Hirundo rustica*	S4B	THR	THR		X	X				X					
Black-and-white Warbler	*Mniotilta varia*	S5B														
Black-billed Cuckoo	*Coccyzus erythropthalmus*	S5B			S								X	S		
Black-capped Chickadee	*Poecile atricapilla*	S5														
Blue Jay	*Cyanocitta cristata*	S5				S	S			S	S			S		
Brown-headed Cowbird	*Molothrus ater*	S4B					X		X		P	X			S	
Canada Goose	*Branta canadensis*	S5			X		X									X
Cedar Waxwing	*Bombycilla cedrorum*	S5B					S			X	H					
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B			H				S							
Chipping Sparrow	*Spizella passerina*	S5B														S
Common Grackle	*Quiscalus quiscula*	S5B			X	X		X		S			X			X
Common Tern	*Sterna hirundo*	S4B										X			X	
Common Yellowthroat	*Geothlypis trichas*	S5B			H				S		S					S
Double-crested Cormorant	*Phalacrocorax auritus*	S5B														
Eastern Kingbird	*Tyrannus tyrannus*	S4B				S	H							H		
Eastern Towhee	*Pipilo erythrophthalmus*	S4B								S		X				
Eastern Wood-Pewee	*Contopus virens*	S4B	SC	SC										H		S
European Starling	*Sturnus vulgaris*	SNA			H				S						X	X
Field Sparrow	*Spizella pusilla*	S4B				X							X			
Gray Catbird	*Dumetella carolinensis*	S4B									S			S		
Great Blue Heron	*Ardea herodias*	S4														
Great Crested Flycatcher	*Myiarchus crinitus*	S4B														
Green Heron	*Butorides virescens*	S4B				X										
Hairy Woodpecker	*Picoides villosus*	S5														
House Finch	*Haemorhous mexicanus*	SNA										S	S			S
House Wren	*Troglodytes aedon*	S5B				S	X			S	S				S	H
Indigo Bunting	*Passerina cyanea*	S4B				S					S					
Killdeer	*Charadrius vociferus*	S5B,S5N					X	H		S		X	X	S		X
Mallard	*Anas platyrhynchos*	S5				X										
Marsh Wren	*Cistothorus palustris*	S4B				X									S	
Mourning Dove	*Zenaida macroura*	S5			H		S		S		S			H		S
Northern Cardinal	*Cardinalis cardinalis*	S5					X		X		X		S			
Northern Flicker	*Colaptes auratus*	S4B					H								S	
Pileated Woodpecker	*Dryocopus pileatus*	S5									H					
Red-bellied Woodpecker	*Melanerpes carolinus*	S4												X		
Red-eyed Vireo	*Vireo olivaceus*	S5B									H					
Red-winged Blackbird	*Agelaius phoeniceus*	S4			S			H		S	H		H	H		S
Ring-billed Gull	*Larus delawarensis*	S5B,S4N				X										X
Rock Pigeon	*Columba livia*	SNA														
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B					S				S		H			S
Ruffed Grouse	*Bonasa umbellus*	S4									H		S			
Savannah Sparrow	*Passerculus sandwichensis*	S4B														
Song Sparrow	*Melospiza melodia*	S5B			S		X			S	S		S	S		
Spotted Sandpiper	*Actitis macularia*	S5														
Swamp Sparrow	*Melospiza georgiana*	S5B			S						H					
Tree Swallow	*Tachycineta bicolor*	S4B									X		X			
Turkey Vulture	*Cathartes aura*	S5B				X	X	X		X						
White-throated Sparrow	*Zonotrichia albicollis*	S5B														S
Wild Turkey	*Meleagris gallopava*	S5										X				
Willow Flycatcher	*Empidonax traillii*	S5B											S			
Winter Wren	*Troglodytes hiemalis*	S5B														
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR				S	H							
Yellow Warbler	*Setophaga petechia*	S5B			S						S			P		S
Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B														

Appendix E-1
Breeding Bird Survey Results
Natural Environment Assessment Report
Brooks Road Landfill

Common Name	Scientific Name	Ontario Status	ESA	SARA	BBS 6			BBS 7			BBS 8			BBS 9		
					10-Jun-22	27-Jun-22	10-Jul-22	10-Jun-22	27-Jun-22	10-Jul-22	10-Jun-22	27-Jun-22	10-Jul-22	10-Jun-22	27-Jun-22	10-Jul-22
Alder Flycatcher	*Empidonax alnorum*	S5B						S								
American Crow	*Corvus brachyrhynchos*	S5B						X		X	X	X		X	X	X
American Goldfinch	*Spinus tristis*	S5B				S		H	H		S	S	S		S	S
American Kestrel	*Falco sparverius*	S4												X		
American Redstart	*Setophaga ruticilla*	S5B									S	S				
American Robin	*Turdus migratorius*	S5B				S			H				H	H		S
Baltimore Oriole	*Icterus galbula*	S4B						S		X						
Barn Swallow	*Hirundo rustica*	S4B	THR	THR	X											
Black-and-white Warbler	*Mniotilta varia*	S5B							S							
Black-billed Cuckoo	*Coccyzus erythropthalmus*	S5B														
Black-capped Chickadee	*Poecile atricapilla*	S5									H		X	S		
Blue Jay	*Cyanocitta cristata*	S5					S									
Brown-headed Cowbird	*Molothrus ater*	S4B				X				S	X				S	S
Canada Goose	*Branta canadensis*	S5			X				X							
Cedar Waxwing	*Bombycilla cedrorum*	S5B				H		H			S		S	S		
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B					S	S								
Chipping Sparrow	*Spizella passerina*	S5B														
Common Grackle	*Quiscalus quiscula*	S5B				X	X	X	X				X	X	X	S
Common Tern	*Sterna hirundo*	S4B														
Common Yellowthroat	*Geothlypis trichas*	S5B			H	S		S		S			H	H		
Double-crested Cormorant	*Phalacrocorax auritus*	S5B				X							X			
Eastern Kingbird	*Tyrannus tyrannus*	S4B														
Eastern Towhee	*Pipilo erythrophthalmus*	S4B						S	S			S		S	S	H
Eastern Wood-Pewee	*Contopus virens*	S4B	SC	SC										S		S
European Starling	*Sturnus vulgaris*	SNA					S			X			X		X	X
Field Sparrow	*Spizella pusilla*	S4B				X		S						S	S	
Gray Catbird	*Dumetella carolinensis*	S4B					S	S			H		S	S		
Great Blue Heron	*Ardea herodias*	S4										X				X
Great Crested Flycatcher	*Myiarchus crinitus*	S4B												S		
Green Heron	*Butorides virescens*	S4B					S									
Hairy Woodpecker	*Picoides villosus*	S5													X	X
House Finch	*Haemorhous mexicanus*	SNA			X	S				S						H
House Wren	*Troglodytes aedon*	S5B					X									
Indigo Bunting	*Passerina cyanea*	S4B			S								S	S		
Killdeer	*Charadrius vociferus*	S5B,S5N			X			X			S		S			S
Mallard	*Anas platyrhynchos*	S5					X							X		
Marsh Wren	*Cistothorus palustris*	S4B												S		
Mourning Dove	*Zenaida macroura*	S5				S				S					S	
Northern Cardinal	*Cardinalis cardinalis*	S5			S				S		S					S
Northern Flicker	*Colaptes auratus*	S4B										S	S			
Pileated Woodpecker	*Dryocopus pileatus*	S5														
Red-bellied Woodpecker	*Melanerpes carolinus*	S4														
Red-eyed Vireo	*Vireo olivaceus*	S5B					S		S			S	S			
Red-winged Blackbird	*Agelaius phoeniceus*	S4			S		S	S		S	X	FY		X		S
Ring-billed Gull	*Larus delawarensis*	S5B,S4N							X							
Rock Pigeon	*Columba livia*	SNA						X				X				
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B														S
Ruffed Grouse	*Bonasa umbellus*	S4														
Savannah Sparrow	*Passerculus sandwichensis*	S4B										X				
Song Sparrow	*Melospiza melodia*	S5B			S				H			S		S		H
Spotted Sandpiper	*Actitis macularia*	S5					X									
Swamp Sparrow	*Melospiza georgiana*	S5B			H			S		S			S	S		S
Tree Swallow	*Tachycineta bicolor*	S4B					X									
Turkey Vulture	*Cathartes aura*	S5B			X					X				S		
White-throated Sparrow	*Zonotrichia albicollis*	S5B														
Wild Turkey	*Meleagris gallopava*	S5														
Willow Flycatcher	*Empidonax traillii*	S5B			S				S		S					
Winter Wren	*Troglodytes hiemalis*	S5B										S				
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR		S										
Yellow Warbler	*Setophaga petechia*	S5B			S			S		S	S			S		
Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B										X				

Appendix E-1
Breeding Bird Survey Results
Natural Environment Assessment Report
Brooks Road Landfill

Notes
BBS 5 was not surveyed due to it's location within private property.
S-Ranks-
S1: Critically Imperiled - Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S2: Imperiled - Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or
S3: Vulnerable - Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4: Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5: Secure - Common, widespread, and abundant in the nation or state/province.
SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
SR: Reported in Ontario, but without persuasive documentation.
SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it
SE: Exotic; not believed to be a native component of Ontario's flora. Numerical rankings after SE follow designations described above for native species.
SNA: Unranked — Status not assigned.
SU: Unranked — Nation or state/province conservation status not yet assessed.
ESA Status
Endangered Species Act (ESA), 2007. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC
SARA Status
Species at Risk Act (SARA), 2002. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC
All species listed were identified by song/vocalizations unless otherwise noted
O: Species observed ('X': observed during breeding season but no evidence of breeding)
P: Possible breeding ('S': singing male present; 'H': species observed in breeding season in suitable nesting habitat)
PR: Probable breeding ('P': Pair observed; 'T': Permanent territory presumed through territorial behaviour on both visits; 'D': Courtship or display; 'V': visiting probable nest site; 'A': Agitated behaviour or anxiety calls of an adult; 'B': Brood Patch; 'N': Nest-building)
C: Confirmed breeding ('DD': Distraction display; 'NU': Used nest or eggshells found; 'FY': Recently fledged young; 'AE': Adult leaving or entering nest site; 'FS': Adult carrying fecal sac; 'CF': adult carrying food for young; 'NE': Nest with eggs; 'NY': Nest with young)

Appendix E-2
Song Meter Micro (SM1) Results
Natural Environment Assessment Report
Brooks Road Landfill

Common Name	Scientific Name	Ontario Status	ESA	SARA	Common Name	Scientific Name	Ontario Status	ESA	SARA
American Crow	*Corvus brachyrhynchos*	S5B			Gray Catbird	*Dumetella carolinensis*	S4B		
American Goldfinch	*Spinus tristis*	S5B			Great Blue Heron	*Ardea herodias*	S4		
American Redstart	*Setophaga ruticilla*	S5B			House Sparrow	*Passer domesticus*	SNA		
American Robin	*Turdus migratorius*	S5B			House Wren	*Troglodytes aedon*	S5B		
Baltimore Oriole	*Icterus galbula*	S4B			Indigo Bunting	*Passerina cyanea*	S4B		
Black-capped Chickadee	*Poecile atricapilla*	S5			Killdeer	*Charadrius vociferus*	S5B,S5N		
Blue Jay	*Cyanocitta cristata*	S5			Mourning Dove	*Zenaida macroura*	S5		
Brown Thrasher	*Toxostoma rufum*	S4B			Northern Cardinal	*Cardinalis cardinalis*	S5		
Brown-headed Cowbird	*Molothrus ater*	S4B			Northern Flicker	*Colaptes auratus*	S4B		
Canada Goose	*Branta canadensis*	S5			Northern Mockingbird	*Mimus polyglottos*	S4		
Canada Warbler	*Cardellina canadensis*	S4B	SC	THR	Red-eyed Vireo	*Vireo olivaceus*	S5B		
Carolina Wren	*Thryothorus ludovicianus*	S4			Red-winged Blackbird	*Agelaius phoeniceus*	S4		
Cedar Waxwing	*Bombycilla cedrorum*	S5B			Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B		
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B			Ruffed Grouse	*Bonasa umbellus*	S4		
Chipping Sparrow	*Spizella passerina*	S5B			Song Sparrow	*Melospiza melodia*	S5B		
Common Grackle	*Quiscalus quiscula*	S5B			Tennessee Warbler	*Oreothlypis peregrina*	S5B		
Common Raven	*Corvus corax*	S5			Veery	*Catharus fuscescens*	S4B		
Common Yellowthroat	*Geothlypis trichas*	S5B			White-throated Sparrow	*Zonotrichia albicollis*	S5B		
Downy Woodpecker	*Picoides pubescens*	S5			Willow Flycatcher	*Empidonax traillii*	S5B		
Eastern Kingbird	*Tyrannus tyrannus*	S4B			Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR
Eastern Towhee	*Pipilo erythrophthalmus*	S4B			Yellow Warbler	*Setophaga petechia*	S5B		
European Starling	*Sturnus vulgaris*	SNA			Yellow-rumped Warbler	*Setophaga coronata*	S5B		
Field Sparrow	*Spizella pusilla*	S4B							

Notes

S-Ranks-

S1: Critically Imperiled - Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2: Imperiled - Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3: Vulnerable - Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4: Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.

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SR: Reported in Ontario, but without persuasive documentation.

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SE: Exotic; not believed to be a native component of Ontario's flora. Numerical rankings after SE follow designations described above for native species.

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SU: Unranked — Nation or state/province conservation status not yet assessed.

ESA Status

Endangered Species Act (ESA), 2007. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC

SARA Status

Species at Risk Act (SARA), 2002. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC

Appendix F

Species at Risk Screening

Common Name	Scientific Name	SARA[1]	ESA[2]	Habitat Requirements	Likelihood of Occurrence within the Local Study Area
Insects					
Monarch	*Danaus plexippus*	SC	SC	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (*Asclepias* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).	High likelihood of occurrence. Monarch observed within the Local Study Area. Milkweed is also present within the Local Study Area.
Birds					
Bank swallow	*Riparia riparia*	THR	THR	In Ontario, the bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	Moderate likelihood of occurrence as potentially suitable habitat is present within the Local Study Area.
Barn swallow	*Hirundo rustica*	THR	THR	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared right-of-ways, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	High likelihood of occurrence. Observed foraging over the Site Study Area during surveys.
Bobolink	*Dolichonyx oryzivorus*	THR	THR	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Martin and Gavin 1995).	Low likelihood of occurrence within the Local Study Area. Suitable habitat is potentially present within the agricultural areas, however these areas were not surveyed due to restricted access.
Canada warbler	*Cardellina canadensis*	THR	SC	In Ontario, breeding habitat for Canada warbler consists of moist mixed forests with a well-developed shrubby understory. This includes low-lying areas such as cedar and alder swamps, and riparian thickets (McLaren 2007). It is also found in densely vegetated regenerating forest openings.Suitable habitat often contains a developed moss layer and an uneven forest floor. Nests are well concealed on or near the ground in dense shrub or fern cover, often in stumps, fallen logs, overhanging stream banks or mossy hummocks (Reitsma et al. 2010).	High likelihood of occurrence. Observed within the Local Study Area during surveys.
Cerulean warbler	*Setophaga cerulea*	END	THR	In Ontario, breeding habitat of cerulean warbler consists of second-growth or mature deciduous forest with a tall canopy of uneven vertical structure and a sparse understory. This habitat occurs in both wet bottomland forests and upland areas, and often contains large hickory and oak trees. This species may be attracted to gaps or openings in the upper canopy. The cerulean warbler is associated with large forest tracks, but may occur in woodlots as small as 10 ha (COSEWIC 2010). Nests are usually built on a horizontal limb in the mid-story or canopy of a large deciduous tree (Buehler et al. 2013).	Moderate likelihood of occurrence as potentially suitable habitat is present within the Local Study Area.
Chimney swift	*Chaetura pelagica*	THR	THR	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	Low likelihood of occurrence as suitable habitat is not present within the Local Study Area.

Common Name	Scientific Name	SARA[1]	ESA[2]	Habitat Requirements	Likelihood of Occurrence within the Local Study Area
Eastern meadowlark	*Sturnella magna*	THR	THR	In Ontario, the eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970)	Low likelihood of occurrence within the Local Study Area. Suitable habitat is potentially present within the agricultural areas, however these areas were not surveyed due to restricted access.
Eastern wood-pewee	*Contopus virens*	SC	SC	The eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats but is most commonly associated with the mid-canopy of forest clearings, and edge habitat in deciduous and mixed forests. It also occurs in anthropogenic habitats that provide an open forested aspect such as parks and suburban neighborhoods. It prefers intermediate-age mature forest stands with little understory vegetation (COSEWIC 2012).	High likelihood of occurrence. Observed within the Local Study Area during surveys.
Golden-winged warbler	*Vermivora chrysoptera*	THR	SC	In Ontario, golden-winged warbler breeds in regenerating scrub habitat with dense ground cover and a patchwork of shrubs, usually surrounded by forest. Their preferred habitat is characteristic of a successional landscape associated with natural or anthropogenic disturbance such as right-of-ways, and field edges or openings resulting from logging or burning. The nest of the golden-winged warbler is built on the ground at the base of a shrub or leafy plant, often at the shaded edge of the forest or at the edge of a forest opening (Confer et al. 2011).	Low likelihood of occurrence as suitable habitat is not present within the Local Study Area.
Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum* (*pratensis* subspecies)	SC	SC	In Ontario, grasshopper sparrow is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures. Close-grazed pastures and limestone plains (e.g. Carden and Napanee Plains) support highest density of this bird in the province (COSEWIC 2013).	Low likelihood of occurrence within the Local Study Area. Suitable habitat is potentially present within the agricultural areas, however these areas were not surveyed due to restricted access.
Least bittern	*Ixobrychus exilis*	THR	THR	In Ontario, the least bittern breeds in marshes, usually greater than 5 ha, with emergent vegetation, relatively stable water levels and areas of open water. Preferred habitat has water less than 1 m deep (usually 10 – 50 cm). Nests are built in tall stands of dense emergent or woody vegetation (Woodliffe 2007). Clarity of water is important as siltation, turbidity, or excessive eutrophication hinders foraging efficiency (COSEWIC 2009).	High likelihood of occurrence. Observed in the Local Study Area during 2014 surveys (GHD 2017).
Red-headed woodpecker	*Melanerpes erythrocephalus*	END	END	In Ontario, the red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs (Woodliffe 2007). They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees (Smith et al. 2000).	Moderate likelihood of occurrence as suitable habitat is present within the Local Study Area.
Wood thrush	*Hylocichla mustelina*	THR	SC	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).	High likelihood of occurrence. Observed within the Local Study Area during surveys.
Yellow-breasted chat	*Icteria virens virens*	END	END	In Ontario, yellow-breasted chat breeds in early successional, shrub-thicket habitats including woodland edges, regenerating old fields, railway and hydro right-of-ways, young coniferous reforestations, and wet thickets bordering wetlands. Tangles of grape (*Vitis* spp.) and raspberry (*Rubus* spp.) vines are features of most breeding sites. There is some evidence that the yellow-breasted chat is an area sensitive species. Nests are located in dense shrubbery near to the ground (COSEWIC 2011).	Moderate likelihood of occurrence as suitable habitat is present within the Local Study Area.

Common Name	Scientific Name	SARA[1]	ESA[2]	Habitat Requirements	Likelihood of Occurrence within the Local Study Area
Mammals					
Eastern small-footed myotis	*Myotis leibii*	—	END	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes, or rock piles, and occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017).	Moderate likelihood of occurrence as potentially suitable habitat is present within the Local Study Area.
Little brown myotis	*Myotis lucifugus*	END	END	In Ontario, this species range is extensive and covers much of the province. It will roost in both natural and man-made structures. They require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas (Lacki, 2007). May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required.	High likelihood of occurrence as suitable habitat is present within the Local Study Area.
Tri-colored bat	*Perimyotis subflavus*	END	END	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada (Poissant et al, 2010). They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year.	High likelihood of occurrence as suitable habitat is present within the Local Study Area.
Northern myotis	*Myotis septentrionalis*	END	END	In Ontario, this species range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required (COSSARO 2012).	High likelihood of occurrence as suitable habitat is present within the Local Study Area.
Reptiles					
Blanding's turtle - Great Lakes/St. Lawrence population	*Emydoidea blandingii*	THR	THR	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2005).	High likelihood of occurrence. Observed in the Local Study Area during 2014 surveys (GHD 2017).
Eastern ribbonsnake - (Great Lakes population)	*Thamnophis sauritus*	SC	SC	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).	High likelihood of occurrence as suitable habitat is present within the Local Study Area.
Midland painted turtle	*Chrysemys picta marginata*	SC	Under consideration	Painted turtles occupy slow moving, relatively shallow and well-vegetated wetlands (e.g., swamps, marshes, ponds, fens, bogs, and oxbows) and water bodies (e.g., lakes, rivers, creeks, and streams) with abundant basking sites and organic substrate. The species is semi-tolerant of human-altered landscapes and may occasionally be found occupying urban ponds and lands subject to anthropogenic disturbance (e.g., farm ponds, impoundments, water treatment facilities) (COSEWIC 2018).	High likelihood of occurrence as suitable habitat is present within the Local Study Area.
Milksnake	*Lampropeltis triangulum*	SC	NAR	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).	High likelihood of occurrence. Observed within the Site Study Area during surveys.

Common Name	Scientific Name	SARA[1]	ESA[2]	Habitat Requirements	Likelihood of Occurrence within the Local Study Area
Northern map turtle	Graptemys geographica	SC	SC	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).	High likelihood of occurrence as suitable habitat is present within the Local Study Area.
Snapping turtle	*Chelydra serpentina*	SC	SC	In Ontario, snapping turtle utilizes a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).	High likelihood of occurrence. Observed in the Local Study Area during 2013 surveys (GHD 2017).
Vascular Plants					
American chestnut	*Castanea dentata*	END	END	In Ontario, American chestnut occurs in mixed or deciduous forests in the Carolinian zone (Farrar 1995). It is often found in communities with dense canopy cover and often associated with oak and maple. This tree grows primarily on acidic, sand or gravel soils (Boland et al. 2012).	Moderate likelihood of occurrence as suitable habitat is present within the Local Study Area.
Black ash	*Fraxinus nigra*	-	END	Black Ash is predominantly a wetland species of swamps, floodplains and fens. It has an intermediate light requirement and a tendency toward greater abundance in more alkaline sites. Most sites in which it is dominant are flood prone, where its high tolerance of seasonal flooding appears to offer a competitive advantage. Black Ash also occurs widely in moist upland forests, but generally at lower densities than in wet areas (COSEWIC 2018).	Moderate likelihood of occurrence as suitable habitat is present within the Local Study Area. Observed in the Local Study Area during 2016 surveys (GHD 2017).
Butternut	*Juglans cinerea*	END	END	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	Moderate likelihood of occurrence as suitable habitat is present within the Local Study Area.
Eastern flowering dogwood	*Cornus florida*	END	END	In Ontario, eastern flowering dogwood grows in the understory of dry to rich deciduous forests, especially on hillsides and riverbanks. It prefers sandy acidic soils but occasionally is found in loams, clays and organic soils (Waldron 2003). This species is restricted to the Carolinian zone of southern Ontario.	Moderate likelihood of occurrence as suitable habitat is present within the Local Study Area.
Notes					
[1] *Species at Risk Act* (SARA), 2002. Schedule 1; Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)					
[2] *Endangered Species Act* (ESA), 2007. Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)					


GHD

Appendix G

Checklist for Cultural and Built Heritage

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Archaeological Potential

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

  If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

  The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

  If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

Project or Property Name

Brooks Road Landfill Site

Project or Property Location (upper and lower or single tier municipality)

160 Brooks Road, Haldimand, ON

Proponent Name

Brooks Road Environmental

Proponent Contact Information

Richard Weldon, 416-928-4810

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	☐	☑

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	☐	☑
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	☐	☑
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	☐	☑
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	☐	☑
7. Has the property (or project area) been recognized for its cultural heritage value?	☐	☑

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	☑	☐

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

	Yes	No
9. Are there present or past water sources within 300 metres of the property (or project area)?	☐	☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

	Yes	No
10. Is there evidence of two or more of the following on the property (or project area)?	☐	☐

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
  - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
  - individual designation (Part IV)
  - part of a heritage conservation district (Part V)
  - an archaeological site (Part VI)
- subject to:
  - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
  - a notice of intention to designate (Part IV)
  - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
  - a municipal register or inventory of heritage properties
  - Ontario government's list of provincial heritage properties
  - Federal government's list of federal heritage buildings
- part of a:
  - National Historic Site
  - UNESCO World Heritage Site
- designated under:
  - *Heritage Railway Station Protection Act*
  - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check Regulation 875 and Ontario Regulation 11/06.

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
  - where the building has deep foundations or a basement
- infrastructure development such as:
  - sewer lines
  - gas lines
  - underground hydro lines
  - roads
  - any associated trenches, ditches, interchanges. **Note**: this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
  - primary - lakes, rivers, streams, creeks
  - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
  - high bluffs
  - swamps
  - marsh fields by the edge of a lake
  - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
  - temporary channels for surface drainage
  - rock chutes and spillways
  - temporarily ponded areas that are normally farmed
  - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
  - runoff from farm animal yards
  - manure storage facilities
  - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

- **Elevated topography**

  Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

  Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

  Find out if your property or project area has elevated topography, through:

  - site inspection
  - aerial photographs
  - topographical maps

- **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

  Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

  Find out if your property or project area has sandy soil through:

  - site inspection
  - soil survey reports

- **Distinctive land formations**

  Distinctive land formations include – but are not limited to:

  - waterfalls
  - rock outcrops
  - rock faces
  - caverns
  - mounds, etc.

  They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

  - burials
  - structures
  - offerings
  - rock paintings or carvings

  Find out if your property or project areas has a distinctive land formation through:

  - a site visit
  - aerial photographs
  - 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

  The following resources were collected in these extraction areas:

  - food or medicinal plants e.g., migratory routes, spawning areas, prairie
  - scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
  - resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

  Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

  Early Euro-Canadian settlement include – but are not limited to:

  - early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
  - early wharf or dock complexes
  - pioneers churches and early cemeteries

  For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

  For more information, see:

  - historical maps and/or historical atlases
    - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
    - Archives of Ontario holds a large collection of historical maps and historical atlases
    - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
  - commemorative markers or plaques such as local, provincial or federal agencies
  - municipal heritage committee or other local heritage organizations
    - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
    - for information on commemorative markers or plaques

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
    - is a recognized heritage property
    - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
    - the main project area
    - temporary storage
    - staging and working areas
    - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

Brooks Road Landfill Site

Project or Property Location (upper and lower or single tier municipality)

160 Brooks Road, Haldimand County, ON

Proponent Name

Brooks Road Environmental

Proponent Contact Information

Richard Weldon, 416-928-4810

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b. has or is adjacent to a known burial site and/or cemetery?	☐	☑
c. is in a Canadian Heritage River watershed?	☑	☐
d. contains buildings or structures that are 40 or more years old?	☐	☑

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☐	☑
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

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ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

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iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

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iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Appendix H

Transportation Assessment Report

Transportation Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

2270386 Ontario Limited

April 1, 2024

→ The Power of Commitment

Project name		Brooks Road Landfill Expansion					
Document title		Transportation Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524					
File name		Brooks Road Landfill Capacity Expansion Environmental Screening Transportation Assessment Report-November 2023.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
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Contents

Table index

Figure index

Appendices

1. Introduction

The Brooks Road Landfill Site (Site) is located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario and is owned and operated by 2270386 Ontario Limited, herein referred to as Brooks Road Environmental (BRE, Owner, Proponent). The location of the Site is shown in Figure 1.1.

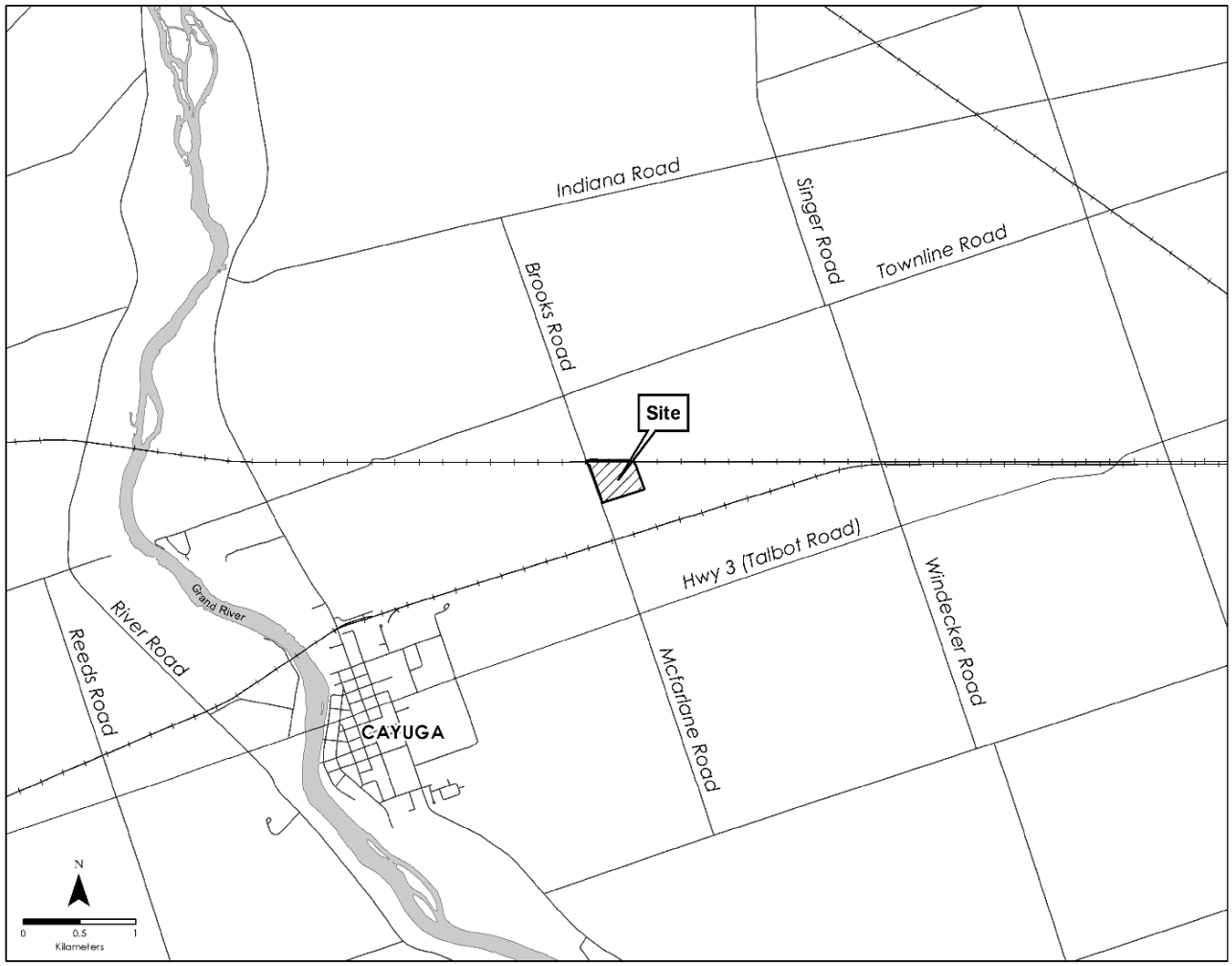

Figure 1.1 Location of the Proposed Undertaking

The Site, which operates under Environmental Compliance Approval (ECA) No. A110302 (Landfill ECA), has an approved annual fill rate of 250,000 tonnes per year and a total capacity of 1,045,065 cubic metres (m^3) (including waste and cover). The Site also operates under an air and noise ECA No. 7323-C6EJUM (Air ECA) and industrial sewage works ECA No. 1122-BKUPSM (Industrial Sewage ECA). The Site has accepted waste (in one form or another) since 1959 and received a Certificate of Approval (CofA, now referred to as an ECA) in 1980, with amendments approved by the Ministry of the Environment (currently the Ministry of Environment, Conservation and Parks (MECP) in 1980, 2002, 2004, 2005, 2007, 2011, 2012, 2013, 2014, 2017, 2018, 2020, and 2021. Under the current ECA, the Site is licenced to receive post-diversion solid non-hazardous Industrial, Commercial & Institutional (IC&I) waste from across Ontario. The 14.3-hectare (ha) Site contains an approved fill area of 6 ha.

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road

Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151,000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

In order to meet the growing demand from waste generators and customer for a safe and reliable waste management facility for their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils), Brooks Road Environmental is proposing to expand the capacity of the Brooks Road Landfill by approximately 219,400 m^3, adding capacity equal to approximately two additional years. This expansion would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours), as well as increasing the existing landfill footprint to expand the Site horizontally, as shown in Figure 1.2.

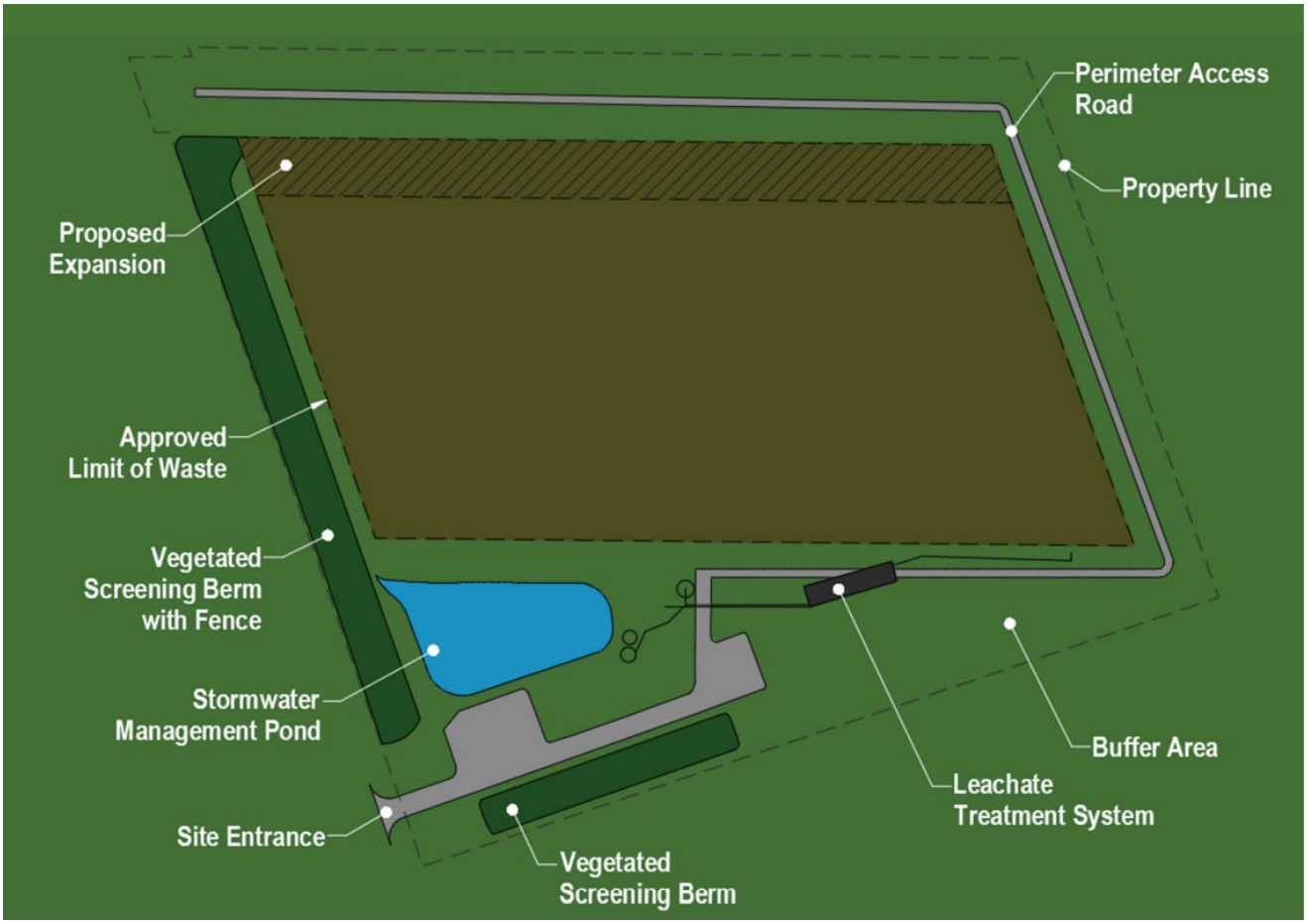

Figure 1.2 Proposed Capacity Expansion Concept

The proposed expansion would amend the approved ECA to allow for landfill volume expansion by approximately 219,400 m^3, allowing for receipt of an approved maximum daily quantity (1,000 tonnes per day) throughout the year, maintaining the approved rate of 250,000 tonnes per year. The proposed change to the total landfill capacity requires additional landfill infrastructure and changes to the currently approved landfill volume, footprint, and final contours.

The proposed Brooks Road Landfill Site capacity expansion is subject to the Environmental Screening Process in accordance with Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *EA Act*, as follows:

A change to a landfilling site or dump is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies, if the changes meet the following criteria:

1. *The total waste disposal volume of the landfilling site or dump after the change would exceed the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change by more than 100,000 cubic metres but by less than or equal to 375,000 cubic metres.*
2. *The increase in the total waste disposal volume of the landfilling site or dump would not exceed 25 per cent of the total waste disposal volume that the landfilling site or dump was authorized to have under the Environmental Protection Act before the change.*
3. *If a notice of completion under the Environmental Screening Process for Waste Management Projects has been submitted to the Ministry in respect of a previous change to the landfilling site or dump that meets the criteria in paragraphs 1 and 2, the day on which the notice of commencement is issued under the Environmental Screening Process for Waste Management Projects in respect of the change is at least 10 years after the day the notice of completion in respect of the previous change was submitted.*

Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process an application will be made to amend the existing ECA No. A110302.

GHD has prepared a Transportation Assessment on behalf of BRE for the proposed undertaking. This report documents the following as it relates to the transportation environment:

– Baseline/existing conditions (i.e., what exists in the absence of the proposed project).
– Potential effects on the environment, mitigation measures, and net effects.
– Future monitoring requirements to be implemented.

The Study Areas reviewed for the transportation assessment were as follows (see **Figure 1.3**):

– **Site Study Area (SSA)** – the 14.3 ha area within the existing, approved boundaries of the Site, as defined by ECA No. A110302, as amended; and
– **Local Study Area (LSA)** – the area within the vicinity of the Site extending approximately 1 kilometre (km) in all directions.

Paper Size ANSI B

0 75 150 225 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
TRANSPORTATION ASSESSMENT
REPORT

STUDY AREAS

Project No. **12561524**
Revision No. **-**
Date **Oct 26, 2022**

FIGURE 1.3

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Print date: 26 Oct 2022 - 13:27

Data source: Google Earth Imagery, Date: 07/08/2018

2. Screening Criteria Checklist

At the beginning of the Environmental Screening, the Screening Criteria Checklist (provided as Schedule I, pp 67 – 69, to the "Guide to Environmental Assessment Requirements for Waste Management Projects") is to be completed based on the information provided in the Project Description. The Screening Criteria reflect the broad definition of "environment" contained in the *Ontario Environmental Assessment Act.*

As noted in the Guide:

"*The Screening Criteria are presented in the form of a checklist with the option of a "Yes" or "No" response. Mitigation measures **are not** to be considered in concluding whether there is "No" potential environmental effect. That is, the proponent is required to answer "Yes" even if the proponent believes that a potential environmental effect could likely be mitigated. The reason for requiring a "Yes" is to ensure that mitigation measures are open to discussion and review. Another reason for this approach is that further discussion and review of a potential effect may reveal that there is no actual effect, in which case no mitigation is required. Where a "yes' has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance. Even where the proponent indicates that no environmental effects are anticipated, it is recommended that additional information is provided in the Environmental Screening Report in order to support the "no effects" conclusion*."

Each criterion is based on a question which is prefaced with the phrase, "*Might the Project*…" Table 2.1 was completed as the first step of the Environmental Screening Process and is a summary of the criteria for the Transportation discipline. Further descriptions of the criteria for which a "Yes" response was indicated in the Screening table are discussed in Section 4 of this report.

Table 2.1 Screening Criteria Checklist – Transportation

	Criterion	YES	NO	Additional Information
	Might the project…			
1. Socio-Economic				
6.8	Cause negative effects related to traffic?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects related to traffic through prolonging the life of the Site.

3. Existing Conditions

The following subsections describe the existing conditions that are found within the SSA and LSA of the proposed project.

3.1 Methodology

3.1.1 Available Secondary Source Information Collection and Review

Available secondary sources of information were collected and reviewed by the Transportation Study Team to determine existing Transportation conditions within the Study Area(s). The following sources of secondary information were collected and reviewed in completing the 2018 Individual Environmental Assessment:

– Haldimand County Annual Average Daily Traffic (AADT) data, 2005

– Haldimand County Annual AADT data, 2011

3.1.2 Process Undertaken

Information on the Transportation Existing Conditions within the Study Area was gathered from a combination of secondary source research, field investigations and discussions with Haldimand County staff.

3.1.3 Field Investigations

As part of the 2018 Individual Environmental Assessment, turning movement counts were conducted at the intersection of Highway 3 and Brooks Road and at the existing Brooks Road Landfill Site driveway during the weekday a.m., mid-day and p.m. peak periods and Saturday mid-day peak periods. These counts were completed on Saturday, December 5, 2015 and on Monday, December 7, 2015.

3.1.4 Agency Consultation

Also, as part of the 2018 Individual Environmental Assessment, discussions with Haldimand County staff took place in December 2015 to confirm AADT data.

3.2 Description of Existing Conditions

Road Network

The following two major roads provide access to the existing Brooks Landfill:

Highway 3 (Talbot Road) – within the vicinity of Brooks Road, Highway 3 (Talbot Road) is a two-lane road with a posted speed limit of 80 kph. The intersection of Highway 3 and Brooks Road is stop controlled on Brooks Road with both eastbound and westbound right turn taper on Highway 3.

Brooks Road – Brooks Road is a two-lane road that extends from Highway 3(Talbot Road) in the south and terminates at Indiana Road to the north. The speed limit on this road is 50 kph. Brooks Road is paved from Highway 3 to just north of the Brooks landfill driveway access where it changes to a gravel road for the remaining length to Indiana Road.

Traffic Data

Historical AADT data was obtained from Haldimand County. The 2005 AADT on Brooks Road approximately 500 metres north of Highway 3 was 144 two-way trips. In 2011 the AADT was slightly lower at 114 two-way trips. Discussions with staff confirmed that the split is approximately 50/50 between north and south volumes.

Turning movement counts were also conducted on Saturday, December 5, 2015 and on Monday, December 7, 2015 at both the intersection of Highway 3 and Brooks Road and at the existing Brooks Road Landfill Site driveway during the weekday a.m., mid-day and p.m. peak periods and Saturday mid-day peak periods. Detailed turning movement data sheets are found in Appendix A.

2022 Base Traffic Conditions

To establish the base 2022 traffic conditions and capture any expected background growth in traffic volumes at the study area intersections, a conservative compound annual growth rate of 2.0 percent was adopted and utilized to forecast grow the 2015 turning movement counts to 2022. The base 2022 traffic volumes also includes the estimated 16 site trucks per day as a result of the proposed vertical expansion approved in 2018. To provide a conservative and worst-case scenario analysis, all 16 of the daily truck trips associated with the vertical expansion were applied to each peak hour (i.e., all 16 would enter/exit the site within each of the peak hours which results in a large over estimation of the daily traffic volumes to the Site).

The resulting 2022 weekday a.m., mid-day and p.m. peak hour as well as the Saturday peak hour volumes are summarized in Figure 3.1.

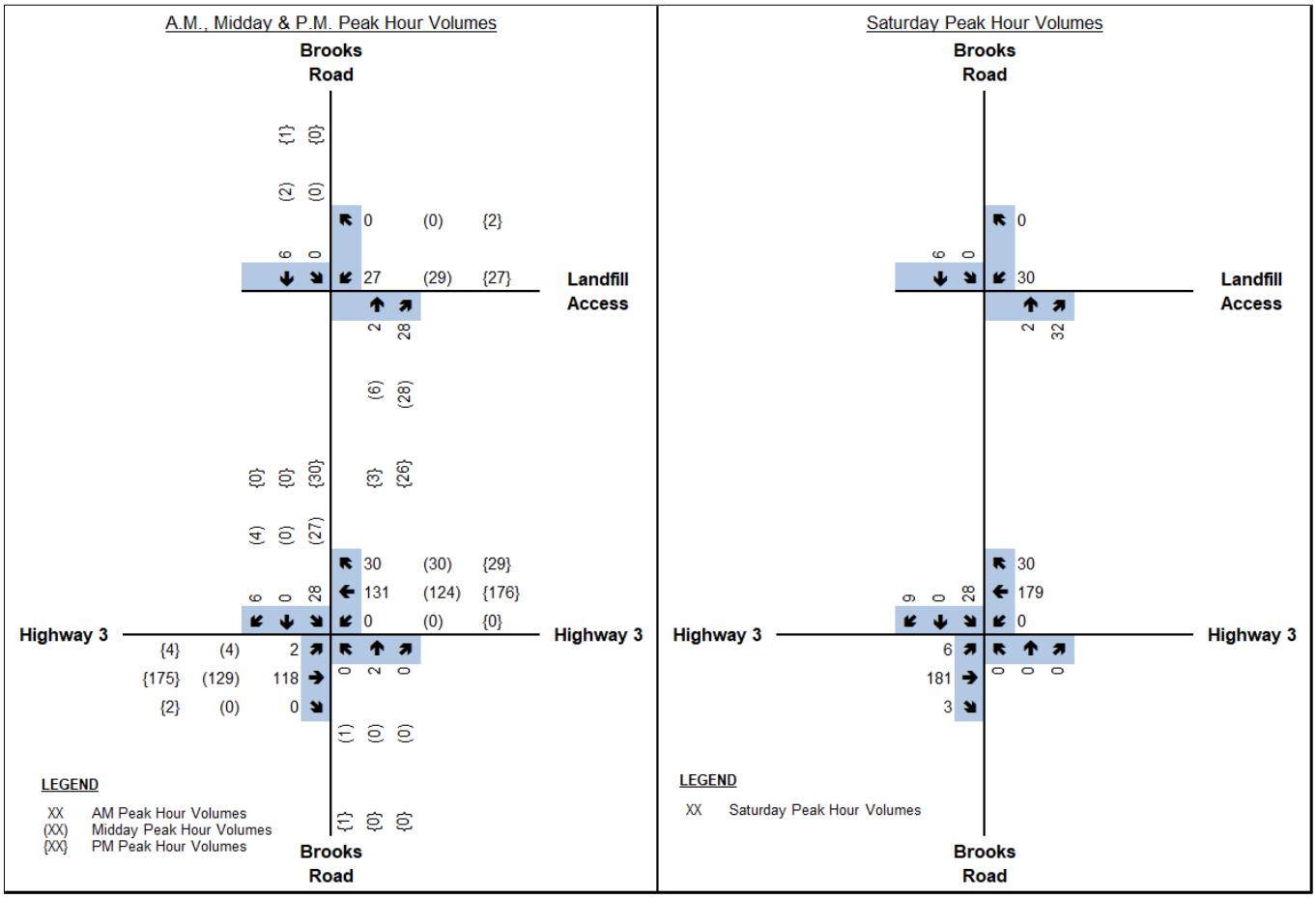


Figure 3.1 2022 Existing Peak Hour Volumes

Traffic on Brooks Road is predominately truck traffic specific to the landfill operation, traffic on Highway 3 is a mix of both commuter and truck traffic.

Landfill Operations

The Brooks Road Landfill Site is currently open and accepting waste during the week and on Saturdays. The site currently handles 1,000 tonnes of material per day based on the following five different truck configurations:

– Walking floor – can handle 25 to 40 metric tonnes per load
– Roll-off – can handle 0.5 to 10 metric tonnes per load
– Front End – can handle 3 to 12 metric tonnes per load
– Tri-axle – can handle 14 to 22 metric tonnes per load
– Dump trailer – can handle 34 to 42 metric tonnes per load

The current maximum daily truck traffic at the landfill assuming delivery of 1,000 tonnes of material per day is 16 to 24 walking floor trucks, 2 to 4 front end trucks and 2 to 6 roll-offs for a total of 34 inbound and 34 outbound trucks plus another one or two trips for staff over the period of a day. This number can increase slightly if there are certain soil jobs on the site as the walking floor trucks are replaced with Dump trailers and Tri-axle trucks.

The turning movement counts conducted at the site driveway on Saturday December 5, 2015 and Monday December 7, 2015 show the following total volume of trucks entering and exiting the landfill during the peak hours:

– Weekday am peak hour – 12 inbound and 11 outbound
– Weekday mid-day peak hour – 12 inbound and 13 outbound
– Weekday pm peak hour – 10 inbound and 13 outbound
– Saturday mid-day peak hour – 16 inbound and 14 outbound

The traffic volumes confirm that the peak operating times for the landfill occur during both the weekday and Saturday mid-day peak hours when the maximum volumes of inbound and outbound traffic were observed.

Coincidentally, a review of the 2015 traffic counts confirms that the volume of inbound and outbound traffic from the landfill during the two survey dates was considerably higher than the typically expected volumes provided by the operator assuming delivery of 1,000 tonnes of material per day. It was confirmed that during the two survey dates, there was a transfer of clean clay to another property that resulted in approximately 75 additional loads throughout both days.

As a result, the analysis of the existing 2022 conditions not only includes the approved vertical expansion but also includes additional traffic that is not typical for existing operations and results in slightly reduced capacity at both the site driveway on Brooks Road and at the intersection of Brooks Road and Highway 3.

Capacity Analysis

As a measure of the existing capacity on the adjacent road network surrounding the Brooks Landfill, both the site access on Brooks Road and the stop-controlled intersection of Brooks Road and Highway 3 were analyzed using the projected 2022 turning movement volumes for the weekday am, mid-day, pm and Saturday peak hours. A summary of the capacity analysis using Synchro version 10 is summarized in Table 3.1 below with detailed reports provided in Appendix A.

Table 3.1 Existing Capacity Analysis

Intersection	Movement v/c ratio (LOS) delay			
	A.M. Peak	Mid-Day Peak	P.M. Peak	Sat Peak
Brooks Road and Landfill access	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec	WBLR = 0.03 LOS A 9 Sec NBTR = 0.02 LOS A 0 Sec SBTL = 0 LOS A 0 Sec
Brooks Road and Highway 3	EBTLR = 0 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS B 11 Sec SBTLR = 0.05 LOS B 10 Sec	EBTLR = 0 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS B 11 Sec SBTLR = 0.05 LOS B 11 Sec	EBTLR = 0 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS B 12 Sec SBTLR = 0.06 LOS B 12 Sec	EBTLR = 0.01 LOS A 0 Sec WBTLR = 0 LOS A 0 Sec NBTLR = 0 LOS A 0 Sec SBTLR = 0.07 LOS B 12 Sec

The turning movements at both study intersections currently operate with levels of service ‘B’ or better during the weekday am, mid-day, pm and Saturday mid-day peak hours.

The analysis of existing conditions confirms no current capacity constraints at either study intersection despite the higher than normal traffic volumes captured during the survey of existing traffic volumes as a result of the movement of clean clay off-site.

Safety Analysis

Collision Analysis

A review of available data shows that there is no indication that either Highway 3 in the vicinity of Brooks Road, or Brooks Road north to the site has experienced significantly higher collision frequency than the historical average accident rate along Highway 3 in Haldimand County.

Sight Line Analysis

The site entrance in its current location satisfies the sight distance requirements for trucks approaching and departing from the site. Brooks Road is fairly straight with little deviation in the horizontal or vertical alignment. Existing sight distances are in excess of 350 metres both to the north and south of the driveway access which exceeds the required sight distance based on TACC standard of 85 metres for stopping sight distance which for a posted speed limit of 50 kph (60 kph design speed).

4. Potential Effects, Mitigation Measures & Net Effects

A Project Description, which includes proposed engineering design figures, was prepared so that potential environmental effects and mitigation measures could be identified. The following subsections provide a general summary of the proposed undertaking.

4.1 Description of Project Components and Activities

The project for which the Environmental Screening Process is being undertaken is a proposed capacity expansion of 219,400 m^3 and involves a change to the final site capacity, contours, and footprint. Some level of construction is required to implement the proposal. This would be a combination of re-engineering the Site's final contours to expand the Site vertically in the expansion area (not to exceed current approved peak contours, as well as increasing the existing landfill footprint to expand the Site horizontally. Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours. The former railway property would continue to provide buffer land for the Site. The Brooks Road Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual. There are no changes to the annual fill rate limits (maximum 1,000 tonnes per day and 250,000 tonnes per year) proposed as part of this project.

A summary of the key elements of the proposed capacity expansion compared to the existing approved Site is provided in Table 4.1.

Table 4.1 Summary of Proposed Brooks Road Landfill Capacity Expansion Design vs Existing Landfill

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30

Design Component	Existing Landfill	Proposed Capacity Expansion
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted by 30 m. East and west ditches will extend to maintain full perimeter ditch.
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Methodology and Investigations

The assessment of effects associated with the proposed undertaking was carried out through a series of steps that is based, in part, on the description of existing conditions as well as the Project Description and Site Plan. The assessment of effects was also undertaken within the context of the previously completed Screening Criteria Checklist, as summarized in **Section 2** of this report.

Based on the description of the Alternative Methods provided in **Section 2** and the characterization of Transportation Existing Conditions within the Study Area described in **Section 3**, the following section provides the Transportation Future Conditions within the Study Area and any recommended mitigation measures for the 2026 horizon year when the Site is anticipated to reach capacity. The future conditions traffic analysis utilizes the existing 2022 conditions as a baseline and incorporates additional corridor growth to the traffic volumes.

As previously presented in **Table 4.1**, the maximum daily truck traffic before and after the proposed capacity expansion does not change and remains at 25 to 50 trucks per day. As a result, the turning volumes entering and exiting the site access are not expected to change from exiting conditions.

4.3 Future Transportation Conditions

4.3.1 Methodology

Horizon Year

The proposed capacity expansion for the existing site is expected to extend the life of the landfill by one approximately two years from 2024 to 2026. Therefore, a future horizon year of 2026 has been assumed representing the worst-case

scenario which includes the anticipated corridor growth expected until the Site reaches capacity. Haldimand County's Traffic Impact Study Guidelines for developments generating less than 500 peak hour vehicle trips requires future conditions traffic analysis be conducted for both the opening year and 5 years after opening. However, post 2026, the Site will generate no traffic onto the surrounding road network and therefore, analysis of future conditions was limited to the 2026 horizon year.

Background Volume Growth Rate

In order to capture any expected background growth in traffic volumes at the study area intersections, a conservative compound annual growth rate of 2.0 percent has been adopted and will be utilized to forecast for the 2026 traffic volumes.

Future Traffic Volumes

The Forecasted 2026 turning movement counts were projected at both the intersection of Highway 3 and Brooks Road and at the existing Brooks Road Landfill Site driveway during the weekday a.m., mid-day and p.m. peak periods and Saturday mid-day peak periods. This includes the existing truck traffic corresponding to approximately 1,000 tonnes per day. As previously noted, to provide a conservative and worst-case scenario analysis, the daily truck trips associated with the Site were applied to each peak hour (i.e., the total amount of daily truck trips would enter/exit the site within each of the peak hours). The resulting weekday a.m., mid-day and p.m. peak hour as well as the Saturday peak hour volumes are summarized in Figure 4.1. No additional site trips were accounted for in the 2026 horizon year as the maximum daily number of trucks generated by the Site remains at 25 to 50 trucks after the proposed capacity expansion.

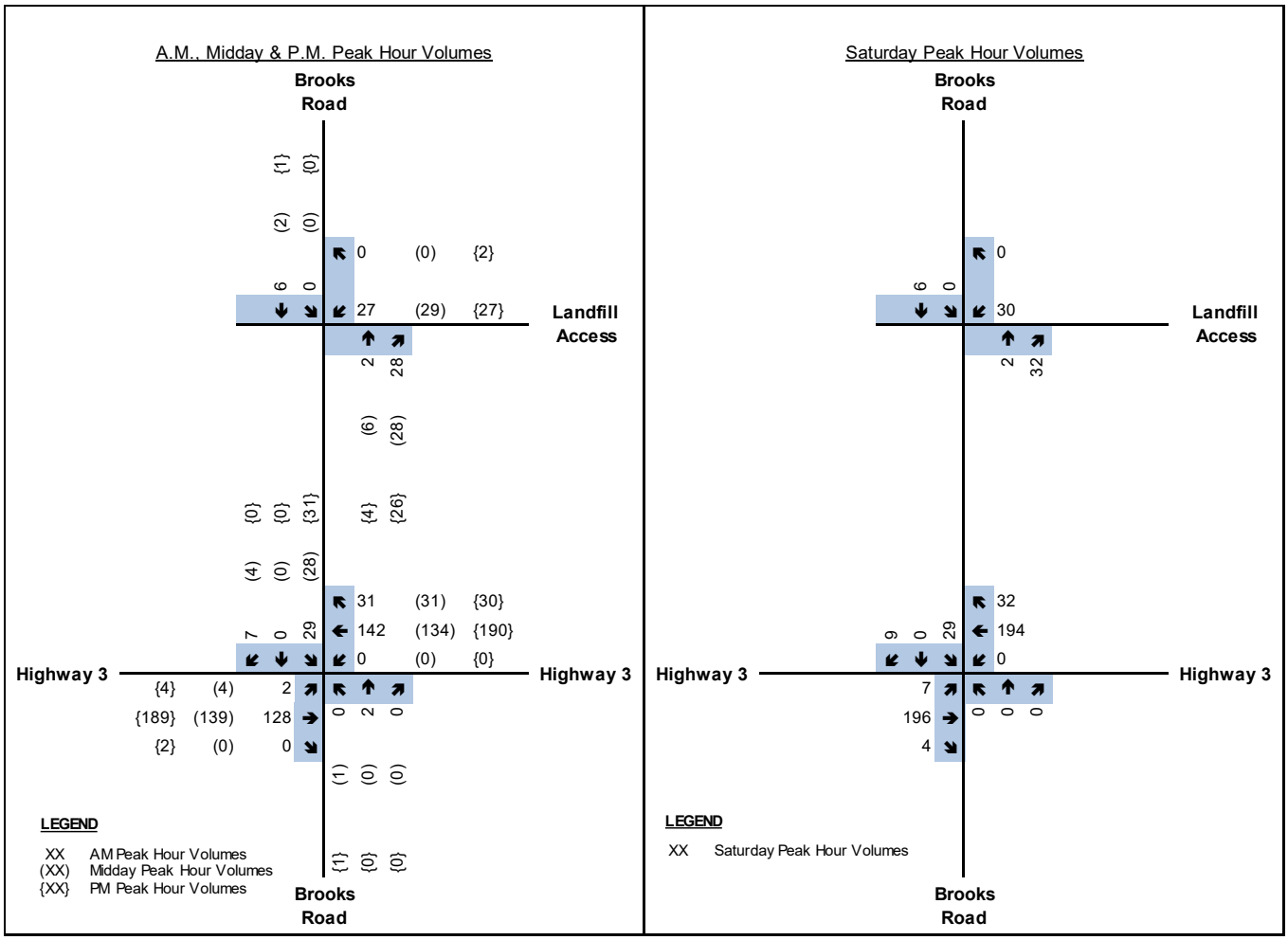


Figure 4.1 2026 Future Total Peak Hour Volumes

4.3.2 Capacity Analysis

As a measure of the capacity on the adjacent road network surrounding the Brooks Road Landfill at peak operations (i.e., 1,000 tonnes of material per day translating to 25 to 50 daily trucks), both the Site access on Brooks Road and the stop-controlled intersection of Brooks Road and Highway 3 were analyzed using the projected 2026 peak turning movement volumes for the weekday a.m., mid-day, p.m. and Saturday peak hours. A summary of the capacity analysis using Synchro version 10 is summarized in the Table 4.2 with detailed reports provided in Appendix A.

Table 4.2 2026Future Conditions Capacity Analysis at Peak Operations

Intersection	Movement v/c ratio (LOS) delay			
	A.M. Peak	Mid-Day Peak	P.M. Peak	Sat Peak
Brooks Road & Brooks Road Landfill Site access	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0 SEC	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0 SEC	WBLR = 0.03 LOS A 9 SEC NBTR = 0.02 LOS A 0 SEC SBTL = 0 LOS A 0 SEC
Brooks Road & Highway 3	EBTLR = 0 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS B 11 SEC SBTLR = 0.06 LOS B 11 SEC	EBTLR = 0 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS B 11 SEC SBTLR = 0.05 LOS B 11 SEC	EBTLR = 0 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS B 12 SEC SBTLR = 0.06 LOS B 12 SEC	EBTLR = 0.01 LOS A 0 SEC WBTLR = 0 LOS A 0 SEC NBTLR = 0 LOS A 0 SEC SBTLR = 0.08 LOS B 12 SEC

Both intersections overall are expected to operate with minimal delay and substantial excess capacity under future 2026 conditions. Individual movements at both study intersections are expected to operate with levels of service ‘B’ or better representing minimal delay, and volume-to-capacity (v/c) ratios not exceeding 0.08 representing substantial excess capacity, during the weekday a.m., mid-day, p.m. and Saturday mid-day peak hours.

The analysis of future 2026 conditions under peak operations confirms no vehicle delay issues or capacity constraints at either study intersection resulting from the proposed capacity expansion.

4.3.3 Safety Analysis

4.3.3.1 Collision Analysis

Existing conditions collision analysis determined no indication that either Highway 3 in the vicinity of Brooks Road or Brooks Road north to the site has experienced significantly higher collision frequency than the historical average accident rate along Highway 3 in Haldimand County. Since no additional site traffic is generated by the proposed capacity expansion, safety conditions remain unchanged.

4.3.3.2 Sight Line Analysis

Existing conditions sight line analysis determined the site entrance in its current location satisfies the sight distance requirements for trucks approaching and departing from the site.

4.4 Transportation Net Effects

This Section provides an assessment of the potential negative environmental effects (i.e., those for which a “Yes” answer was given in the Screening Criteria Checklist) for those Transportation criteria which might be affected by the project as identified in **Section 2**. The effects assessment describes how existing environmental conditions in the Study Area(s) would change as a result of the construction and operation of the proposed undertaking.

As described in Section 2, a “Yes” was applied to the following Transportation criteria:

6. Socio-Economic				
6.8	Cause negative effects related to traffic?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects related to traffic through prolonging the life of the Site.

With respect to the above criterion, a description of the potential negative environmental effects, necessary mitigation measures and the resultant net effects on the environment are discussed. Studies conducted during the Environmental Screening Process showed that the anticipated effects will be much less than expected or will not occur at all. In all cases, impact management (mitigation) measures have been identified that, when applied, will eliminate the potential environmental effects, or reduce them to acceptable levels.

4.4.1 Potential Effects on Transportation Environment

Based on the Future Conditions traffic analysis undertaken in **Section 4.1**, it is expected that the proposed capacity expansion will have a negligible transportation effect at the study area intersections and surrounding road network. Truck traffic associated with the proposed capacity expansion will not contribute any additional truck traffic within the study area, therefore it is not expected to adversely affect residents, businesses, institutions and movement of farm vehicles in the LSA.

4.5 Mitigation Measures

With no additional truck traffic generated by the proposed capacity expansion, no mitigation measures are recommended in order to avoid or minimize impacts on Transportation.

4.5.1 Net Effects

As no mitigation measures beyond those incorporated into the design are recommended, the net impacts of the capacity expansion from a transportation perspective are represented in the Future Transportation Conditions analysis undertaken in Section 4.1.

4.6 Monitoring Requirements

Since no mitigation measures were identified in **Section 4.5** are implemented as envisioned, no further monitoring of the transportation effects are recommended.

4.7 Additional Approvals

No additional approvals are required for transportation.

5. Conclusion

Under existing 2022 traffic conditions the site is expected to be acceptable from a traffic operations and safety perspective. The capacity analysis under peak operations confirms no current capacity constraints in the LSA road network. Concerning safety, a review of previously obtained data shows the LSA road network has not experienced significantly higher collision frequency than the local historical average accident rate, and a review of the site entrance in its current location satisfies the sight distance requirements.

The analysis of future conditions undertaken for the 2026 horizon year when the Site is anticipated to reach maximum capacity, indicates the site will continue to be acceptable from a traffic operations and safety perspective. Under peak operations no vehicle delay issues or capacity constraints at either study intersection are expected. Concerning safety, it is expected that since no additional site traffic is generated by the proposed capacity expansion, existing safety conditions will not deteriorate, and Site traffic will continue to be safely accommodated by the existing site entrance.

No mitigation measures beyond those incorporated into the design have been recommended as a result of the proposed capacity expansion.

Concerning the truck transportation effects along access roads, no effects are expected. With no additional traffic being generated by the Site, there is an expected minimal impact on traffic safety, traffic operations, and no potential road improvements are required or recommended.

Appendices

Appendix A

Detailed Turning Movement Data Sheets and Synchro Capacity Reports

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 8:30:00
To: 10:30:00

One Hour Peak
From: 9:30:00
To: 10:30:00

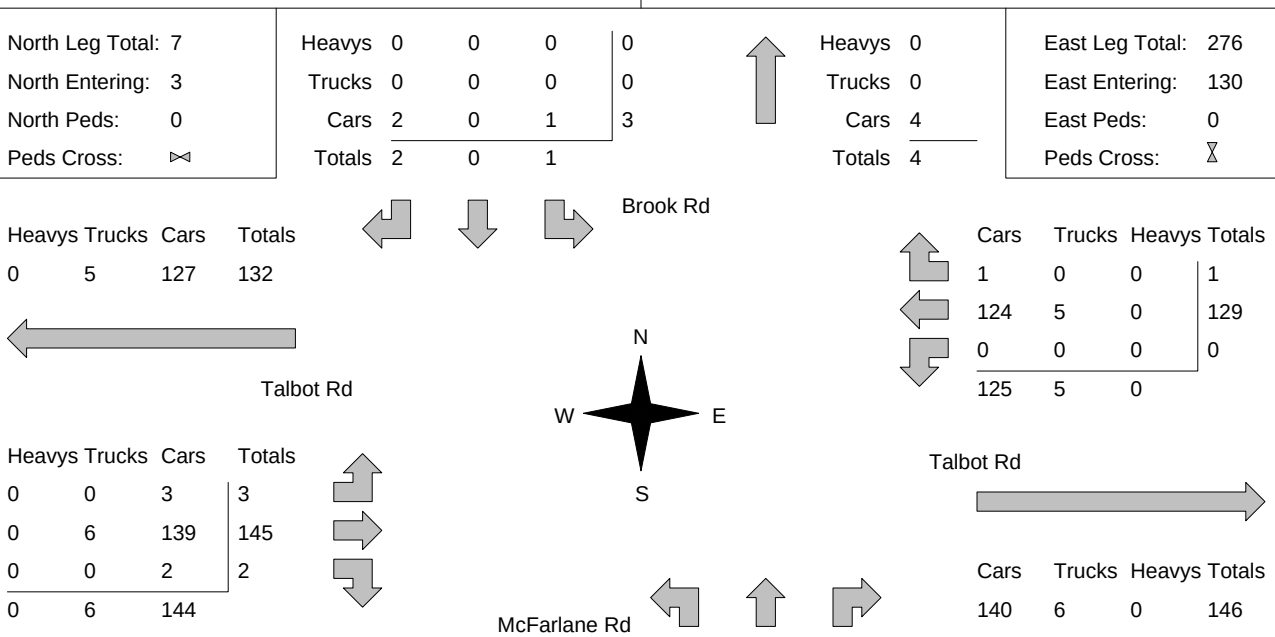
Municipality: Cayuga
Site #: 1533100001
Intersection: Talbot Rd & Brook Rd
TFR File #: 1
Count date: 5-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Talbot Rd runs W/E



Comments

Ontario Traffic Inc

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 14:30:00

One Hour Peak
From: 11:30:00
To: 12:30:00

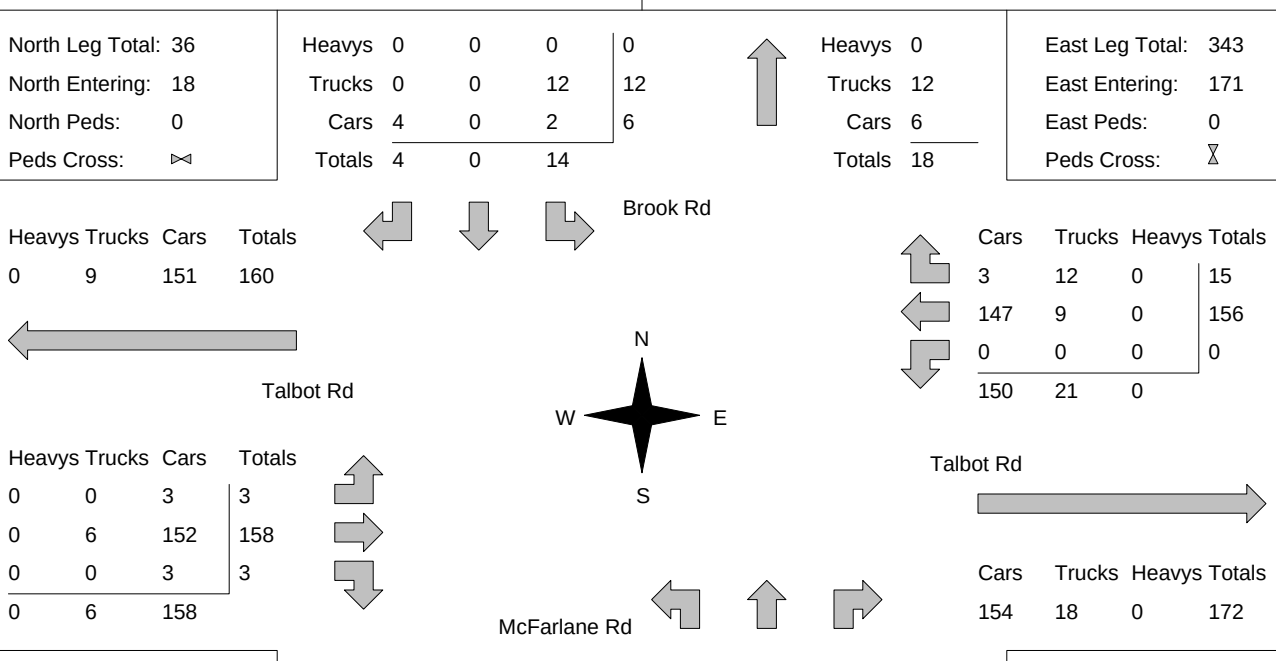
Municipality: Cayuga
Site #: 1533100001
Intersection: Talbot Rd & Brook Rd
TFR File #: 1
Count date: 5-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Talbot Rd runs W/E



Comments

Ontario Traffic Inc

Total Count Diagram

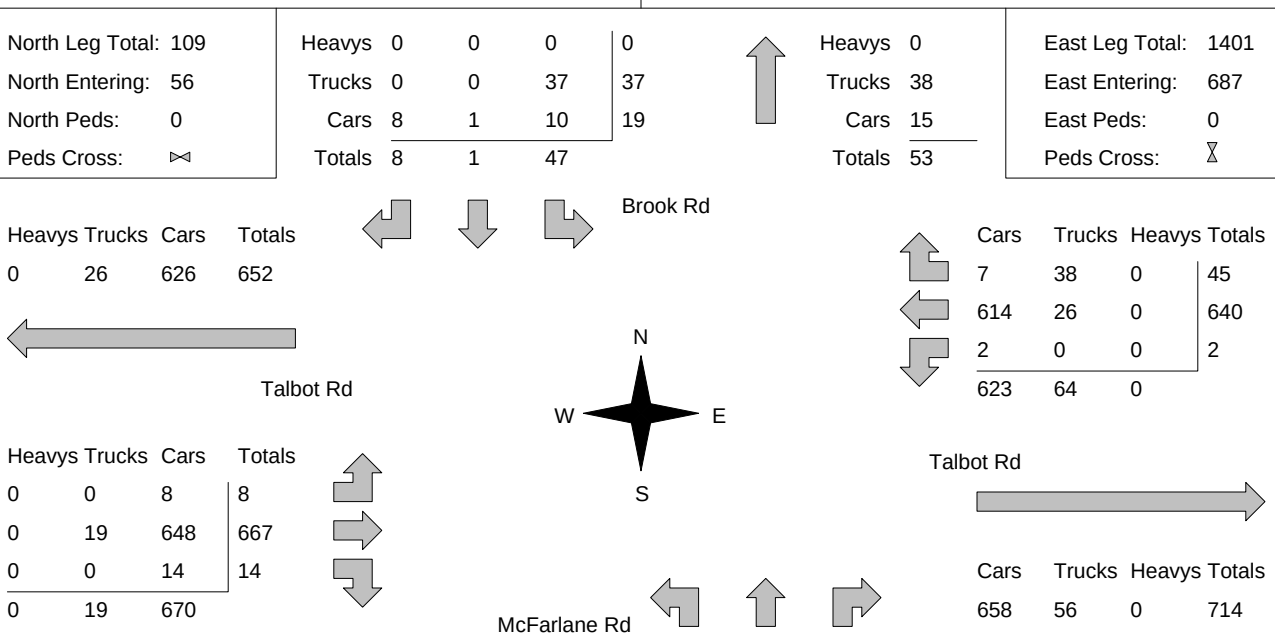
Municipality: Cayuga
Site #: 1533100001
Intersection: Talbot Rd & Brook Rd
TFR File #: 1
Count date: 5-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Talbot Rd runs W/E



Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 8:30:00
To: 10:30:00

One Hour Peak
From: 8:30:00
To: 9:30:00

Municipality: Cayuga
Site #: 1533100002
Intersection: Brooks Rd & Landfill Access
TFR File #: 1
Count date: 5-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

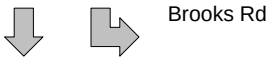
Major Road: Brooks Rd runs N/S

North Leg Total: 10
North Entering: 6
North Peds: 0
Peds Cross: ⋈

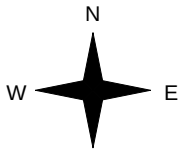
Heavys	0	0	0
Trucks	0	0	0
Cars	6	0	6
Totals	6	0	

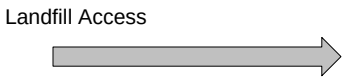
Heavys	0
Trucks	0
Cars	4
Totals	4

East Leg Total: 0
East Entering: 0
East Peds: 0
Peds Cross: ⋈



Cars	Trucks	Heavys	Totals
0	0	0	0
0	0	0	0
0	0	0	





Cars	Trucks	Heavys	Totals
0	0	0	0

Cars	6
Trucks	0
Heavys	0
Totals	6

Cars	4	0	4
Trucks	0	0	0
Heavys	0	0	0
Totals	4	0	

Peds Cross: ⋈
South Peds: 0
South Entering: 4
South Leg Total: 10

Comments

Ontario Traffic Inc

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 14:30:00

One Hour Peak
From: 12:15:00
To: 13:15:00

Municipality: Cayuga
Site #: 1533100002
Intersection: Brooks Rd & Landfill Access
TFR File #: 1
Count date: 5-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Brooks Rd runs N/S

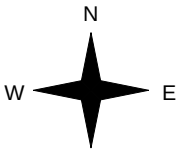
North Leg Total: 7
North Entering: 5
North Peds: 0
Peds Cross: ⋈

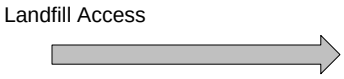
Heavys	0	0	0
Trucks	0	0	0
Cars	5	0	5
Totals	5	0	

Heavys	0
Trucks	0
Cars	2
Totals	2

East Leg Total: 30
East Entering: 14
East Peds: 0
Peds Cross: ⋈

Cars	Trucks	Heavys	Totals
0	0	0	0
0	14	0	14
0	14	0	





Cars	Trucks	Heavys	Totals
0	16	0	16

Brooks Rd

Cars	5
Trucks	14
Heavys	0
Totals	19

Cars	2	0	2
Trucks	0	16	16
Heavys	0	0	0
Totals	2	16	

Peds Cross: ⋈
South Peds: 0
South Entering: 18
South Leg Total: 37

Comments

Ontario Traffic Inc

Total Count Diagram

Municipality: Cayuga
Site #: 1533100002
Intersection: Brooks Rd & Landfill Access
TFR File #: 1
Count date: 5-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Brooks Rd runs N/S

North Leg Total: 29
North Entering: 18
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	1	0	1
Cars	17	0	17
Totals	18	0	

Heavys	0	
Trucks	0	
Cars	11	
Totals	11	

East Leg Total: 77
East Entering: 41
East Peds: 0
Peds Cross: ⋈

Brooks Rd

Cars	Trucks	Heavys	Totals
0	0	0	0
1	40	0	41
1	40	0	

N
W E
S

Landfill Access

Cars	Trucks	Heavys	Totals
0	36	0	36

Brooks Rd

Cars	18
Trucks	41
Heavys	0
Totals	59

Cars	11	0	11
Trucks	0	36	36
Heavys	0	0	0
Totals	11	36	

Peds Cross: ⋈
South Peds: 0
South Entering: 47
South Leg Total: 106

Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 7:30:00
To: 10:30:00

One Hour Peak
From: 7:30:00
To: 8:30:00

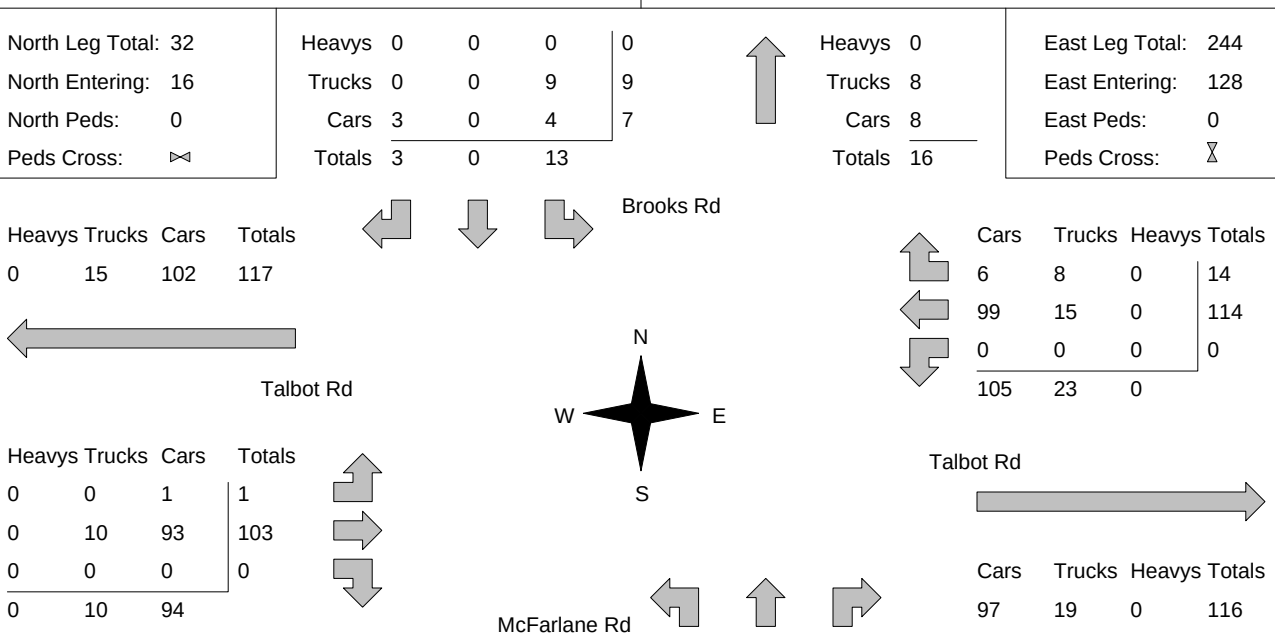
Municipality: Cayuga
Site #: 1533100003
Intersection: Talbot Rd & Brooks Rd
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Talbot Rd runs W/E



Comments

Ontario Traffic Inc

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:30:00
To: 13:30:00

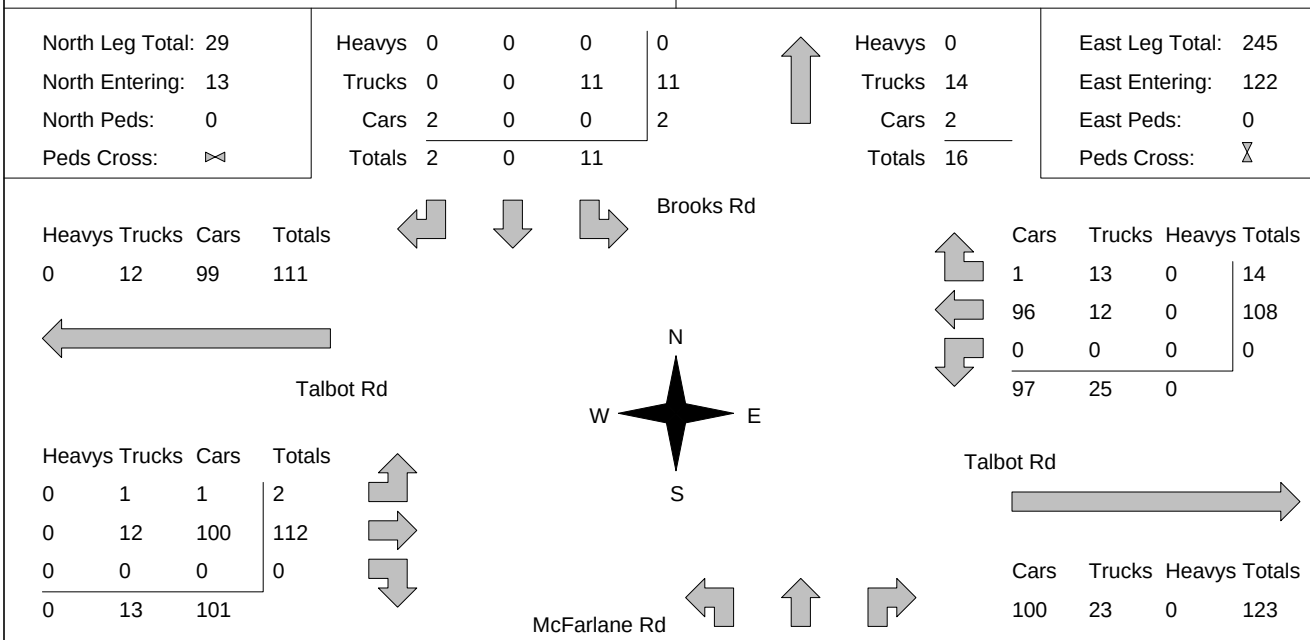
Municipality: Cayuga
Site #: 1533100003
Intersection: Talbot Rd & Brooks Rd
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Talbot Rd runs W/E



Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 14:00:00
To: 16:30:00

One Hour Peak
From: 15:30:00
To: 16:30:00

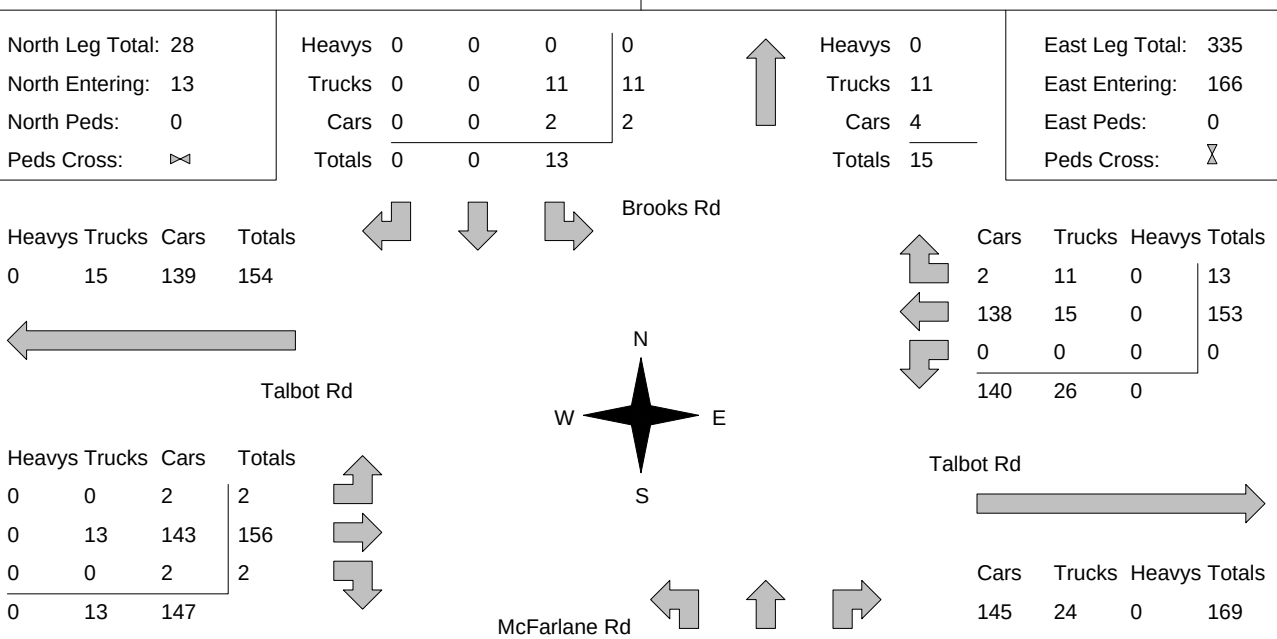
Municipality: Cayuga
Site #: 1533100003
Intersection: Talbot Rd & Brooks Rd
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Talbot Rd runs W/E



Comments

Ontario Traffic Inc

Total Count Diagram

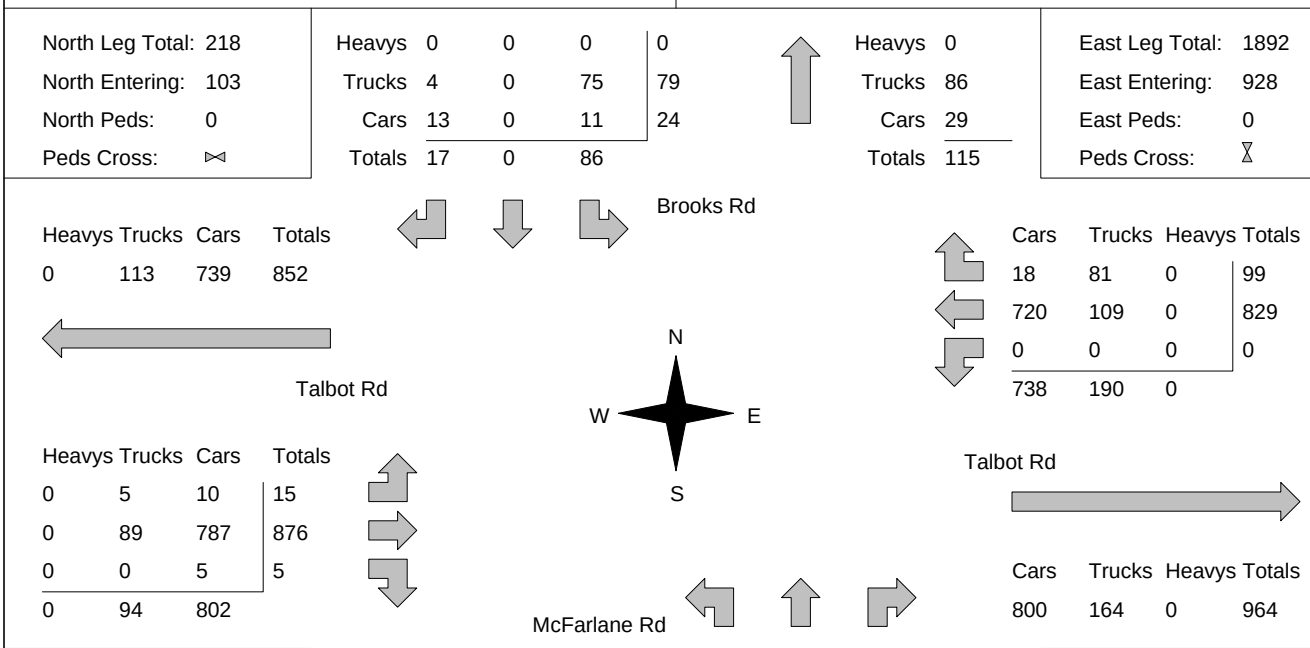
Municipality: Cayuga
Site #: 1533100003
Intersection: Talbot Rd & Brooks Rd
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Talbot Rd runs W/E



Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 7:30:00
To: 10:30:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Cayuga
Site #: 1533100004
Intersection: Brooks Rd & Landfill Access
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Brooks Rd runs N/S

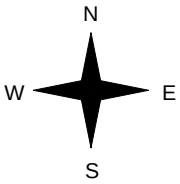
North Leg Total: 7
North Entering: 5
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	5	0	5
Totals	5	0	

Heavys	0
Trucks	0
Cars	2
Totals	2

East Leg Total: 23
East Entering: 11
East Peds: 0
Peds Cross: ⋈

Cars	Trucks	Heavys	Totals
0	0	0	0
3	8	0	11
3	8	0	



Landfill Access

Cars	Trucks	Heavys	Totals
3	9	0	12

Brooks Rd

Cars	8
Trucks	8
Heavys	0
Totals	16

Cars	2	3	5
Trucks	0	9	9
Heavys	0	0	0
Totals	2	12	

Peds Cross: ⋈
South Peds: 0
South Entering: 14
South Leg Total: 30

Comments

Ontario Traffic Inc

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:30:00
To: 13:30:00

Municipality: Cayuga
Site #: 1533100004
Intersection: Brooks Rd & Landfill Access
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Brooks Rd runs N/S

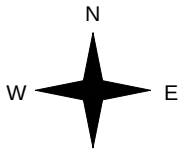
North Leg Total: 8
North Entering: 3
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	3	0	3
Totals	3	0	

Heavys	0
Trucks	1
Cars	4
Totals	5

East Leg Total: 25
East Entering: 13
East Peds: 0
Peds Cross: ⋈

Cars	Trucks	Heavys	Totals
0	0	0	0
1	12	0	13
1	12	0	



Landfill Access

Cars	Trucks	Heavys	Totals
0	12	0	12

Brooks Rd

Cars	4
Trucks	12
Heavys	0
Totals	16

Cars	4	0	4
Trucks	1	12	13
Heavys	0	0	0
Totals	5	12	

Peds Cross: ⋈
South Peds: 0
South Entering: 17
South Leg Total: 33

Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 14:00:00
To: 16:30:00

One Hour Peak
From: 15:15:00
To: 16:15:00

Municipality: Cayuga
Site #: 1533100004
Intersection: Brooks Rd & Landfill Access
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

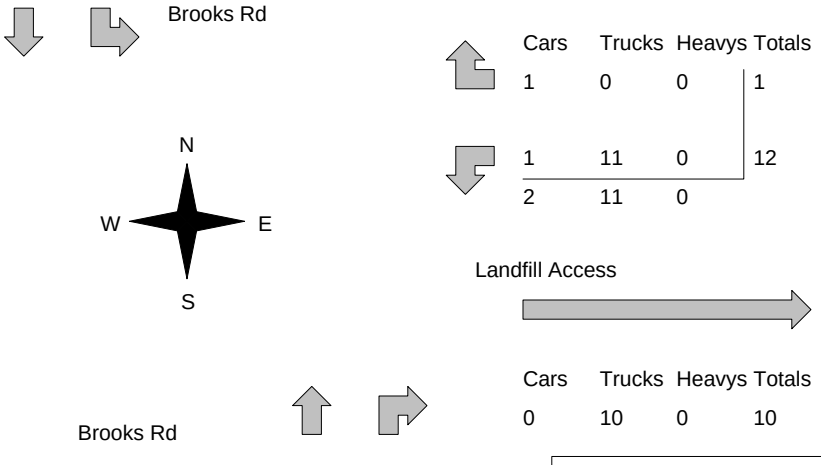
Major Road: Brooks Rd runs N/S

North Leg Total: 5
North Entering: 1
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	1	0	1
Totals	1	0	

Heavys	0
Trucks	0
Cars	4
Totals	4

East Leg Total: 23
East Entering: 13
East Peds: 0
Peds Cross: ⋈



Cars	2	Cars	3	0	3
Trucks	11	Trucks	0	10	10
Heavys	0	Heavys	0	0	0
Totals	13	Totals	3	10	

Peds Cross: ⋈
South Peds: 0
South Entering: 13
South Leg Total: 26

Comments

Ontario Traffic Inc

Total Count Diagram

Municipality: Cayuga
Site #: 1533100004
Intersection: Brooks Rd & Landfill Access
TFR File #: 2
Count date: 7-Dec-15

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Brooks Rd runs N/S

North Leg Total: 43
North Entering: 23
North Peds: 1
Peds Cross: ⋈

Heavys	0	0	0
Trucks	1	0	1
Cars	22	0	22
Totals	23	0	

Heavys	0
Trucks	1
Cars	19
Totals	20

East Leg Total: 163
East Entering: 85
East Peds: 0
Peds Cross: ⋈

Brooks Rd

	Cars	Trucks	Heavys	Totals
	1	0	0	1
	7	77	0	84
	8	77	0	

N
W E
S

Landfill Access

Cars	Trucks	Heavys	Totals
4	74	0	78

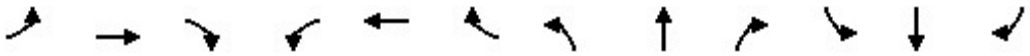
Brooks Rd

Cars	29	Cars	18	4	22
Trucks	78	Trucks	1	74	75
Heavys	0	Heavys	0	0	0
Totals	107	Totals	19	78	

Peds Cross: ⋈
South Peds: 0
South Entering: 97
South Leg Total: 204

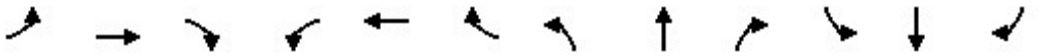
Comments

Synchro Reports



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	118	0	0	130	30	0	2	0	27	0	6
Future Volume (vph)	2	118	0	0	130	30	0	2	0	27	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.974						0.974	
Flt Protected		0.999									0.961	
Satd. Flow (prot)	0	1882	0	0	1834	0	0	1883	0	0	1763	0
Flt Permitted		0.999									0.961	
Satd. Flow (perm)	0	1882	0	0	1834	0	0	1883	0	0	1763	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		582.0			708.0			1694.7			1063.5	
Travel Time (s)		43.7			53.1			127.1			79.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	128	0	0	141	33	0	2	0	29	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	130	0	0	174	0	0	2	0	0	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 23.9%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	118	0	0	130	30	0	2	0	27	0	6
Future Volume (Veh/h)	2	118	0	0	130	30	0	2	0	27	0	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	128	0	0	141	33	0	2	0	29	0	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	174			128			296	306	128	290	290	158
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	174			128			296	306	128	290	290	158
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	96	100	99
cM capacity (veh/h)	1403			1458			650	607	922	659	620	888

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	130	174	2	36
Volume Left	2	0	0	29
Volume Right	0	33	0	7
cSH	1403	1458	607	694
Volume to Capacity	0.00	0.00	0.00	0.05
Queue Length 95th (m)	0.0	0.0	0.1	1.2
Control Delay (s)	0.1	0.0	11.0	10.5
Lane LOS	A		B	B
Approach Delay (s)	0.1	0.0	11.0	10.5
Approach LOS			B	B

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	23.9%	ICU Level of Service	A	
Analysis Period (min)	15			

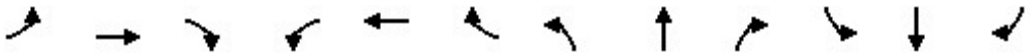
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	0	2	28	0	5
Future Volume (vph)	27	0	2	28	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.873			
Flt Protected	0.950					
Satd. Flow (prot)	1789	0	1644	0	0	1883
Flt Permitted	0.950					
Satd. Flow (perm)	1789	0	1644	0	0	1883
Link Speed (k/h)	48		48			48
Link Distance (m)	758.3		1063.5			423.8
Travel Time (s)	56.9		79.8			31.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	0	2	30	0	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	0	32	0	0	5
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 13.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	27	0	2	28	0	5
Future Volume (Veh/h)	27	0	2	28	0	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	0	2	30	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	22	17			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	22	17			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	995	1062			1580	

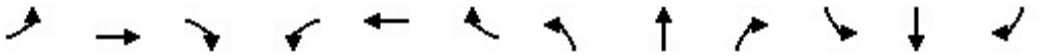
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	29	32	5
Volume Left	29	0	0
Volume Right	0	30	0
cSH	995	1700	1580
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	128	0	0	124	30	1	0	0	26	0	4
Future Volume (vph)	4	128	0	0	124	30	1	0	0	26	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.973						0.983	
Flt Protected		0.999						0.950			0.958	
Satd. Flow (prot)	0	1882	0	0	1833	0	0	1789	0	0	1774	0
Flt Permitted		0.999						0.950			0.958	
Satd. Flow (perm)	0	1882	0	0	1833	0	0	1789	0	0	1774	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		582.0			708.0			1694.7			1063.5	
Travel Time (s)		43.7			53.1			127.1			79.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	139	0	0	135	33	1	0	0	28	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	143	0	0	168	0	0	1	0	0	32	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	128	0	0	124	30	1	0	0	26	0	4
Future Volume (Veh/h)	4	128	0	0	124	30	1	0	0	26	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	139	0	0	135	33	1	0	0	28	0	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	168			139			302	315	139	298	298	152
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168			139			302	315	139	298	298	152
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	96	100	100
cM capacity (veh/h)	1410			1445			646	599	909	652	612	895

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	143	168	1	32
Volume Left	4	0	1	28
Volume Right	0	33	0	4
cSH	1410	1445	646	675
Volume to Capacity	0.00	0.00	0.00	0.05
Queue Length 95th (m)	0.1	0.0	0.0	1.1
Control Delay (s)	0.2	0.0	10.6	10.6
Lane LOS	A		B	B
Approach Delay (s)	0.2	0.0	10.6	10.6
Approach LOS			B	B

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			

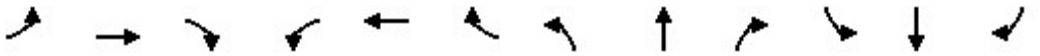
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	29	0	5	28	0	2
Future Volume (vph)	29	0	5	28	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.884			
Flt Protected	0.950					
Satd. Flow (prot)	1789	0	1665	0	0	1883
Flt Permitted	0.950					
Satd. Flow (perm)	1789	0	1665	0	0	1883
Link Speed (k/h)	48		48			48
Link Distance (m)	758.3		1063.5			423.8
Travel Time (s)	56.9		79.8			31.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	0	5	30	0	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	32	0	35	0	0	2
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 13.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	29	0	5	28	0	2
Future Volume (Veh/h)	29	0	5	28	0	2
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	5	30	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	22	20			35	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	22	20			35	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	995	1058			1576	

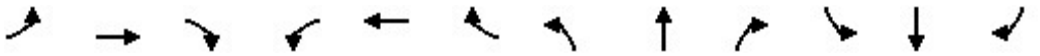
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	35	2
Volume Left	32	0	0
Volume Right	0	30	0
cSH	995	1700	1576
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.8	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	174	2	0	175	28	1	0	0	29	0	0
Future Volume (vph)	4	174	2	0	175	28	1	0	0	29	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.982							
Flt Protected		0.999						0.950			0.950	
Satd. Flow (prot)	0	1880	0	0	1850	0	0	1789	0	0	1789	0
Flt Permitted		0.999						0.950			0.950	
Satd. Flow (perm)	0	1880	0	0	1850	0	0	1789	0	0	1789	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		582.0			708.0			1694.7			1063.5	
Travel Time (s)		43.7			53.1			127.1			79.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	189	2	0	190	30	1	0	0	32	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	195	0	0	220	0	0	1	0	0	32	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.5%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	174	2	0	175	28	1	0	0	29	0	0
Future Volume (Veh/h)	4	174	2	0	175	28	1	0	0	29	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	189	2	0	190	30	1	0	0	32	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	220			191			403	418	190	403	404	205
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	220			191			403	418	190	403	404	205
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	94	100	100
cM capacity (veh/h)	1349			1383			557	524	852	557	534	836

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	195	220	1	32
Volume Left	4	0	1	32
Volume Right	2	30	0	0
cSH	1349	1383	557	557
Volume to Capacity	0.00	0.00	0.00	0.06
Queue Length 95th (m)	0.1	0.0	0.0	1.4
Control Delay (s)	0.2	0.0	11.5	11.9
Lane LOS	A		B	B
Approach Delay (s)	0.2	0.0	11.5	11.9
Approach LOS			B	B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

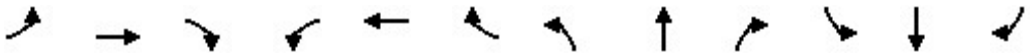
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	2	3	26	0	1
Future Volume (vph)	27	2	3	26	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.878			
Flt Protected	0.955					
Satd. Flow (prot)	1782	0	1654	0	0	1883
Flt Permitted	0.955					
Satd. Flow (perm)	1782	0	1654	0	0	1883
Link Speed (k/h)	48		48			48
Link Distance (m)	758.3		1063.5			423.8
Travel Time (s)	56.9		79.8			31.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	2	3	28	0	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	0	31	0	0	1
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 13.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	27	2	3	26	0	1
Future Volume (Veh/h)	27	2	3	26	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	2	3	28	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	18	17			31	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	18	17			31	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	1000	1062			1582	

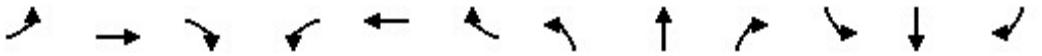
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	31	1
Volume Left	29	0	0
Volume Right	2	28	0
cSH	1004	1700	1582
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	181	3	0	179	30	0	0	0	28	0	8
Future Volume (vph)	6	181	3	0	179	30	0	0	0	28	0	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.980						0.969	
Flt Protected		0.998									0.963	
Satd. Flow (prot)	0	1876	0	0	1846	0	0	1883	0	0	1758	0
Flt Permitted		0.998									0.963	
Satd. Flow (perm)	0	1876	0	0	1846	0	0	1883	0	0	1758	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		582.0			708.0			1694.7			1063.5	
Travel Time (s)		43.7			53.1			127.1			79.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	197	3	0	195	33	0	0	0	30	0	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	207	0	0	228	0	0	0	0	0	39	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 24.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	181	3	0	179	30	0	0	0	28	0	8
Future Volume (Veh/h)	6	181	3	0	179	30	0	0	0	28	0	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	197	3	0	195	33	0	0	0	30	0	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	228			200			433	440	198	424	426	212
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	228			200			433	440	198	424	426	212
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	94	100	99
cM capacity (veh/h)	1340			1372			525	508	843	538	518	829

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	207	228	0	39
Volume Left	7	0	0	30
Volume Right	3	33	0	9
cSH	1340	1372	1700	586
Volume to Capacity	0.01	0.00	0.00	0.07
Queue Length 95th (m)	0.1	0.0	0.0	1.6
Control Delay (s)	0.3	0.0	0.0	11.6
Lane LOS	A		A	B
Approach Delay (s)	0.3	0.0	0.0	11.6
Approach LOS			A	B

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	24.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	0	2	32	0	5
Future Volume (vph)	30	0	2	32	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.872			
Flt Protected	0.950					
Satd. Flow (prot)	1789	0	1642	0	0	1883
Flt Permitted	0.950					
Satd. Flow (perm)	1789	0	1642	0	0	1883
Link Speed (k/h)	48		48			48
Link Distance (m)	758.3		1063.5			423.8
Travel Time (s)	56.9		79.8			31.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	0	2	35	0	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	33	0	37	0	0	5
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

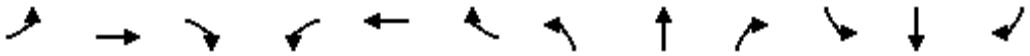
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 13.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	0	2	32	0	5
Future Volume (Veh/h)	30	0	2	32	0	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	0	2	35	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	24	20			37	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	24	20			37	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	991	1058			1574	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	33	37	5
Volume Left	33	0	0
Volume Right	0	35	0
cSH	991	1700	1574
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.8	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

2026 Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	128	0	0	142	31	0	2	0	29	0	7
Future Volume (Veh/h)	2	128	0	0	142	31	0	2	0	29	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	139	0	0	154	34	0	2	0	32	0	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	188			139			322	331	139	315	314	171
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	188			139			322	331	139	315	314	171
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	95	100	99
cM capacity (veh/h)	1386			1445			624	588	909	635	601	873

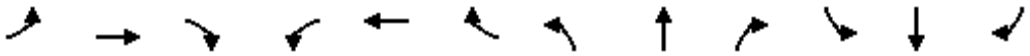
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	141	188	2	40
Volume Left	2	0	0	32
Volume Right	0	34	0	8
cSH	1386	1445	588	672
Volume to Capacity	0.00	0.00	0.00	0.06
Queue Length 95th (m)	0.0	0.0	0.1	1.4
Control Delay (s)	0.1	0.0	11.1	10.7
Lane LOS	A		B	B
Approach Delay (s)	0.1	0.0	11.1	10.7
Approach LOS			B	B

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	27	0	2	28	0	6
Future Volume (Veh/h)	27	0	2	28	0	6
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	0	2	30	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	24	17			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	24	17			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	992	1062			1580	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	29	32	7
Volume Left	29	0	0
Volume Right	0	30	0
cSH	992	1700	1580
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

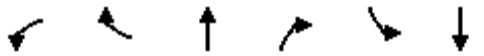
Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	139	0	0	134	31	1	0	0	28	0	4
Future Volume (Veh/h)	4	139	0	0	134	31	1	0	0	28	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	151	0	0	146	34	1	0	0	30	0	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	180			151			326	339	151	322	322	163
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	180			151			326	339	151	322	322	163
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	95	100	100
cM capacity (veh/h)	1396			1430			623	581	895	630	594	882

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	155	180	1	34
Volume Left	4	0	1	30
Volume Right	0	34	0	4
cSH	1396	1430	623	651
Volume to Capacity	0.00	0.00	0.00	0.05
Queue Length 95th (m)	0.1	0.0	0.0	1.3
Control Delay (s)	0.2	0.0	10.8	10.8
Lane LOS	A		B	B
Approach Delay (s)	0.2	0.0	10.8	10.8
Approach LOS			B	B

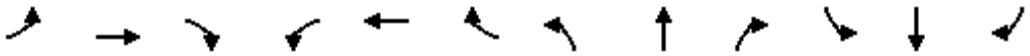
Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	20.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	29	0	6	28	0	2
Future Volume (Veh/h)	29	0	6	28	0	2
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	7	30	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	24	22			37	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	24	22			37	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	992	1055			1574	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	37	2
Volume Left	32	0	0
Volume Right	0	30	0
cSH	992	1700	1574
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.8	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	189	2	0	190	30	1	0	0	31	0	0
Future Volume (Veh/h)	4	189	2	0	190	30	1	0	0	31	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	205	2	0	207	33	1	0	0	34	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	240			207			438	454	206	438	438	224
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	240			207			438	454	206	438	438	224
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	94	100	100
cM capacity (veh/h)	1327			1364			528	500	835	528	511	816

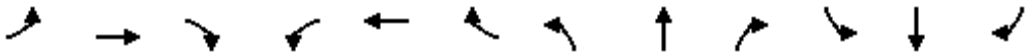
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	211	240	1	34
Volume Left	4	0	1	34
Volume Right	2	33	0	0
cSH	1327	1364	528	528
Volume to Capacity	0.00	0.00	0.00	0.06
Queue Length 95th (m)	0.1	0.0	0.0	1.6
Control Delay (s)	0.2	0.0	11.8	12.3
Lane LOS	A		B	B
Approach Delay (s)	0.2	0.0	11.8	12.3
Approach LOS			B	B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	23.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	27	2	4	26	0	1
Future Volume (Veh/h)	27	2	4	26	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	2	4	28	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	19	18			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	19	18			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	998	1061			1580	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	32	1
Volume Left	29	0	0
Volume Right	2	28	0
cSH	1002	1700	1580
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

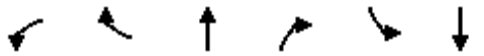
Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	196	4	0	194	32	0	0	0	29	0	9
Future Volume (Veh/h)	7	196	4	0	194	32	0	0	0	29	0	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	213	4	0	211	35	0	0	0	32	0	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	246			217			470	477	215	460	462	228
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	246			217			470	477	215	460	462	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	94	100	99
cM capacity (veh/h)	1320			1353			496	484	825	510	494	811

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	225	246	0	42
Volume Left	8	0	0	32
Volume Right	4	35	0	10
cSH	1320	1353	1700	559
Volume to Capacity	0.01	0.00	0.00	0.08
Queue Length 95th (m)	0.1	0.0	0.0	1.8
Control Delay (s)	0.3	0.0	0.0	12.0
Lane LOS	A		A	B
Approach Delay (s)	0.3	0.0	0.0	12.0
Approach LOS			A	B

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	26.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	0	2	32	0	6
Future Volume (Veh/h)	30	0	2	32	0	6
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	0	2	35	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	26	20			37	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	26	20			37	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	989	1058			1574	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	33	37	7
Volume Left	33	0	0
Volume Right	0	35	0
cSH	989	1700	1574
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.8	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix I

Consultation Correspondence and Documentation

Government Agency / Office / Services / Utilities	Contact Name	Contact Address	Email	Phone
Conservation Authorities				
Grand River Conservation Authority, Haldimand County	**Will Towns** Planner	400 Clyde Road, PO Box 729 Cambridge, ON, N1R 5W6	wtowns@grandriver.ca	519- 621-2763 (Ext. 2232)
Niagara Peninsula Conservation Authority	**Sarah Mastroianni** Manager, Planning and Development	250 Thorold Road West; 3rd Floor Welland, ON, L3C 3W2	smastroianni@npca.ca	905-788-3135 (Ext. 249)
Provincial Government				
Ministry of Environment, Conservation and Parks	**Andrew Evers** Project Coordinator Unit Supervisor, Environmental Assessment and Permissions Division	Environmental Approvals Branch 1st Flr, 135 St Clair Ave W Toronto, ON, M4V 1P5	Andrew.Evers@ontario.ca	416-276-0360
Ministry of Environment, Conservation and Parks Hamilton District Office	**Neil Hannington** Supervisor (Acting)	Ellen Fairclough Bldg 119 King Street West, 9th Floor Hamilton ON, L8P 4Y7	neil.hannington@ontario.ca	905-630-9375
Ministry of Environment, Conservation and Parks Hamilton District Office	**Jordan Balch** Environmental Officer	Ellen Fairclough Bldg 9th Flr, 119 King St W, Hamilton, ON, L8P 4Y7	Jordan.Balch@ontario.ca	905-515-0768
Ministry of Environment, Conservation and Parks Hamilton District Office	**Stephen Burt** District Manager	Ellen Fairclough Bldg 9th Flr, 119 King St W, Hamilton, ON, L8P 4Y7	stephen.burt@ontario.ca	905-541-4533
Ministry of Environment, Conservation and Parks Hamilton District Office	**Sandra Attias** Projects and Planning Advisor	Ellen Fairclough Bldg. 12th Floor 119 King Street West Hamilton, ON L8P 4Y7	sandra.attias@ontario.ca	437-227-9202
Ministry of Environment, Conservation and Parks Hamilton District Office	**Joan Del Villar Cuicas** Environmental Resource Planner & EA Coordinator	Ellen Fairclough Bldg. 12th Floor 119 King Street West Hamilton, ON L8P 4Y7	joan.delvillarcuicas@ontario.ca	365-889-1180
Ministry of Agriculture, Food, and Rural Affairs Central Southwest Ontario (Halimand County)	**Nancy Rutherford** Rural Planner(A)	6484 Wellington Road 7 – Unit 10 Elora ON N0B 1S0	nancy.rutherford@ontario.ca	226-962-2139
Ministry of Heritage, Sport, Tourism and Cultural Industries	**Karla Barboza** Team Lead (A), Heritage Heritage Planning Unit	401 Bay Street, Suite 1700 Toronto ON M7A 0A7	karla.barboza@ontario.ca	416-314 7120
Ministry of Heritage, Sport, Tourism and Cultural Industries	**Laura Romeo** Heritage Planner (A) Heritage Planning Unit	401 Bay Street, Suite 1700 Toronto ON M7A 0A7	laura.romeo@ontario.ca	437-996-5218
Ministry of Heritage, Sport, Tourism and Cultural Industries	**Joseph Harvey** Heritage Planner (A) Heritage Planning Unit	401 Bay Street, Suite 1700 Toronto ON M7A 0A7	joseph.harvey@ontario.ca	613-242-3743
Ministry of Education	**Paul Bloye** Director, Capital Program Branch	315 Front Street W, 15th Flr Toronto ON, M7A 0B8	paul.bloye@ontario.ca	416-325-8589
Grand Erie District School Board	**JoAnna Roberto** Director of Education and Secretary	349 Erie Avenue Brantford, ON, N3T 5V3	joanna.roberto@granderie.ca	519-756-6301 (Ext. 281133)
Ontario Provincial Police	**Jennifer Davey** Administrative Assistant Research and Program Evaluation Unit / Research Planning & Analysis Section	777 Memorial Avenue, 1st Floor Orillia ON, L3V 7V3	jennifer.davey@opp.ca	705-309-2621
Ontario Provincial Police Haldimand County	**Phil Carter** Inspector Detachment Commander	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	phil.carter@opp.ca	905-318-5932

Ontario Provincial Police Haldimand County	**Belinda Rose** S/Sgt. Operations Manager	72 Highway 54, PO Box 148 Cauyga ON, N0A 1E0	Belinda.Rose@opp.ca	905-318-5932
Ontario Provincial Police West Region	**Rod LeClair** Provincial Constable Provincial Liaison Team	72 Highway 54, PO Box 148 Cauyga ON, N0A 1E0	rodney.leclair@opp.ca	905-772-3322
Ontario Provincial Police West Region	**Lindsay Van Paassen** Provincial Constable Provincial Liaison Team	72 Highway 54, PO Box 148 Cauyga ON, N0A 1E0	lindsay.vanpaassen@opp.ca	
Ministry of Municipal Affairs and Housing	**Erick Boyd** Manager, Community Planning and Development Western Municipal Services Office	659 Exeter Road, 2nd Floor London ON N6E 1L3	erick.boyd@ontario.ca	519-873-4025
Ministry of Northern Development, Mines, Natural Resources and Forestry	**Ian Thornton** Supervisor	1 Stone Road West Guelph ON, N1G 4Y2	ian.thornton@ontario.ca	519-826-4828
Ministry of Transportation	**Geddes Mahabir** Manager Highway Operations West Operations Division	659 Exeter Road, 2nd Floor London ON, N6E 1L3	geddes.mahabir@ontario.ca	519-873-4222
Municipal Government				
Haldimand County	**Shannon VanDalen** Manager, Planning and Development	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	svandalen@haldimandcounty.on.ca	905-318-5932 (Ext. 6339)
Haldimand County	**Philip Mete** General Manager, Public Works Operations	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	pmete@haldimandcounty.on.ca	905-318-5932 (Ext. 6318)
Haldimand County	**Brandon Hedges** Manager, Environmental Operations	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	bhedges@haldimandcounty.on.ca	905-318-5932 (Ext. 6156)

Municipal Government	Contact Name	Contact Address	Email	Phone
Haldimand County	**Ken Hewitt** Mayor	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	khewitt@haldimandcounty.on.ca	905-318-5932 (Ext. 6101)
Haldimand County	**John Metcalfe** Councillor - Ward 2	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	jmetcalfe@haldimandcounty.on.ca	289-775-6206
Haldimand County	**Stewart Patterson** Councillor - Ward 1	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	spatterson@haldimandcounty.on.ca	365-366-2429
Haldimand County	**Dan Lawrence** Councillor - Ward 3	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	dlawrence@haldimandcounty.on.ca	905-515-9187
Haldimand County	**Tony Dalimonte** Councillor - Ward 4	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	tdalimonte@haldimandcounty.on.ca	905-768-1260
Haldimand County	**Rob Shirton** Councillor - Ward 5	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	rshirton@haldimandcounty.on.ca	905-515-8934
Haldimand County	**Bernie Corbett** Councillor - Ward 6	53 Thorburn Street South Cayuga, Ontario, N0A 1E0	bcorbett@haldimandcounty.on.ca	289-925-4610

Indigenous Community	Contact Name	Contact Address	Email	Phone
Mississaugas of the Credit First Nation	**Chief R. Stacey Laforme**	2789 Mississauga Road R.R. #6 Hagersville, Ontario, N0A 1H0	Stacey.LaForme@mncfn.ca	905-979-9254
Mississaugas of the Credit First Nation	**Mark LaForme** Director, Department of Consultation and Accommodation	4065 Hwy 6 Hagersville, ON, N0A 1H0	Mark.Laforme@mncfn.ca	905-768-4260
Mississaugas of the Credit First Nation	**Abby LaForme** Acting Consultation Coordinator	4065 Hwy 6 Hagersville, ON, N0A 1H0	Abby.LaForme@mncfn.ca	905-768-4260
Six Nations of the Grand River	**Chief Mark B. Hill**	1695 Chiefswood Rd PO Box 5000 Ohsweken, ON, N0A 1M0	markhill@sixnations.ca	519-445-2201
Six Nations of the Grand River	**Darrin Jamieson** Chief Executive Officer	1695 Chiefswood Rd PO Box 5000 Ohsweken, ON, N0A 1M0	darrinjamieson@sixnations.ca	519-445-2201
Métis Nation of Ontario	**To Whom it May Concern**	Unit 311 – 75 Sherbourne Street Toronto, ON, M5A 2P9	consultations@metisnation.org	416-977-9881
Métis Nation of Ontario	**Derrick Pont** President, MNO Niagara Region Métis Council	Unit 1A – 3250 Schmon Parkway Thorold, ON, L2V 4Y6	pontdj@hotmail.com	905-682-3487
Métis Nation of Ontario	**Andrew Buttenham** President, MNO Clear Waters Métis Council		cwmc@metisnation.org	
Haudenosaunee Confederacy Chiefs Council	**Hohahes Leroy Hill** Secretary	Suite 420B, 16 Sunrise Ct, Box 714 Ohsweken, ON, N0A 1M0	jocko@sixnationsns.com	519-445-4222

Public Open House Summary Report

Brooks Road Landfill Capacity Expansion Environmental Screening

2270386 Ontario Limited

March 26, 2024

The Power of Commitment

Project name		Brooks Road Landfill Expansion					
Document title		Public Open House Summary Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524					
File name		12561524 Open House Summary Report-March 26, 2024.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	Axita Patel	Erika Brown	On file	Blair Shoniker	On file	11/28/2023
S4	0	Axita Patel	Erika Brown		Blair Shoniker		3/26/2024

GHD
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100 Milverton Drive, Suite 404
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Contents

Table index

Appendices

1. Introduction

This report summarizes the Public Open House for the Brooks Road Landfill Capacity Expansion Environmental Screening held on June 29th, 2022. Brooks Road Environmental (BRE), owners and operators of the Brooks Road Landfill in Haldimand County, Ontario, have initiated an Environmental Screening Process in accordance with Section 13 of the Waste Management Projects Regulation, (Ontario Regulation 101/07) of the Environmental Assessment Act (EA Act) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. At the time of the first public open house, the capacity expansion proposed under this Environmental Screening Process was for approximately 100,000 cubic metres (m^3). This was changed in October 2023 to 219,400 m^3 as a result of a change in Ontario Regulation 101/07.

1.1 Objective of Open House

The main objectives of the Open House were to introduce the proposed undertaking; describe the Environmental Screening process; solicit feedback and comments on the proposed undertaking as well as how to best consult with the public going forward; meet the Project Team and ask questions regarding the undertaking and Environmental Screening process; and provide an update on Site developments occurring outside of the EA process.

Attendees were offered the opportunity to present their comments regarding the information directly to staff from BRE and GHD Limited (GHD).

1.2 Date, Time, and Location of Open House

The Public Open House was held on June 29, 2022, from 5 to 7 p.m. at the Cayuga Kinsmen Community Centre (15 Thorburn Street South, Cayuga, Ontario).

The Public Open House followed a drop-in format, with the information illustrated on a set of display panels arranged around the perimeter of the room. Project Team members were available to answer questions from attendees.

2. Notification

Notification of the Public Open House and Notice of Commencement was provided in the Sachem/Glanbrook Gazette and Haldimand Press newspaper publications (online and print) during the weeks of June 13 and 20, 2022.

In addition to the newspaper advertisement, notification of the Public Open House and Notice of Commencement was provided to the following identified agencies, Indigenous communities, and stakeholder groups on June 16, 2022:

- Haldimand County Mayor, Councillors, and relevant staff
- Grand River Conservation Authority
- Niagara Peninsula Conservation Authority
- Ministry of the Environment, Conservation & Parks (MECP)
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Heritage, Sport, Tourism and Cultural Industries
- Ministry of Education
- Ontario Provincial Police
- Grand Erie District School Board
- Ministry of Municipal Affairs – Ontario Growth Secretariat (formerly under the Ministry of Infrastructure)
- Ministry of Municipal Affairs and Housing

– Ministry of Northern Development, Mines, Natural Resources and Forestry
– Ministry of Transportation
– Métis Nation of Ontario (Head Office, Niagara Region Métis Council and Hamilton-Wentworth Métis Council)
– Six Nations of the Grand River First Nation
– Mississaugas of the Credit First Nation
– Haudenosaunee Confederacy Chiefs Council
– Haudenosaunee Development Institute
– Adjacent land owners and members of the public who had previously expressed an interest in the landfill

Notification was also provided to 1,674 addresses within the N0A postal code, covering the town of Cayuga, via unaddressed Canada Post mail-drop delivered during the week of June 20, 2022.

Copies of notification material are found in **Appendix A.**

3. Project Team Members in Attendance

The following project team members were in attendance at the Public Open House to answer questions:

Brooks Road Environmental	GHD
Tim Danyliw	Blair Shoniker Ryan Loveday Erika Brown Katrina McCullough Emily Cameron

4. Information Presented

Information presented at the Public Open House was in the form of display boards arranged around the room and organized to take the viewer through the process from project introduction to the history of the Site, Environmental Screening process, need/rationale, screening criteria checklist, and next steps in the process. This information included:

– Outline of the purpose of the Open House
– Project Overview
– About BRE and the existing landfill
– Outline of the Environmental Screening process
– Rational for the undertaking
– Proposed capacity expansion concept map
– Screening criteria checklist overview
– Screening criteria checklist
– Description of the Study Areas, including an aerial map
– List of the discipline existing environmental conditions assessments prepared as part of the EA
– Outline of the methodology for the assessment and evaluation of the Alternative Methods
– Summary of proposed mitigation measures and best management practices

– Overview of existing and ongoing odour management measures employed at the Site
– Summary of the findings of GHD's report on the abandoned gypsum mine within the Local Study Area
– Comparative evaluation results
– Next steps in the Environmental Screening process

Copies of the display panels are included in **Appendix B**.

5. Attendance

A total of fourteen individuals attended the Public Open House on June 29, 2022. Those in attendance included local residents and landowners; members of the Public Liaison Committee for the existing landfill; and a member of the media.

Comments ranged from against the proposal to supportive. The majority of comments received during the Open House related to the operations of the existing landfill. Landowners within the immediate vicinity of the site asked questions regarding the possible height of the expansion, visual impact, odour, noise, wetland protection, potential for impacts to surface and groundwater, traffic, site life, and post-closure use. Overall, there was good dialogue between the staff and the attendees.

Attendees were encouraged to provide written comments on the comment sheets provided.

All attendees who signed in were given the option to be added to the project-specific contact database. This database will be used during the remaining phases of the Environmental Screening process to contact and inform interested members of the public, Indigenous communities, and key stakeholders.

6. Summary of Comments Received

One comment sheet was submitted in person at the Public Open House, and one was submitted on July 13, 2022 via email. **Table 1** Summary of Comments Received below, summarizes the comments received. A copy of the email and letter received is included in Error! Reference source not found.**C.**

Table 1 Summary of Comments Received

No.	Comment
1.	Two ongoing concerns: stink and noise from tracked vehicles
2.	**Comments Questions Suggestions** <u>Vegetated screening berm (with fence)</u> – Increase fence height as required for increased height of land fill. – Start planting trees on berm for wind screening and visual appeal. <u>Buffer area</u> – Start planting permanent vegetation and trees if not already in progress. <u>Proposed expansion and temporary fill storage</u> – The area along the north boundary and maybe other areas not visible from the road. – Plant cover crop, vegetation – better than weeds – May be an opportunity for farmers. – Achieves dust, erosion and runoff control. – Plant permanent vegetation and trees as slopes are completed.

No.	Comment
	Dust control – Due to increased height of fill, use portable windscreens on hilltops as capacity. – expansion progresses. – Reference Stelco Nanticoke coal fields. Stormwater management pond – Plant native species typical of marsh – Improve filtering and subsequent runoff water quality. Odour and gaseous emissions – Found answers to most of my concerns in the FAQ section: – Are smelly additions perfumed or are they treated? – Treat with “odour control product”, hydrogen peroxide or some other oxidizer other than – bleach? – Aerate or vacuum the build-up with underlayed temporary piping as it progresses? – Has a ground gas collection and treatment system been installed? – If not will it be installed as filling progresses? Future use – toboggan hill!

Appendix A

Notification

Notice of Commencement of an Environmental Screening & Public Open House – Brooks Road Landfill Capacity Expansion

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* (EA Act) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

The proposed capacity expansion is subject to the Environmental Screening Process, as stated in Section 15 of the Waste Management Projects Regulation (O. Reg. 101/07) of the EA Act. The proposed capacity expansion would allow Brooks Road Environmental to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post diversion solid non-hazardous Industrial, Commercial & Institutional waste. The proposed capacity expansion will add capacity equal to approximately one additional year of waste acceptance over and above the remaining/ current approved capacity. There are no changes to the annual fill rate limits proposed as part of this project.

The location of the Brooks Road Landfill Site is shown on the map below. The purpose of the Environmental Screening is to study the potential effects of the capacity expansion on the environment.

The Process

As described above, the proposed project is subject to the Ministry of the Environment, Conservation and Parks (MECP) Environmental Screening Process for waste management projects in accordance with O. Reg. 101/07 under the EA Act. The Environmental Screening will be conducted in accordance with the planning and design process outlined in the Ontario MECP's "Guide to Environmental Assessment Requirements for Waste Management Projects." The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to the public, Indigenous communities, and government agencies.

Consultation and Public Open House #1

Members of the public, Indigenous communities, agencies, and other interested persons are encouraged to actively participate in the planning process by attending consultation events or contacting Project Team staff directly with questions. Consultation activities are planned throughout the Environmental Screening Process and will be advertised via direct and/or electronic mail, in the local newspaper, and on the project website (www.brenvironmental.com).

The first **Public Open House** for the Environmental Screening Process is scheduled for **June 29, 2022**. The details of the Public Open House are as follows:

Date: Wednesday, June 29, 2022 Drop In Time: 5 p.m. to 7 p.m.

Location: Cayuga Kinsmen Community Centre – 15 Thorburn Street South, Cayuga

You are encouraged to attend the Public Open House and to submit your comments via the project website (www.brenvironmental.com), mail, email or telephone to the addresses/numbers below.

If you would like to be added to our project mailing list or have project-related questions, please contact:

Tim Danyliw, P.Eng, PMP
Project Manager, Brooks Road Environmental
160 Brooks Road, Cayuga, ON N0A 1E0
T: (888)-402-7368 **E-mail:** tim@gperivironmental.ca

Blair Shoniker, MA., RPP
Senior Waste & Environmental Planner
GHD Limited
T: 905-630-5656 **E-mail:** Blair.Shoniker@ghd.com

All personal information included in a submission to be collected, maintained, and disclosed by the Ministry of the Environment, Conservation and Parks for the purposes of transparency and consultation. The information is collected under the authority of the Environmental Assessment Act or is collected and maintained for the purpose of creating a record that is available to the general public as described in s.37 of the Freedom of Information and Protection of Privacy Act (FIPPA). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the Ministry of the Environment, Conservation and Parks Freedom of Information and Privacy Coordinator at (416) 327-1434.

This notice was first published on: JUNE 16, 2022

Premiere screening of 'Canfield Roots' to raise funds for Canfield Community Centre, featured in documentary

To The Haldimand Press

CANFIELD—Windecker Road Films and Canfield Community Centre invite you to the premiere screening of the home-grown documentary Canfield Roots on Thursday, June 23, 2022 at 7 p.m. in Canfield.

Doubling as a fundraiser for the Canfield Community Centre, which was featured in the series, the evening will also include an introduction to local history by historian Sylvia Weaver, an exciting live auction featuring fantastic local donations, and a question and answer session with Director Graeme Bachiu and Street family descendants Aileen Duncan and Spencer Martin, who are featured in the documentary.

"There's no better place for my first Canfield Roots screening than Canfield Community Centre. The team at this hall was so helpful and accommodating as I shot the film, so it's important to me to show my gratitude for their support. And, it's key to recognize the important role that all community halls play. Canfield Community Centre, and other rural halls like it, are vital to maintaining and strengthening community bonds and providing a space for groups to gather," said Bachiu.

This first-ever in-person screening of Canfield Roots will debut a 75-minute director's cut of the popular series that aired earlier this year on numerous PBS stations across North America, including WNED PBS – where the first episode alone garnered over 10,000 viewers from southern Ontario and western New York, prompting the station to add a second run for the series in the spring. The original documentary series, made up of six 25-minutes segments, is available for digital rental or purchase at

windeckerroadfilms.com.

The evening's auction will be helmed by a guest auctioneer, local Haldimand County Ward 6 Councillor Bernie Corbett. Items available include a limited-edition framed Canfield Roots Poster donated by Bachiu, a signed book by Canfield author Brad Smith, a luxurious gift basket and experience from Purple Haven Lavender Farm, a chocolate charcuterie plate from Sweet Retro-Spect, and more.

Canfield Community Centre President Bart Barnes is looking forward to hosting a big event once again. "Over the last two years of the pandemic, we've had to keep our hall closed and have therefore lost a great deal of revenue. This fundraiser will go a long way in helping us gain some revenue to help maintain the hall and keep our rates affordable for community members," said Barnes, who has been president of Canfield Community Centre for 15 years.

As with many rural halls, Canfield Community Centre is a popular choice for family Christmas parties and birthday parties, wedding showers and baby showers, as well as smaller weddings and stag and doe parties.

Admission to the Canfield Roots screening is $10 per person. Popcorn, drinks, and Canfield Roots DVDs will be available to purchase. Those interested in purchasing tickets can send a message to the Canfield Community Centre on Facebook (link: fb.me/e/2tlqD8I0b), call or text 905-772-5790, or buy tickets at the door.

"I can't wait to celebrate in Canfield with the many people who helped make Canfield Roots possible – from our incredible cast and crew, to our sponsors, to the many locals who shared their family history with me," said Bachiu. "This was a real passion project that spanned three years, and I'm truly grateful to the many people who gave of their time and talents. I couldn't have done it without them."

Sharing the history of some of the Black families who lived and thrived in a small rural town, Canfield Roots follows present-day descendants in Canada and the US as they learn about their family history, share their early experiences, and fight to preserve the Street cemetery, now the focus of a restoration project. Located on private land, the cemetery is the final resting place of freedom seekers and the last remaining evidence that those freedom seekers lived in Canfield. To view the Canfield Roots trailer, visit

windeckerroadfilms.com.

Educators interested in educational licensing of the Canfield Roots docuseries can visit McIntyre Media for more information and to order the series. Groups wanting to book an in-person or virtual screening, complete with personalized Q&A with Director/Producer Graeme Bachiu, will be sent a screening toolkit including pricing and event planning tools and tips. Contact graeme@windeckerroadfilms.com for more information.

CANFIELD—Canfield Roots Director/Producer Graeme Bachiu poses in front of the Canfield Community Centre marquee, where the premiere of Canfield Roots is taking place on Thursday, June 23. *—Submitted photo.*

To stay up to date on the ongoing story of Canfield Roots, learn about other Windecker Road Films productions, and access links to all Windecker Road Films productions, join the email list at windeckerroadfilms.com.

Windecker Road Films is a Cayuga-based media production company focused on character-driven short films, broadcast, and branded documentaries. Founder and Filmmaker Graeme Bachiu was named a 2021 Breakthrough Fellow by the Documentary Organization of Canada. While Bachiu's films have been screened at film festivals around the world, they remain rooted in the rural area he lives in. Current projects include Canfield Roots, Definitely The Hard Way, Shane Dreams of Sweet Corn, and Music From Windecker Road. Join the email list at windeckerroadfilms.com to stay updated on all the latest projects. Follow Windecker Road Films on Facebook at @windeckerroadfilms and on Instagram @graemebachiu.

Notice of Commencement of an Environmental Screening & Public Open House – Brooks Road Landfill Capacity Expansion

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* (EA Act) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

The proposed capacity expansion is subject to the Environmental Screening Process, as stated in Section 13 of the Waste Management Projects Regulation (O. Reg. 101/07) of the EA Act. The proposed capacity expansion would allow Brooks Road Environmental to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post diversion solid non-hazardous Industrial, Commercial & Institutional waste. The proposed capacity expansion will add capacity equal to approximately one additional year of waste acceptance over and above the remaining/ current approved capacity. There are no changes to the annual fill rate limits proposed as part of this project.

The location of the Brooks Road Landfill Site is shown on the map below. The purpose of the Environmental Screening is to study the potential effects of the capacity expansion on the environment.

The Process

As described above, the proposed project is subject to the Ministry of the Environment, Conservation and Parks (MECP) Environmental Screening Process for waste management projects in accordance with O. Reg. 101/07 under the EA Act. The Environmental Screening will be conducted in accordance with the planning and design process outlined in the Ontario MECP's "Guide to Environmental Assessment Requirements for Waste Management Projects." The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to the public, Indigenous communities, and government agencies.

Consultation and Public Open House #1

Members of the public, Indigenous communities, agencies, and other interested persons are encouraged to actively participate in the planning process by attending consultation events or contacting Project Team staff directly with questions. Consultation activities are planned throughout the Environmental Screening Process and will be advertised via direct and/or electronic mail, in the local newspaper, and on the project website (www.brenvironmental.com).

The first **Public Open House** for the Environmental Screening Process is scheduled for **June 29, 2022**. The details of the Public Open House are as follows:

Date: Wednesday, June 29, 2022 Drop In Time: 5 p.m. to 7 p.m.

Location: Cayuga Kinsmen Community Centre – 15 Thorburn Street South, Cayuga

You are encouraged to attend the Public Open House and to submit your comments via the project website (www.brenvironmental.com), mail, email or telephone to the addresses/numbers below.

If you would like to be added to our project mailing list or have project-related questions, please contact:

Tim Danyliw, P.Eng, PMP
Project Manager, Brooks Road Environmental
160 Brooks Road, Cayuga, ON N0A 1E0
T: (888)-402-7368 **E-mail:** tim@genvironmental.ca

Blair Shoniker, MA., RPP
Senior Waste & Environmental Planner
GHD Limited
T: 905-830-5656 **E-mail:** Blair.Shoniker@ghd.com

All personal information included in a submission is collected, maintained, and disclosed by the Ministry of the Environment, Conservation and Parks for the purpose of transparency and consultation. The information is collected under the authority of the *Environmental Assessment Act* or is collected and maintained for the purpose of creating a record that is available to the general public as described in s.37 of the *Freedom of Information and Protection of Privacy Act (FIPPA)*. Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the Ministry of the Environment, Conservation and Parks Freedom of Information and Privacy Coordinator at (416) 327-1434.

This notice was first published on: JUNE 16, 2022

World Knitting in Public Day celebrated in Jarvis

JARVIS—Knitting needles and crochet hooks were in motion for all to see as members of the Jarvis Knitting Social Club participated in the annual World Knitting in Public Day on June 11, 2022 at the Jarvis Library. Whether in sunshine or shade, participants enjoyed an afternoon of creating and conversation. The many projects being worked on included baby hats for St. Joseph's Hospital, a neck warmer, a Persian tile Afghan, towel tops for hand towels, and poppies for the Haldimand Horticultural Society. Most in attendance have been knitting or crochet enthusiasts for decades, having learned from their mothers, grandmothers, or in Home Economics class. Pictured is (sitting, l-r) Kim Slavinsky, Cathy Hill, Karen Bootsma, (standing) Alexis Hayes, Laurel Porteous, Jenny Eggink, and Wanda Nelson, Jarvis Library staff. The Jarvis Knitting Social Club meets at the library on Thursdays from 2 p.m. to 4 p.m. and new members are always welcome. —Haldimand Press photo by Sheila Phibbs.

OPP continue search for missing 74-year-old boater near Port Maitland

By Haldimand Press Staff

DUNNVILLE—Haldimand OPP, the OPP Marine Unit, and OPP Aviation Services, along with the Joint Rescue Coordination Centre (JRCC) based out of Trenton, Niagara Regional Police and Canadian Coast Guard continue searching for an overdue boater near Port Maitland.

On Thursday, June 16 at 5:20 p.m., Haldimand County OPP received a dispatch call for a missing 74-year-old male that had gone fishing at 4 a.m. and had not yet returned.

An OPP helicopter searched the area last night with JRCC assistance.

Victim Services has been engaged with the family members.

As of Monday, June 20, Constable Mary Gagliardi said, "The OPP Underwater Search and Recovery Unit, OPP Aviation Services, and OPP Marine Unit are still searching."

Updates will be provided as information becomes available.

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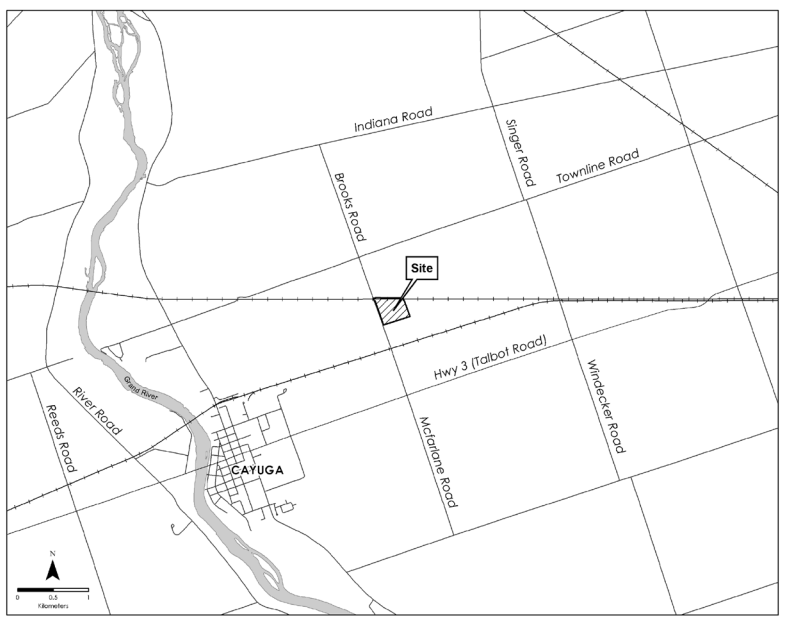
The location of the Brooks Road Landfill Site is shown on the map below. The purpose of the Environmental Screening is to study the potential effects of the capacity expansion on the environment.



The Process

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Location: Cayuga Kinsmen Community Centre – 15 Thorburn Street South, Cayuga

You are encouraged to attend the Public Open House and to submit your comments via the project website (www.brenvironmental.com), mail, email or telephone to the addresses/numbers below.

If you would like to be added to our project mailing list or have project-related questions, please contact:

Tim Danyliw, P.Eng, PMP
Project Manager, Brooks Road Environmental
160 Brooks Road, Cayuga, ON N0A 1E0
T: (888)-402-7368 **E-mail:** tim@gpenvironmental.ca

Blair Shoniker, MA., RPP
Senior Waste & Environmental Planner
GHD Limited
T: 905-830-5656 **E-mail:** Blair.Shoniker@ghd.com

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This notice was first published on: JUNE 16, 2022

From:	Erika Brown
To:	khewitt@haldimandcounty.on.ca; jmetcalfe@haldimandcounty.on.ca; spatterson@haldimandcounty.on.ca; dlawrence@haldimandcounty.on.ca; tdalimonte@haldimandcounty.on.ca; rshirton@haldimandcounty.on.ca; bcorbett@haldimandcounty.on.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 2:47:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

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Good Afternoon,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

Please find attached a copy of the Notice of Commencement of an Environmental Screening and Public Open House. The Notice of Commencement and Public Open House will appear in the local papers as well as being sent out via mail and email to the public, Indigenous communities, and agencies.

For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of
BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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Waste & Environmental Planner

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D 647 989 7353 | **E** erika.brown@ghd.com

The Power of Commitment

Connect

From:	Erika Brown
To:	joan.delvillarcuicas@ontario.ca; planning@grandriver.ca; smastroianni@npca.ca; carolyn.lee@ontario.ca; nancy.rutherford@ontario.ca; karla.barboza@ontario.ca; laura.romeo@ontario.ca; joseph.harvey@ontario.ca; paul.bloye@ontario.ca; joanna.roberto@granderie.ca; jennifer.davey@opp.ca; phil.carter@opp.ca; Belinda.Rose@opp.ca; erick.boyd@ontario.ca; ian.thornton@ontario.ca; geddes.mahabir@ontario.ca; svandalen@haldimandcounty.on.ca; pmete@haldimandcounty.on.ca; bhedges@haldimandcounty.on.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 2:47:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

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We would like to hold a Government Review Team update meeting during the Screening. Future update meetings are anticipated to be held around key milestones and will be communicated to you well in advance.

We will continue to notify you about this Environmental Screening, unless we hear from you stating that you do not wish to be consulted on this undertaking. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of

BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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MENV., RPP
Waste & Environmental Planner

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D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From:	Erika Brown
To:	jocko@sixnationsns.com
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:44:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

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Good Afternoon Hohahes Leroy Hill,

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We will continue to notify you about this Environmental Screening. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

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Erika Brown

on behalf of

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Waste & Environmental Planner

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D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From:	Erika Brown
To:	consultations@metisnation.org; pontdj@hotmail.com; cwmc@metisnation.org
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:40:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

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D 647 989 7353 | **E** erika.brown@ghd.com

The Power of Commitment

Connect

From:	Erika Brown
To:	Stacey.LaForme@mncfn.ca; Mark.Laforme@mncfn.ca; Fawn.Sault@mncfn.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:39:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

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Good Afternoon Chief Laforme,

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The Power of Commitment

Connect

From:	Erika Brown
To:	Abby.LaForme@mncfn.ca
Subject:	FW: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:48:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

Good afternoon Abby,

I received an automatic reply from Fawn Sault indicating all consultation correspondence should be directed to you.

Please see the email below and files attached.

Kind Regards,
Erika

Erika Brown (she/her)
MENV., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

From: Erika Brown
Sent: Thursday, June 16, 2022 5:40 PM
To: Stacey.LaForme@mncfn.ca; Mark.Laforme@mncfn.ca; Fawn.Sault@mncfn.ca
Cc: tim@gpenvironmental.ca; Blair Shoniker <Blair.Shoniker@ghd.com>
Subject: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

From:	Erika Brown
To:	markhill@sixnations.ca; darrinjamieson@sixnations.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:35:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

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Please find attached a copy of the Notice of Commencement of an Environmental Screening and Public Open House, Draft Project Description, and Screening Criteria Checklist. On behalf of Brooks Road Environmental, GHD will reach out early next week to offer additional details on the undertaking, as well as to determine if you would like to set-up a separate meeting to review the proposed project in greater detail and discuss your preferred approach to future engagement.

We will continue to notify you about this Environmental Screening. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of

BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

GHD
Proudly employee-owned | ghd.com
65 Sunray Street Whitby ON L1N 8Y3 Canada
D 905 429 5040 **M** 647 525 9798 **E** Blair.Shoniker@ghd.com

Erika Brown (she/her)
MENV., RPP

Waste & Environmental Planner

GHD
Proudly employee-owned | ghd.com
184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

The Power of Commitment

Connect

From:	Erika Brown
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 2:48:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

---

Good Afternoon,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

Please find attached a copy of the Notice of Commencement of an Environmental Screening and Public Open House. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

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Please consider the environment before printing this email

Appendix B

Display Panels

WELCOME

Public Open House No.1

Brooks Road Landfill Capacity Expansion Environmental Screening

Purpose of the Open House

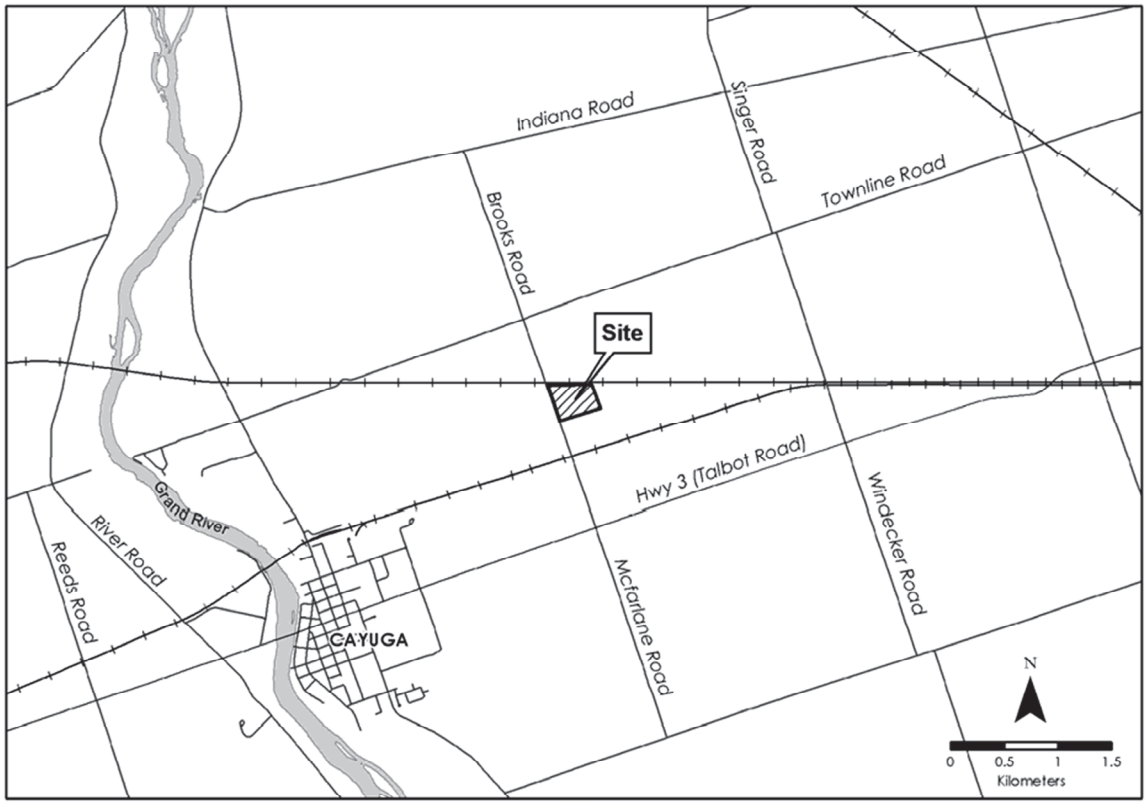
The purpose of this Public Open House is to share information about the Environmental Screening for the proposed Brooks Road Landfill Capacity Expansion and to obtain your comments for consideration by Brooks Road Environmental.

This Open House will:

- Describe the purpose of the proposed Capacity Expansion
- Introduce Brooks Road Environmental
- Outline the Environmental Screening Process
- Summarize the Problem/Opportunity and Project Description
- Present the completed Screening Criteria Checklist
- Identify next steps in the Environmental Screening Process

Project Overview

Brooks Road Environmental has initiated an Environmental Screening Process for a proposed capacity expansion of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario, shown on the Site map below.



- The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres.
- The proposed capacity expansion will add capacity equal to approximately one additional year of waste over and above the remaining/ current approved capacity.

Brooks Road Environmental

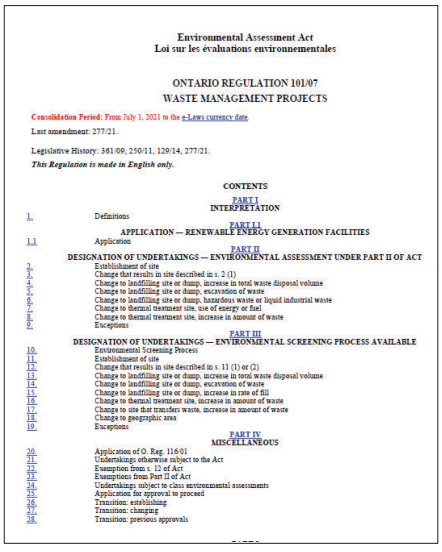
Brooks Road Landfill is a 100% Canadian owned and managed sustainable landfill serving waste generators in Southwestern Ontario.

- Brooks Road Environmental is committed to providing cost-effective and environmentally-sound disposal for solid waste, including impacted soils, generated by industries and businesses.
- With a capacity of 1,000 tonnes per day, Brooks Road Landfill can meet the waste disposal needs of more than 5 million people while protecting our surrounding environment.
- As a part of the community we serve, Brooks Road Environmental is proud to sponsor a number of local organizations, including Cayuga Food Bank and the Dunnville Fair.
- The proposed capacity expansion would allow Brooks Road Environmental to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post diversion solid non-hazardous Industrial, Commercial & Institutional waste.

Environmental Screening Process

An Environmental Screening is an approvals process for projects that have predictable environmental effects that can be readily mitigated.

- This Project is subject to an Environmental Screening Process in accordance with Section 13 of the Waste Management Projects Regulation, (Ontario Regulation 101/07) of the *Environmental Assessment Act.*
- The Project will be conducted in accordance with the Ministry of Environment, Conservation and Parks “Guide to Environmental Assessment Requirements for Waste Management Projects”.
- Results of the Environmental Screening will be documented in an Environmental Screening Report, which will be released for public and agency review.



Environmental Assessment Act
Loi sur les évaluations environnementales

ONTARIO REGULATION 101/07
WASTE MANAGEMENT PROJECTS

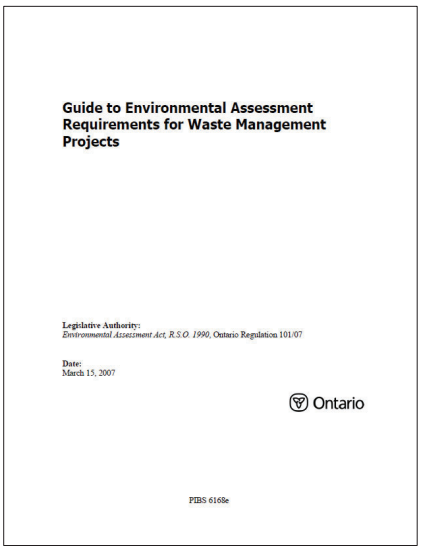
Consolidation Period: From July 1, 2021 to the e-Laws currency date

Last amendment: 277/21.

Legislative History: 361/09, 250/11, 129/14, 277/21.

This Regulation is made in English only.

CONTENTS



Guide to Environmental Assessment Requirements for Waste Management Projects

Legislative Authority:
Environmental Assessment Act, R.S.O. 1990, Ontario Regulation 101/07

Date:
March 15, 2007

Ontario

PIBS 6168e

Environmental Screening Process

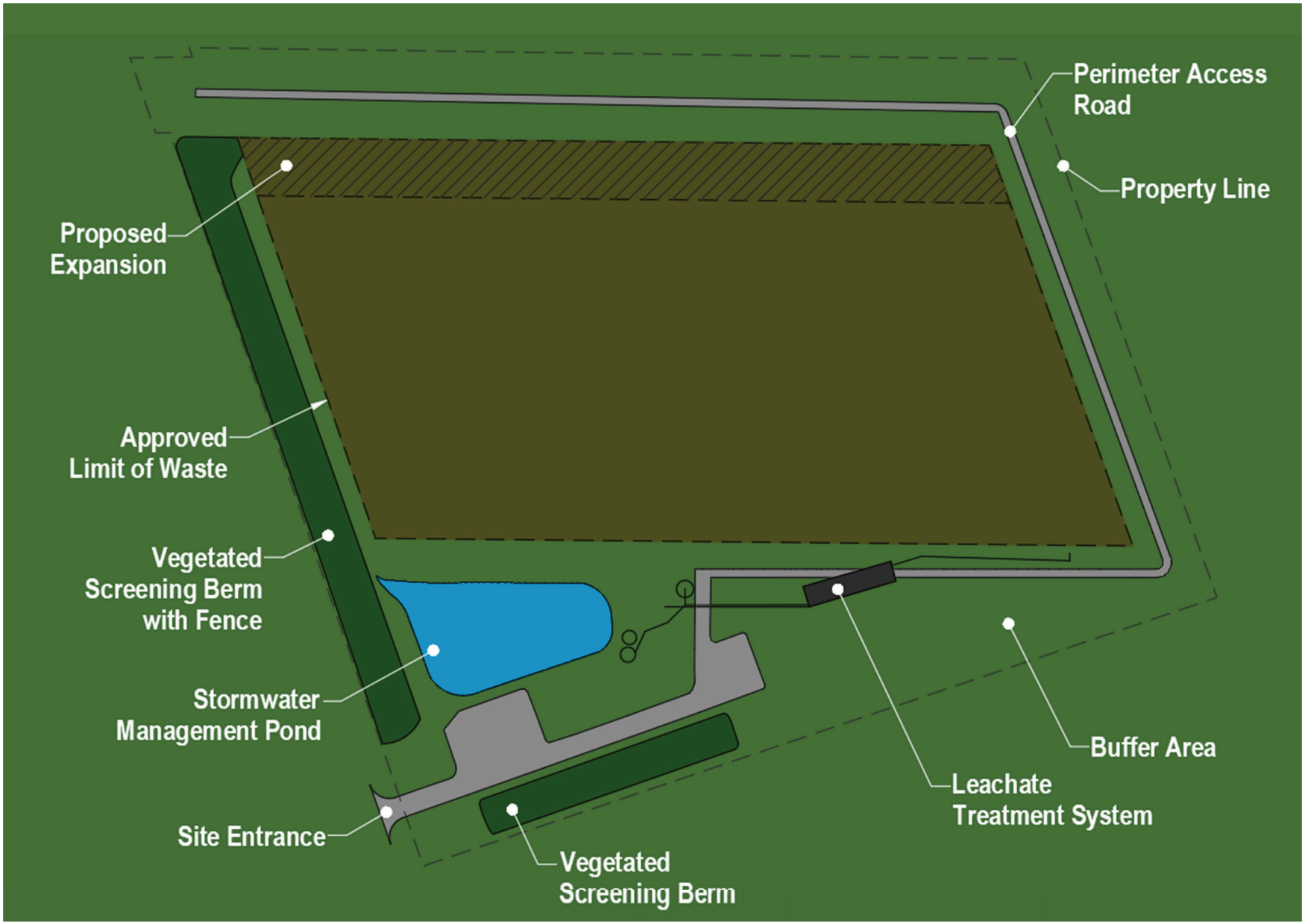
This Public Open House is an important part of the Environmental Screening Process to consult and engage with stakeholders in the process (Steps 1 – 5).

Step 1	Publish Notice of Commencement and Public Open House
Step 2	Identify Problem or Opportunity and Project Description
Step 3	Apply Screening Criteria
Step 4	Describe Potential Environmental Effects, Concerns, and Issues
Step 5	Consultation and Public Open House #1
Step 6	Conduct Studies and Assessment of Potential Environmental Effects
Step 7	Develop Impact Management/ Mitigation Measures
Step 8	Consultation and Public Open House #2
Step 9	Identify Significant Net Effects and Resolve Concerns (if required)
Step 10	Conduct Additional Studies and Assessment (if required)
Step 11	Prepare Environmental Screening Report
Step 12	Publish Notice of Completion
Step 13	Resolve Elevation Requests (if required)
Step 14	Submit Statement of Completion to the Ministry of the Environment, Conservation and Parks

Problem / Opportunity & Project Description

- There is an opportunity to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils).
- The proposed expansion would increase the capacity of the Site by approximately 100,000 cubic metres, adding capacity equal to approximately one additional year.
- This would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically, as well as increasing the existing landfill footprint to expand the Site horizontally.
- Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours.
- The former railway property would continue to provide buffer land for the Site.

Proposed Capacity Expansion Concept



As part of the initiation of the Environmental Screening Process, the Screening Criteria Checklist has been completed based on the information provided in the Project Description.

Screening Criteria Checklist

- The Screening Criteria are presented in the form of a checklist with the option of a “Yes” or “No” response. Mitigation measures are not to be considered in concluding whether there is “No” potential environmental effect. That is, the proponent is required to answer “Yes” even if the proponent believes that a potential environmental effect could likely be mitigated.
- Where a “Yes” has been identified, the proponent is to provide additional information in the Environmental Screening Report, explaining the potential effect(s), methods to mitigate or address the effect(s), any net effects that are anticipated and if so, their significance.

Screening Criteria Checklist

	CRITERION MIGHT THE PROJECT…	YES	NO	ADDITIONAL INFORMATION
1. Surface & Groundwater				
1.1	Cause negative effects on surface water quality, quantities, or flow?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause potential negative effects on surface water quality, quantities, or flows.
1.2	Cause negative effects on groundwater quality, quantity, or movement?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on groundwater quality, quantity, or movement.
1.3	Cause significant sedimentation or soil erosion or shoreline or riverbank erosion on or off site?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause sedimentation on or off site.
1.4	Cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on surface or groundwater from accidental spills or releases (e.g., leachate) to the environment.
2. Land				
2.1	Cause negative effects on residential, commercial, institutional, or other sensitive land uses within 500 metres from the site boundary?		X	The proposed undertaking is a continuation of the existing operation through an expansion within the existing site. No change to land use is being proposed. As such, no negative effects are anticipated on the lands or land uses within 500m the Site as a result of the Project.
2.2	Not be consistent with the Provincial Policy Statement, provincial land use or resource management plans?		X	The proposed landfill expansion would continue to be consistent with the Provincial Policy Statement, provincial land use and/or resource management plans.
2.3	Be inconsistent with municipal land use policies, plans and zoning bylaws (including municipal setbacks)?		X	The proposed landfill expansion would continue to be consistent with municipal land use policies, plans and zoning bylaws (including municipal setbacks). No new lands are required and no changes to existing zoning are required.
2.4	Use lands not zoned as industrial, heavy industrial or waste disposal?		X	The proposed landfill expansion would not require new lands or changes to existing zoning.
2.5	Use hazard lands or unstable lands subject to erosion?		X	The proposed landfill expansion would not require the use of hazard lands or unstable lands subject to erosion.
2.6	Cause negative effects related to the remediation of contaminated land?		X	The proposed landfill expansion would not cause negative effects related to the remediation of contaminated land.

Screening Criteria Checklist

	CRITERION MIGHT THE PROJECT…	YES	NO	ADDITIONAL INFORMATION
3. Air & Noise				
3.1	Cause negative effects on air quality due to emissions (for parameters such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other contaminants)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on air quality due to emissions.
3.2	Cause negative effects from the emission of greenhouse gases (e.g., carbon dioxide, carbon monoxide, methane)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in emission of greenhouse gases associated with continued operation of the Site.
3.3	Cause negative effects from the emission of dust or odour?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in dust and odour emissions associated with continued operation of the Site.
3.4	Cause negative effects from the emission of noise?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in noise emissions associated with continued operation of the Site.
3.5	Cause light pollution from trucks or other operational activities at the site?		X	The proposed landfill expansion would not cause negative effects from light pollution.

Screening Criteria Checklist

	CRITERION MIGHT THE PROJECT…	YES	NO	ADDITIONAL INFORMATION
4. Natural Environment				
4.1	Cause negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat?		X	As there are no rare (vulnerable), threatened or endangered species of flora or fauna or their habitat on-site, the proposed expansion is not expected to cause a negative effect.
4.2	Cause negative effects on protected natural areas such as, ANSIs, ESAs, or other significant natural areas?		X	As there are no ANSIs, ESAs or other significant natural areas on-site, the proposed expansion is not expected to cause a negative effect.
4.3	Cause negative effects on designated wetlands?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on designated wetlands. It should be noted that none have been identified as being present on-site.
4.4	Cause negative effects on wildlife habitat, populations, corridors, or movement?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on wildlife habitats, populations, corridors, or movements. It should be noted that none have been identified as being present on-site.
4.5	Cause negative effects on fish or their habitat, spawning, movement, or environmental conditions (e.g., water temperature, turbidity, etc.)?		X	The proposed landfill expansion would not result in negative effects on fish or their habitat, spawning, movement, or environmental conditions (e.g., water temperature, turbidity, etc.) due to lack of presence on-site.
4.6	Cause negative effects on locally important or valued ecosystems or vegetation?		X	The proposed landfill expansion would not result in negative effects on locally important or valued ecosystems or vegetation.
4.7	Increase bird hazards within the area that could impact surrounding land uses (e.g., airports)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause an increase in bird hazards.

Screening Criteria Checklist

	CRITERION MIGHT THE PROJECT…	YES	NO	ADDITIONAL INFORMATION
5. Resources				
5.1	Result in practices inconsistent with waste studies and/or waste diversion targets (e.g., result in final disposal of materials subject to diversion programs)?		X	The proposed landfill expansion would be consistent with diversion targets.
5.2	Result in generation of energy that cannot be captured and utilized?		X	No energy recovery/ utilization is proposed.
5.3	Be located a distance from required infrastructure (such as availability to customers, markets, and other factors)?		X	The proposed landfill expansion would not change the existing landfill location.
5.4	Cause negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural lands?		X	According to the Canada Land Inventory, lands within the Local Study Area (LSA) are comprised of Class 2 soils (generally north and west of the Site) and Class 3 soils (generally east and south of the Site). The proposed landfill expansion would not result in any loss of soil with agricultural capability, nor would the current expansion cause negative effects on Canada Land Inventory Class 2-3 soils within the LSA. All lands on the Site are considered to be disturbed and are not rated under the Canada Land Inventory.
5.5	Cause negative effects on existing agricultural production?		X	The proposed landfill expansion would not cause negative effects on agricultural production.

Screening Criteria Checklist

	CRITERION MIGHT THE PROJECT…	YES	NO	ADDITIONAL INFORMATION
6. Socio-Economic				
6.1	Cause negative effects on neighbourhood or community character?	X		The proposed landfill expansion would increase the footprint, landfill height in the expansion area and extend site operations and may cause negative effects to neighbourhood or community character.
6.2	Result in aesthetics impacts (e.g., visual and litter impacts)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause aesthetic impacts due to the increase in landfill height in the expansion area.
6.3	Cause negative effects on local businesses, institutions, or public facilities?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on local businesses, institutions, or public facilities.
6.4	Cause negative effects on recreation, cottaging or tourism?		X	The proposed landfill expansion would not result in negative effects on recreation, cottaging or tourism.
6.5	Cause negative effects related to increases in the demands on community services and infrastructure?		X	The proposed landfill expansion would not cause negative effects related to increases in the demands on community services and infrastructure.
6.6	Cause negative effects on the economic base of a municipality or community?		X	The proposed landfill expansion would not cause negative effects on the economic base of a municipality or community.
6.7	Cause negative effects on local employment and labour supply?		X	The proposed landfill expansion would not cause negative effects on local employment and labour supply. The continued use of the road(s) will provide economic benefits to the local community in the form of new employment opportunities in both the construction and day-to-day operation. There is also the potential for increased employment opportunities in local firms.
6.8	Cause negative effects related to traffic?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects related to traffic through prolonging the life of the Site.
6.9	Be located within 8 km of an aerodrome/airport reference point?	X		A private airfield used for soaring is located approximately 7.5 km north of the Site.
6.10	Interfere with flight paths due to the construction of facilities with height (i.e., stacks)?		X	The proposed landfill expansion would not interfere with flight paths.
6.11	Cause negative effects on public health and safety?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on public health and safety.

Screening Criteria Checklist

	CRITERION MIGHT THE PROJECT…	YES	NO	ADDITIONAL INFORMATION
7. Heritage & Culture				
7.1	Cause negative effects on heritage buildings, structures or sites, archaeological sites or areas of archaeological importance, or cultural heritage landscapes?		X	The entire Site has been subjected to recent, extensive and intensive disturbance and it is therefore considered that the Site does not have any heritage, cultural and archaeological potential that will be negatively affected by the expansion. While there are areas within the LSA that may have heritage, cultural, and archaeological potential, these areas will not be disturbed by the proposed expansion.
7.2	Cause negative effects on scenic or aesthetically pleasing landscapes or views?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on scenic or aesthetically pleasing landscapes or views.
8. Aboriginal				
8.1	Cause negative effects on land, resources, traditional activities, or other interests of Aboriginal communities?		X	Consultation with Indigenous communities will take place throughout the Environmental Screening Process.
9. Other				
9.1	Result in the creation of non-hazardous waste materials requiring disposal?		X	The proposed landfill expansion would not change the types of wastes the facility is permitted to receive and would not result in the creation of non-hazardous waste materials requiring disposal (the landfill currently receives non-hazardous waste as permitted by the existing Environmental Compliance Approval).
9.2	Result in the creation of hazardous waste materials requiring disposal?		X	The proposed landfill expansion would not change the types of wastes the facility is permitted to receive and will would not result in the creation of hazardous waste materials requiring disposal (the landfill currently receives non-hazardous waste as permitted by the existing Environmental Compliance Approval).
9.3	Cause any other negative environmental effects not covered by the criteria outlined above?		X	The proposed landfill expansion would not cause any other negative environmental effects not covered by the criteria outlined above.

Next Steps

After this Public Open House, the following next steps in the Environmental Screening Process will be carried out by Brooks Road Environmental

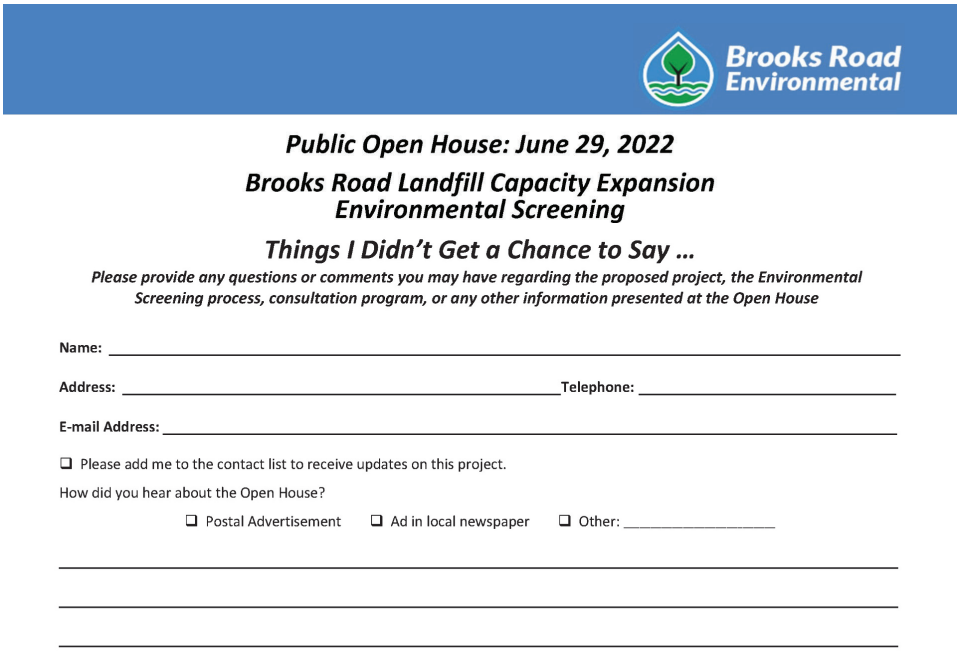
- Determine the potential adverse environmental effects of the Project on the environment.
- If adverse environmental effects are identified, mitigation and monitoring measures will be applied to reduce or eliminate the effects.
- Prepare a Draft Environmental Screening Report which will document the Environmental Screening Process followed.
- Feedback received from members of the public, agencies, and Indigenous communities from this Public Open House and future consultation events will be considered prior to finalizing the Environmental Screening Report.
- There will be additional opportunities for consultation throughout the Screening process, including another Public Open House and review of the Environmental Screening Report.

Thank You

We appreciate your participation in the Environmental Screening Process and your attendance at today's Public Open House.

Comments

Please consider completing a Comment Form, available at the sign-in desk, and joining our project mailing list.



Brooks Road Environmental

Public Open House: June 29, 2022

Brooks Road Landfill Capacity Expansion Environmental Screening

Things I Didn't Get a Chance to Say …

Please provide any questions or comments you may have regarding the proposed project, the Environmental Screening process, consultation program, or any other information presented at the Open House

Name: _____

Address: _____ **Telephone:** _____

E-mail Address: _____

❑ Please add me to the contact list to receive updates on this project.

How did you hear about the Open House?

❑ Postal Advertisement ❑ Ad in local newspaper ❑ Other: _____

_____

_____

_____

Appendix C

Comments Received

Brooks Road Environmental

Public Open House: June 29, 2022

Brooks Road Landfill Capacity Expansion Environmental Screening

Things I Didn't Get a Chance to Say ...

Please provide any questions or comments you may have regarding the proposed project, the Environmental Screening process, consultation program, or any other information presented at the Open House

Name: [redacted]

Address: [redacted] **Telephone:** [redacted]

E-mail Address: _____

☒ Please add me to the contact list to receive updates on this project.

How did you hear about the Open House?

☐ Postal Advertisement ☒ Ad in local newspaper ☐ Other: _____

two ongoing concerns: stink, and noise from tracked vehicles

(see reverse side)

Brooks Road Environmental

Public Open House: June 29, 2022

Brooks Road Landfill Capacity Expansion Environmental Screening

Things I Didn't Get a Chance to Say ...

Please provide any questions or comments you may have regarding the proposed project, the Environmental Screening process, consultation program, or any other information presented at the Open House

Name: [redacted]

Address: [redacted] Telephone: [redacted]

E-mail Address: CAYUGA ONT. N0A1E0

☐ Please add me to the contact list to receive updates on this project.

How did you hear about the Open House?

☐ Postal Advertisement ☒ Ad in local newspaper ☒ Other: RECEIVED LETTER IN THE MAIL

REFER TO SECOND PAGE ATTACHMENT

Comments Questions Suggestions

Vegetated screening berm (with fence)
Increase fence height as required for increased height of land fill
Start planting trees on berm for wind screening and visual appeal

Buffer area
Start planting permanent vegetation and trees if not already in progress

Proposed expansion and temporary fill storage.
The area along the north boundary and maybe other areas not visible from the road.
Plant cover crop, vegetation – better than weeds
May be an opportunity for farmers
Achieves dust, erosion and runoff control
Plant permanent vegetation and trees as slopes are completed

Dust control
Due to increased height of fill, use portable windscreens on hill tops as capacity expansion progresses.
Reference Stelco Nanticoke coal fields.

Storm water management pond
Plant native species typical of marsh
Improve filtering and subsequent run off water quality

Odour and gaseous emissions
Found answers to most of my concerns in the FAQ section:
Are smelly additions perfumed or are they treated?
Treat with "odour control product", hydrogen peroxide or some other oxidizer other than bleach?
Aerate or vacuum the build-up with underlayed temporary piping as it progresses?
Has a ground gas collection and treatment system been installed?
If not will it be installed as filling progresses?

Future use – toboggan hill!

ghd.com

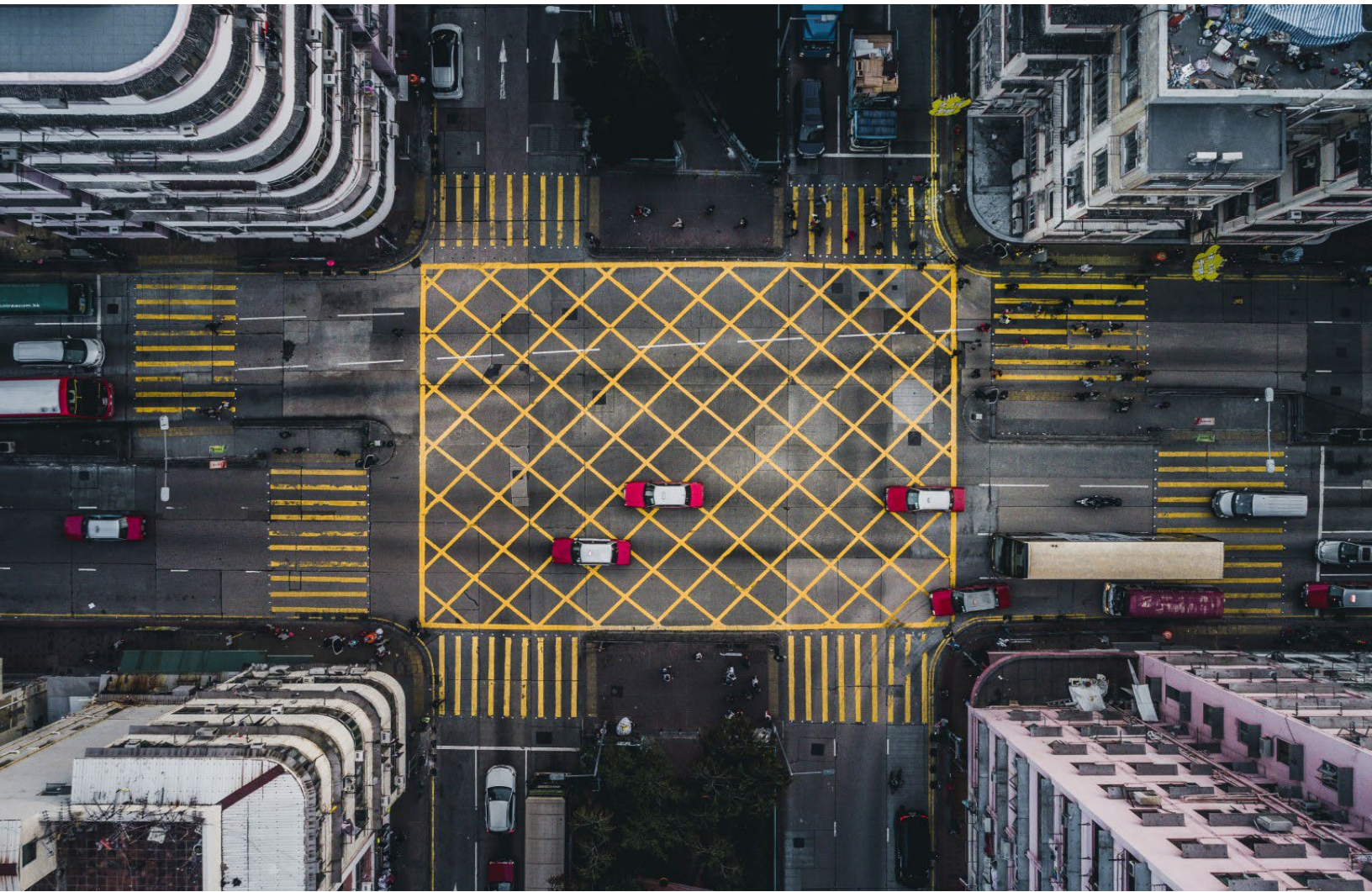
The Power of Commitment

Public Open House 2 Summary Report

2270386 Ontario Limited

March 26, 2024

→ The Power of Commitment



Project name		Brooks Road Landfill Expansion					
Document title		Public Open House 2 Summary Report					
Project number		12561524					
File name		Open House 2 Summary Report November 14 2023.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3		Axita Patel	Erika Brown	On file	Blair Shoniker	On file	11/28/2023
S4	0	Axita Patel	Erika Brown		Blair Shoniker		3/26/2024

GHD
Contact: Axita Patel, Solid Waste Planner | GHD
70 York Street, Suite 801
Toronto, Ontario M5J 1S9, Canada
T +1 416 360 1600 | **E** info-northamerica@ghd.com | **ghd.com**

Contents

Appendices

1. Introduction

This report summarizes the second Public Open House for the Brooks Road Landfill Capacity Expansion Environmental Screening held on October 24th, 2023. Brooks Road Environmental (BRE), owners and operators of the Brooks Road Landfill in Haldimand County, Ontario, have initiated an Environmental Screening process in accordance with Section 13 of the Waste Management Projects Regulation, (Ontario Regulation 101/07) of the Environmental Assessment Act (EA Act) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 219,400 cubic meters (m^3).

1.1 Objective for Open House

The main objectives of the second Open House included providing an overview of the Environmental Screening process; presenting a detailed project description; summarizing the results of the various environmental studies conducted for the Environmental Screening process, including potential effects, mitigation measures, overall net effects from the proposed expansion, and any monitoring requirements; and presenting the project schedule. The key information presented at the second Open House was the change in the planned capacity increase from the previously proposed 100,000 m^3 to 219,400 m^3as a result of the change in Ontario Regulation 101/07. The second Open House provided an opportunity to discuss and solicit feedback and comments on the proposed undertaking as well as how to best consult with the public going forward; meet the Project Team and ask questions regarding the undertaking and the EA process; and provide an update on Site developments occurring outside of the EA process.

Attendees were offered the opportunity to present their comments regarding the information directly to staff from BRE and GHD Limited (GHD).

1.2 Date, Time, and Location of Open House

The Public Open House was held on October 24, 2023, from 6 to 8 p.m. at the Cayuga Kinsmen Community Centre (15 Thorburn Street South, Cayuga, Ontario).

The second Open House followed the same drop-in format as the first Open House, with the information illustrated on a set of display panels arranged around the perimeter of the room. Project Team members were available to answer questions from attendees.

2. Notification

Notification of the second Public Open House was published in the Sachem online and Haldimand Press newspaper on October 12, 2023.

In addition to the newspaper advertisement, email notification of the second Public Open House was provided to the following identified agencies, Indigenous communities, and stakeholder groups on October 11, 2023.

- Haldimand County Mayor, Councillors, and relevant staff
- Grand River Conservation Authority
- Niagara Peninsula Conservation Authority
- Ministry of the Environment, Conservation & Parks (MECP)
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Heritage, Sport, Tourism and Cultural Industries

– Ministry of Education
– Ontario Provincial Police
– Grand Erie District School Board
– Ministry of Municipal Affairs – Ontario Growth Secretariat (formerly under the Ministry of Infrastructure)
– Ministry of Municipal Affairs and Housing
– Ministry of Northern Development, Mines, Natural Resources and Forestry
– Ministry of Transportation
– Métis Nation of Ontario (Head Office, Niagara Region Métis Council and Hamilton-Wentworth Métis Council)
– Six Nations of the Grand River First Nation
– Mississaugas of the Credit First Nation
– Haudenosaunee Confederacy Chiefs Council
– Haudenosaunee Development Institute
– Adjacent land owners and members of the public who had previously expressed an interest in the landfill

Moreover, notification was also provided to 2,019 addresses within the N0A postal code, covering the town of Cayuga, via unaddressed Canada Post mail-drop during the week of October 19, inviting interested stakeholders and members of the community to attend the event.

Copies of notification for the second Public Open House are provided in **Appendix A.**

3. Project Team Members in Attendance

The following Project Team members were in attendance at the Public Open House to answer questions:

Brooks Road Environmental	GHD
Tim Danyliw	Blair Shoniker Ryan Loveday Ben Kempel Matthew Griffin Katrina McCullough Amy Douglas Tochi Azubuike Michaela Watson

4. Information Presented

Information presented at the second Public Open House was in the form of display boards arranged around the room and organized to take the viewer through the process from project introduction to the history of the Site, Environmental Screening process, need/rationale, environmental study results, and next steps in the process. This information included:

– Outline of the purpose of the Open House
– Project Overview
– History of the existing landfill and Site

- Outline of the Environmental Screening process
- Rationale for the undertaking
- Proposed capacity expansion concept map
- Description of the Study Areas, including an aerial map
- Natural Environment Study Results including met effects and proposed mitigation measures.
- Groundwater and Hydrogeology Study Results including Net effects and proposed mitigation measures.
- Noise Study Results including met effects and proposed mitigation measures.
- Surface Water Study Results including met effects and proposed mitigation measures.
- Traffic Study Results including met effects and proposed mitigation measures.
- Land-Use & Socio-Economic Study Results including met effects and proposed mitigation measures.
- Air Quality Study Results including met effects and proposed mitigation measures.
- Next steps in the EA process

Copies of the display panels are included in **Appendix B**.

5. Attendance

A total of 12 individuals attended the second Open House on October 24, 2023. Those in attendance included local residents and landowners, local government officials, members of the Public Liaison Committee of the existing landfill, and a member of the media.

Comments ranged from apprehensive of the proposal to supportive. The majority of comments received during the second Open House related to the operations of the existing landfill. Landowners within the immediate vicinity of the Site asked questions regarding the potential height of the new expansion, wetland protection, visual impact, odour, noise, potential impacts to surface and groundwater, traffic, Site life, and post-closure use. Overall, there was good dialogue between attendees and staff.

Attendees were encouraged to provide written comments on the comment sheets provided. No comments were received.

All attendees who signed in were given the option to be added to the project-specific contact database if they had not already been added after the first Open House. This database will be used during the remaining phases of the Environmental Screening to contact and inform interested members of the public, Indigenous communities, and key stakeholders.

Appendix A

Notification

Local author finds his voice in "Bishop Rider" stories

By Ollvla Snyder
The Haldimand Press

CALEDONIA—Beau Johnson's latest book, *The Abrum Files*, is about legacy, both his own and his characters'.

Over the past seven years, Johnson has written and published three short story collections and three episodic novels, all centred around the character Bishop Rider. *The Abrum Files*, released Monday, October 9, 2023, explores Rider's stories from the perspective of Jeremiah Abrum, the son of the man who ruined Rider's life.

Johnson began reading and writing passionately when he was 15 years old. He had bought a Stephen King novel as a gift for his brother but read it himself instead and was captivated.

As life filled up with work, friends, and family, writing fell from Johnson's mind. For years, he was busy raising three boys and running the family business – Grand River Dinner Cruises in Caledonia – with his wife, Dana.

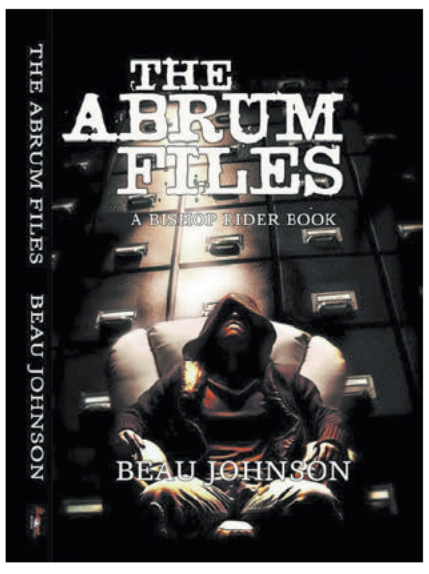
One evening in 2016 while the couple was watching "Mad Men", Beau suddenly turned to Dana and asked, "Why did I stop writing?" Johnson grinned while telling this story, saying, "That's the best thing about writing. There's no time limit, there's no age limit."

That conversation was the catalyst for seven years of developing a voice, getting to know new characters, and learning how to edit, publish, and market books.

Johnson "really found his voice" with Bishop Rider. The character was born out of necessity: Johnson wrote a story with a mother and daughter who were attacked, and they needed someone to avenge them. Rider, whom Johnson describes as a "punisher archetype", became that avenger.

The six Bishop Rider books centre on this mission of retribution. The series tagline, "It's not about saving people. It's about stopping them", illustrates Bishop's strategy and the storyline's "dark but never gratuitous" tone.

Rider's voice "has a cadence to it" that enlivens the character and action – at once dramatic, poetic, disjointed, and sharp. The narration shows how Rider delights in the rhythm of his words and the beauty of their sound, but also reveals



the harshness and agitation in his thoughts.

The Abrum Files introduces a new voice and a new challenge. Jeremiah Abrum's mission is similar to Rider's, but has a more redemptive arc. Abrum works to pay for his father's sins while Bishop strives to avenge the evil around him. The partnership transforms both characters' legacies.

This book, and an upcoming Bishop Rider anthology, have also given Johnson opportunities to grow in his writing process.

Johnson generally focuses more on ideas than structure. He explained, "If I get an idea I just go with it. I don't worry about plot. The first draft is raw, then I clean it up and take out the boring parts."

Next, Johnson's brother copy-edits the story. Finally, it is sent to Down and Out Books, Johnson's publisher, where the stories are sent back and forth several times between the editors and author before publication.

Johnson's non-linear process has caused some logistical challenges, but many more creative opportunities. Because Johnson "always write(s) out of sequence", he has had to "really focus on timeline" for each Bishop Rider book to ensure consistency and accuracy. However, the gaps and jumps leave room for different perspectives. While *The Abrum Files* tells Rider's story through another character's eyes, Johnson's next project, coming in 2024, will look through different author's eyes.

The upcoming anthology is a result of Johnson's personal marketing. Because Down and Out Books is an Indie publisher with limited advertising and distribution channels, their authors must promote their books in creative ways. Johnson focuses on Twitter, TikTok, and Instagram. A Twitter follower asked if Johnson had ever thought about compiling Bishop Rider stories from other authors, and Johnson loved the idea.

He issued a call on social media asking for 50 stories: "Some were really, really bad, some were ok, and a few were really, really good."

After reviewing the submissions, Johnson realized there was a lack of female perspective, so he issued another call specifically for women to submit. The new anthology will have a mix of voices and perspectives to showcase the crime and vengeance genre.

Johnson is passionate about marketing not only his own books, but other up-and-coming authors. Social media posts he calls "Beau's Book Nook" feature his own stories, while "Not Beau's Book Nook" features other authors he enjoys. Local readers can learn more about Johnson and his recommendations on his social media: beaujustinjohnson on Instagram and beaujohnson44 on Twitter.

Cayuga Heritage Centre unveils 'fragile' new exhibit and upcoming October program schedule

To The Haldimand Press

CAYUGA—The Cayuga Heritage Centre is pleased to announce the launch of its newest exhibition, 'Handle With Care', along with its October program schedule.

The events kicked off with an exhibition talk this week, where the museum curator taught participants about the history of fragile, useful objects that we use in our daily lives and the process of setting up and caring for the precious items in Haldimand Museums' collection – including 19th century ceramics, pottery, earthenware, and porcelain. The exhibit remains open for visitors to peruse. Upcoming events include:

Workshop: Preserving Your Family Photographs – October 21

Participants in this hands-on preservation workshop will learn how to keep their cherished family photographs intact for future generations. The workshop will include a discussion on the history of photography and how to identify vulnerabilities and apply preventive care techniques like an archivist! Feel free to bring photos along for consultation at the end of the session. The workshop will run from 11 a.m. to 1 p.m. and take place in the Cayuga Heritage Centre's Archive Room.

Community Voices Participatory Presentation and Community Paramedic Program K9 Visit – October 25

Join other history enthusiasts for a presentation exploring lesser-known families that have had roots in Haldimand County from time immemorial. Attendees will also have an opportunity to learn about the genealogical research process and have a visit with our local emergency services' wellness dogs. This program will run from 1 to 3 p.m. in the Cayuga Heritage Centre programming room. Please note that a trained emergency services dog will be in the building.

Cemetery Walk – October 28

Discover the history and secrets of the Caledonia Methodist Cemetery on a guided walking tour. Learn about headstone symbiology and local family histories. There are two timeslots available: 10:30 a.m. to 12 p.m. or 1 to 2:30 p.m.

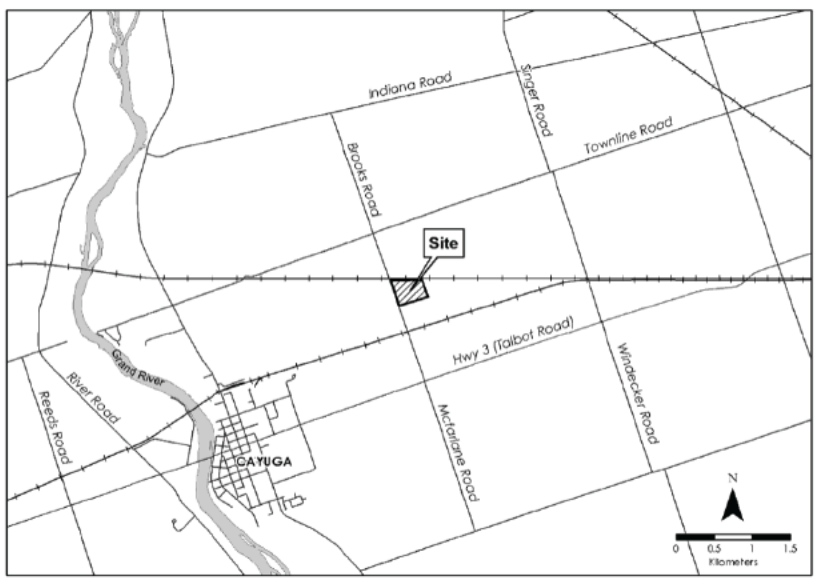
The cost for each program is $10/person unless otherwise specified. Pre-registration is required for all events. Register online at link.haldimandcounty.ca or in person at the Haldimand County Administration Building at 53 Thorburn Street South, Cayuga.

Notice of Public Open House 2 – Brooks Road Landfill Capacity Expansion

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the *Ontario Environmental Assessment Act (EA Act)* for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 219,400 cubic metres (including waste and daily/final cover). This capacity increase is a change from the previously proposed increase of 100,000 cubic metres due to a change in O. Reg 101/07.

The proposed capacity expansion would allow Brooks Road Environmental to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post diversion solid non-hazardous Industrial, Commercial & Institutional waste. The proposed capacity expansion will add capacity equal to approximately two additional years of waste acceptance over and above the remaining/ current approved capacity. There are no changes to the annual fill rate limits proposed as part of this project.

The location of the Brooks Road Landfill Site is shown on the map below. The purpose of the Environmental Screening is to study the potential effects of the capacity expansion on the environment.



The Process

As described above, the proposed project is subject to the Ministry of the Environment, Conservation and Parks (MECP) Environmental Screening Process for waste management projects in accordance with O. Reg. 101/07 under the *EA Act.* The Environmental Screening will be conducted in accordance with the planning and design process outlined in the Ontario MECP's "Guide to Environmental Assessment Requirements for Waste Management Projects." The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to the public, Indigenous communities, and government agencies.

Consultation and Public Open House #2

Members of the public, Indigenous communities, agencies, and other interested persons are encouraged to actively participate in the planning process by attending consultation events or contacting Project Team staff directly with questions. Consultation activities are planned throughout the Environmental Screening Process and will be advertised via direct and/or electronic mail, in the local newspaper, and on the project website (www.brenvironmental.com).

The second **Public Open House** to present the results of the Environmental Studies is scheduled for **October 24, 2023**. The details of the Public Open House are as follows:

Date: Tuesday, October 24, 2023 Drop-In Time: 6 p.m. to 8 p.m.
Location: Cayuga Kinsmen Community Centre – 15 Thorburn Street South, Cayuga

You are encouraged to attend the Public Open House and to submit your comments via the project website (www.brenvironmental.com), mail, email or telephone to the addresses/numbers below.

If you would like to be added to our project mailing list or have project-related questions, please contact:

Tim Danyliw, P.Eng, PMP
Project Manager, Brooks Road Environmental
160 Brooks Road, Cayuga, ON N0A 1E0
T: (888)-402-7368 **E-mail:** tim@gpenvironmental.ca

Blair Shoniker, MA., RPP
Senior Waste & Environmental Planner
GHD Limited
T: 905-830-5656 **E-mail:** Blair.Shoniker@ghd.com

All personal information included in a submission is collected, maintained, and disclosed by the Ministry of the Environment, Conservation and Parks for the purpose of transparency and consultation. The information is collected under the authority of the *Environmental Assessment Act* or is collected and maintained for the purpose of creating a record that is available to the general public as described in s.37 of the Freedom of Information and *Protection of Privacy Act* (FIPPA). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the Ministry of the Environment, Conservation and Parks Freedom of Information and Privacy Coordinator at (416) 327-1434.

This notice was first published on: October 12, 2023

HALDIMAND COUNTY PUBLIC NOTICES

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THE Sachem.

Oct 13, 2023

Article was updated Oct 16, 2023

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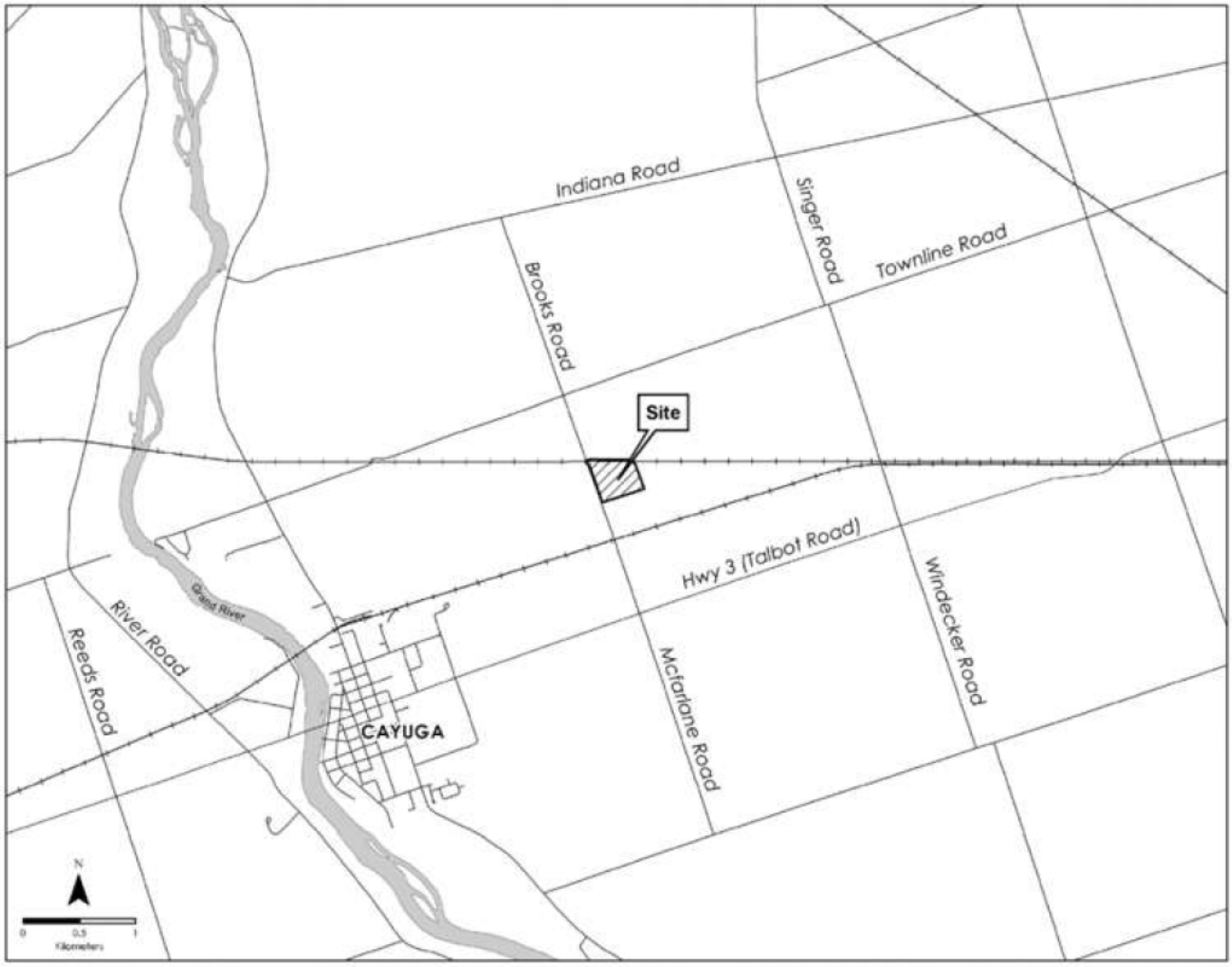

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Tim Danyliw, P.Eng, PMP

Project Manager, Brooks Road Environmental

160 Brooks Road, Cayuga, ON N0A 1E0

T: (888)-402-7368 E-mail: tim@gpenvironmental.ca

Blair Shoniker, MA., RPP

Senior Waste & Environmental Planner

GHD Limited

T: 905-830-5656 E-mail: Blair.Shoniker@ghd.com

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become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the Ministry of the Environment, Conservation and Parks Freedom of Information and Privacy Coordinator at (416) 327-1434.

This notice was first published on: October 12, 2023

From:	Axita Patel
To:	wtowns@grandriver.ca; smastroianni@npca.ca; carolyn.lee@ontario.ca; neil.hannington@ontario.ca; Charlene.anderson@ontario.ca; stephen.burt@ontario.ca; sandra.attias@ontario.ca; joan.delvillarcuicas@ontario.ca; nancy.rutherford@ontario.ca; karla.barboza@ontario.ca; laura.romeo@ontario.ca; joseph.harvey@ontario.ca; paul.bloye@ontario.ca; joanna.roberto@granderie.ca; jennifer.davey@opp.ca; phil.carter@opp.ca; Belinda.Rose@opp.ca; rodney.leclair@opp.ca; lindsay.vanpaassen@opp.ca; erick.boyd@ontario.ca; ian.thornton@ontario.ca; geddes.mahabir@ontario.ca; svandalen@haldimandcounty.on.ca; pmete@haldimandcounty.on.ca; bhedges@haldimandcounty.on.ca
Bcc:	12561524
Subject:	Brooks Road Landfill Expansion - Notice of Public Open House 2
Date:	Wednesday, October 11, 2023 2:43:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Vertical Horizontal ESP - Notice of Public Open House 2.pdf

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Dear Government Review Team Members,

I writing to inform you that Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario.

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You are invited to join the second public open house being held on Tuesday, October 24th at the Cayuga Kinsmen Community Centre. More information is included in the enclosed notice. You are welcome to drop in anytime between 6:00 and 8:00 p.m. to learn more about the preliminary results of the environmental and technical studies being undertaken as part of the Environmental Screening process.

We will continue to notify you about this Environmental Screening unless we hear from you stating that you do not wish to be consulted on this undertaking. For further information on the proposed study, please feel free to contact me and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,

Axita Patel
Solid Waste Planner

GHD
Proudly employee-owned | ghd.com
100 Milverton Drive, Suite 404, Mississauga, Ontario L5R 4H1 Canada
D 905 712 4479 **M** 905 2464301 **E** Axita.Patel@ghd.com

From:	Axita Patel
To:	khewitt@haldimandcounty.on.ca; jmetcalfe@haldimandcounty.on.ca; spatterson@haldimandcounty.on.ca; dlawrence@haldimandcounty.on.ca; tdalimonte@haldimandcounty.on.ca; rshirton@haldimandcounty.on.ca; bcorbett@haldimandcounty.on.ca
Bcc:	12561524
Subject:	Brooks Road Landfill Expansion - Notice of Public Open House 2
Date:	Wednesday, October 11, 2023 2:45:00 PM
Attachments:	Brooks Road Landfill Vertical Horizontal ESP - Notice of Public Open House 2.pdf image001.png image002.png image003.png image004.png image005.png

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Kind Regards,

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D 905 712 4479 **M** 905 2464301 **E** Axita.Patel@ghd.com

From:	Axita Patel
To:	Stacey.LaForme@mncfn.ca; Mark.Laforme@mncfn.ca; Abby.LaForme@mncfn.ca; markhill@sixnations.ca; darrinjamieson@sixnations.ca; consultations@metisnation.org; pontdj@hotmail.com; cwmc@metisnation.org; jocko@sixnationsns.com
Bcc:	12561524
Subject:	Brooks Road Landfill Expansion - Notice of Public Open House 2
Date:	Wednesday, October 11, 2023 2:50:00 PM
Attachments:	Brooks Road Landfill Vertical Horizontal ESP - Notice of Public Open House 2.pdf image001.png image002.png image003.png image004.png image005.png

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D 905 712 4479 **M** 905 2464301 **E** Axita.Patel@ghd.com

From: Axita Patel
To: [redacted]
Bcc: 12561524
Subject: Brooks Road Landfill Expansion - Notice of Public Open House 2
Date: Wednesday, October 11, 2023 3:10:00 PM
Attachments: Brooks Road Landfill Vertical Horizontal ESP - Notice of Public Open House 2.pdf
image001.png
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→ **The Power of Commitment**

Connect

Appendix B

Display Boards

WELCOME

Public Open House No.2

Brooks Road Landfill Capacity Expansion Environmental Screening

Purpose of the Open House

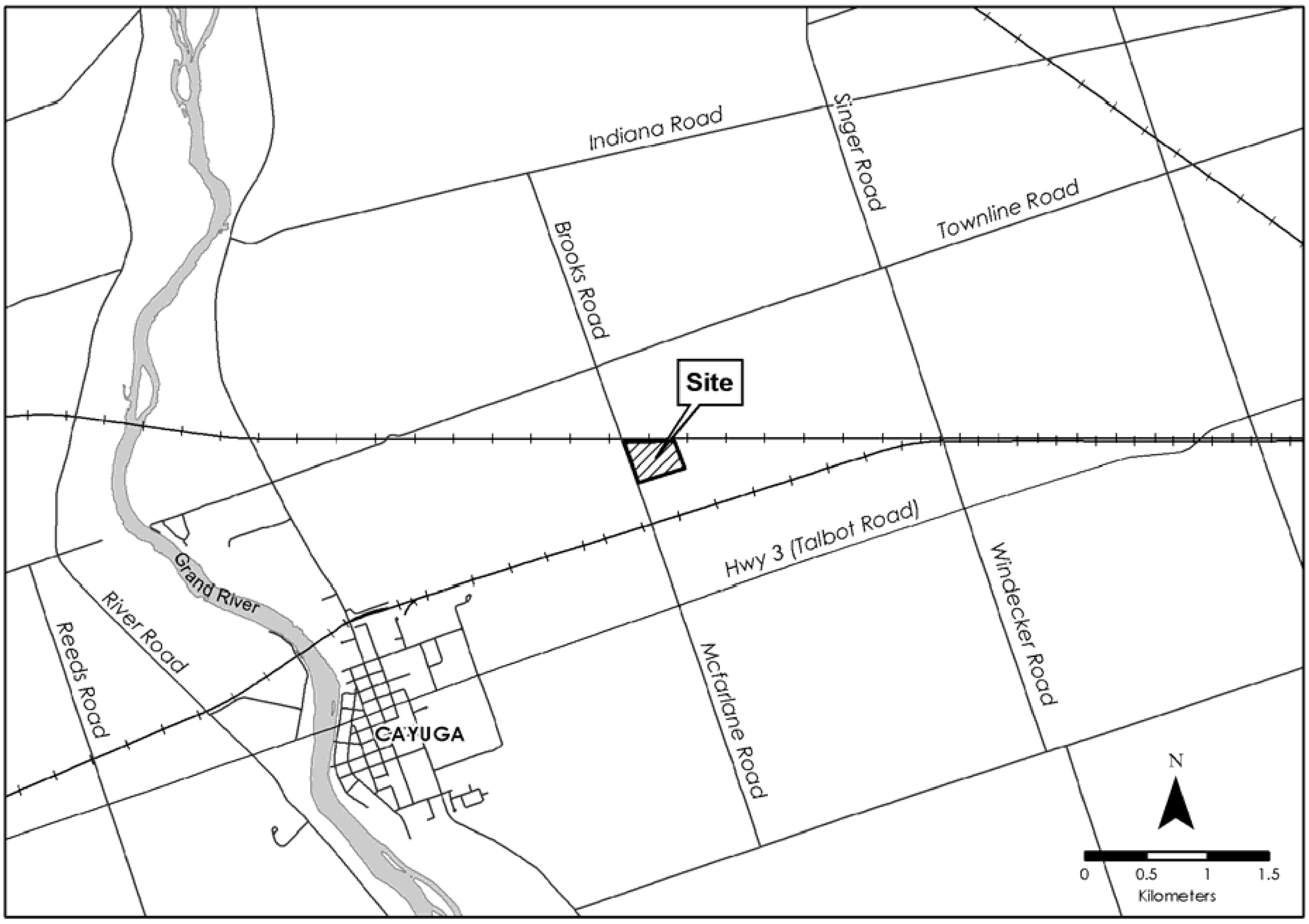
The purpose of this Public Open House is to share information about the Environmental Screening for the proposed Brooks Road Landfill Capacity Expansion and to obtain your comments for consideration by Brooks Road Environmental.

This Open House will:

- Describe the purpose of the proposed Capacity Expansion
- Introduce Brooks Road Environmental
- Outline the Environmental Screening Process
- Summarize the Problem/Opportunity and Project Description
- Present the Environmental Study Results
- Identify next steps in the Environmental Screening Process

Project Overview

Brooks Road Environmental has initiated an Environmental Screening Process for a proposed capacity expansion of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario, shown on the Site map below.



- The capacity expansion proposed under this Environmental Screening Process is for approximately 219,400 cubic metres. This capacity increase is a change from the previously proposed increase of 100,000 cubic metres due to a change in Ontario Regulation 101/07.
- The proposed capacity expansion will add capacity equal to approximately two additional years of waste over and above the remaining/ current approved capacity.

Brooks Road Environmental

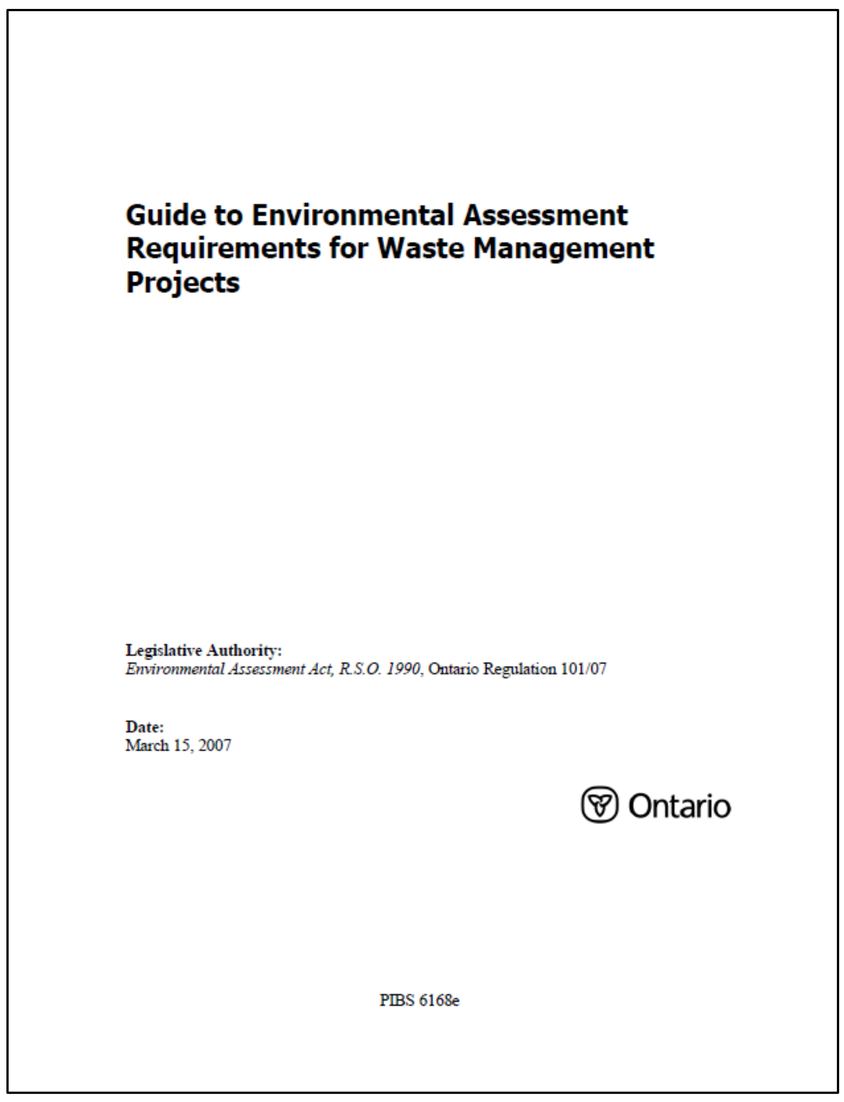
Brooks Road Landfill is a 100% Canadian owned and managed, sustainable landfill, serving waste generators in Southwestern Ontario.

- Brooks Road Environmental is committed to providing cost-effective and environmentally-sound disposal for solid waste, including impacted soils, generated by industries and businesses.
- With a capacity of 1,000 tonnes per day, Brooks Road Landfill can meet the waste disposal needs of Ontario businesses while protecting our surrounding environment.
- BRE has been working with Haldimand County to help with their challenges of disposing of their excess soils and street sweepings
- The proposed capacity expansion would allow Brooks Road Environmental to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post diversion solid non-hazardous Industrial, Commercial & Institutional waste.

Environmental Screening Process

An Environmental Screening Process is an approvals process for projects that have predictable environmental effects that can be readily mitigated.

- This Project is subject to an Environmental Screening Process in accordance with Section 13 of the Waste Management Projects Regulation, (Ontario Regulation 101/07) of the *Environmental Assessment Act.*
- The Ministry amended O. Reg. 101/07 in August 2023. This change allows a landfill to increase the total waste disposal volume by 375,000 m³ (vs 100,000 m³) using a streamlined EA process if the total approved volume is not increased by more than 25%.
- The Project will be conducted in accordance with the Ministry of Environment, Conservation, and Parks “Guide to Environmental Assessment Requirements for Waste Management Projects”.
- Results of the Environmental Screening will be documented in an Environmental Screening Report, which will be released for public and agency review.



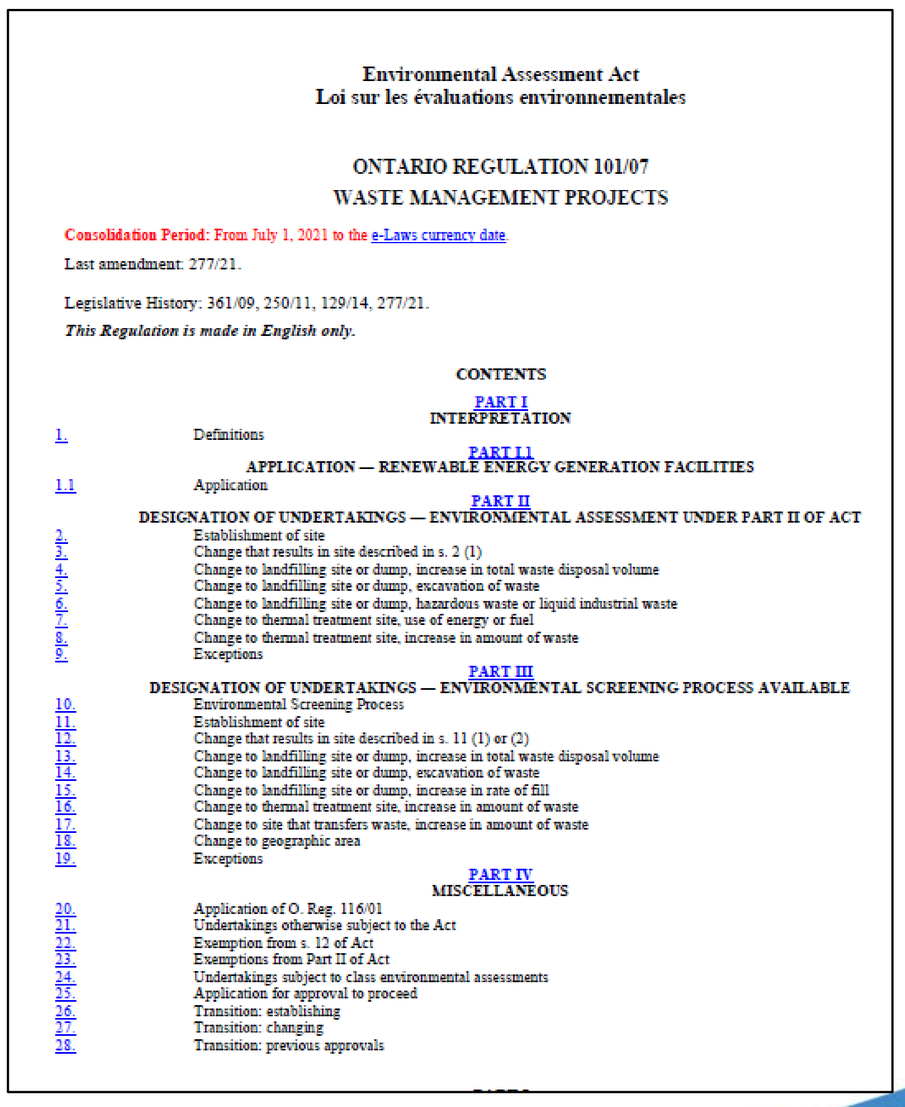
Guide to Environmental Assessment Requirements for Waste Management Projects

Legislative Authority:
Environmental Assessment Act, R.S.O. 1990, Ontario Regulation 101/07

Date:
March 15, 2007

Ontario

PIBS 6168e



Environmental Assessment Act
Loi sur les évaluations environnementales

ONTARIO REGULATION 101/07
WASTE MANAGEMENT PROJECTS

Consolidation Period: From July 1, 2021 to the e-Laws currency date.

Last amendment: 277/21.

Legislative History: 361/09, 250/11, 129/14, 277/21.

This Regulation is made in English only.

CONTENTS

Environmental Screening Process

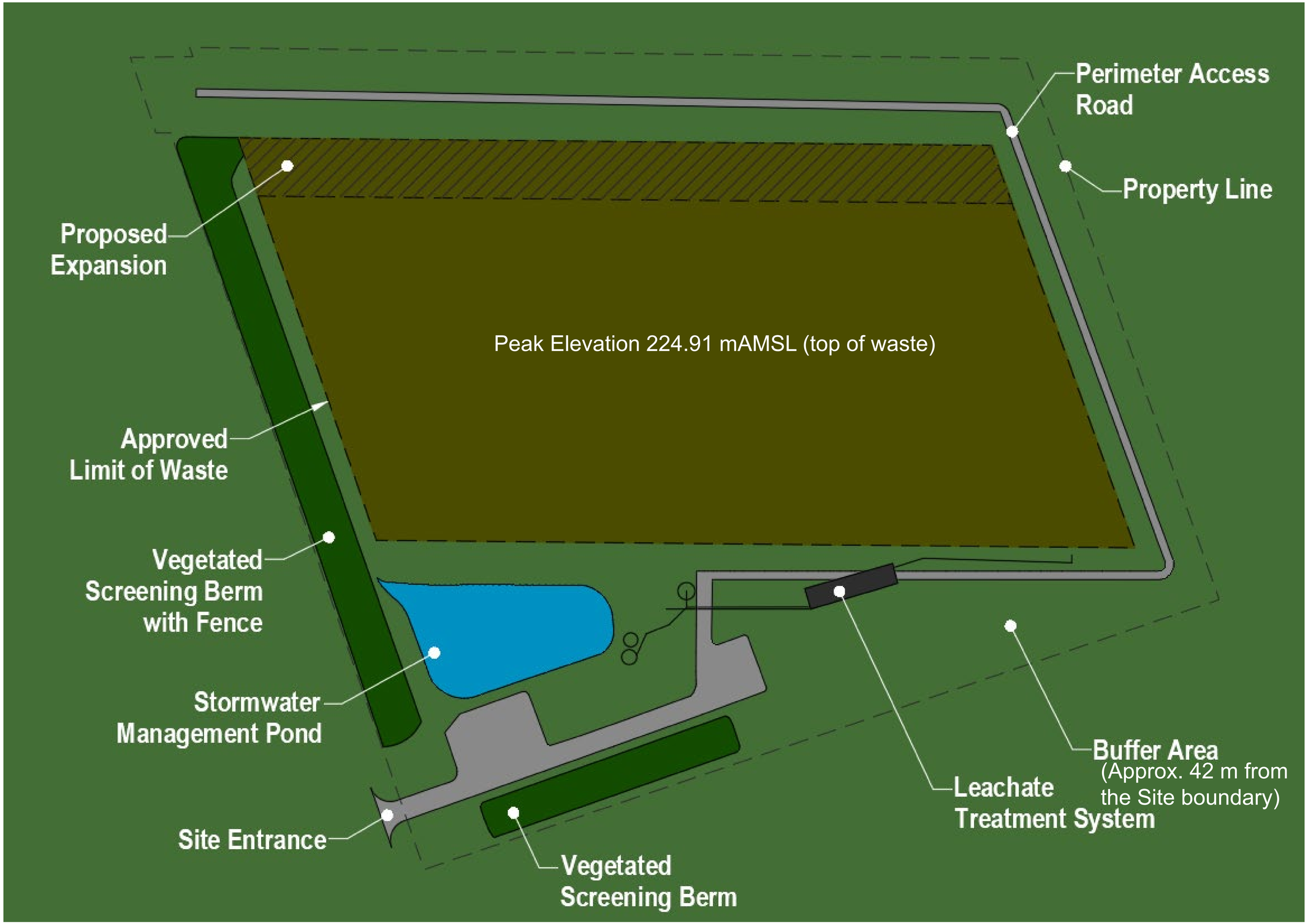
This Public Open House is an important part of the Environmental Screening Process to consult and engage with stakeholders in the process (Steps 6 – 8).

Step 1	Publish Notice of Commencement and Public Open House
Step 2	Identify Problem or Opportunity and Project Description
Step 3	Apply Screening Criteria
Step 4	Describe Potential Environmental Effects, Concerns, and Issues
Step 5	Consultation and Public Open House #1
Step 6	Conduct Studies and Assessment of Potential Environmental Effects
Step 7	Develop Impact Management/ Mitigation Measures
Step 8	Consultation and Public Open House #2
Step 9	Identify Significant Net Effects and Resolve Concerns (if required)
Step 10	Conduct Additional Studies and Assessment (if required)
Step 11	Prepare Environmental Screening Report
Step 12	Publish Notice of Completion
Step 13	Resolve Elevation Requests (if required)
Step 14	Submit Statement of Completion to the Ministry of the Environment, Conservation and Parks

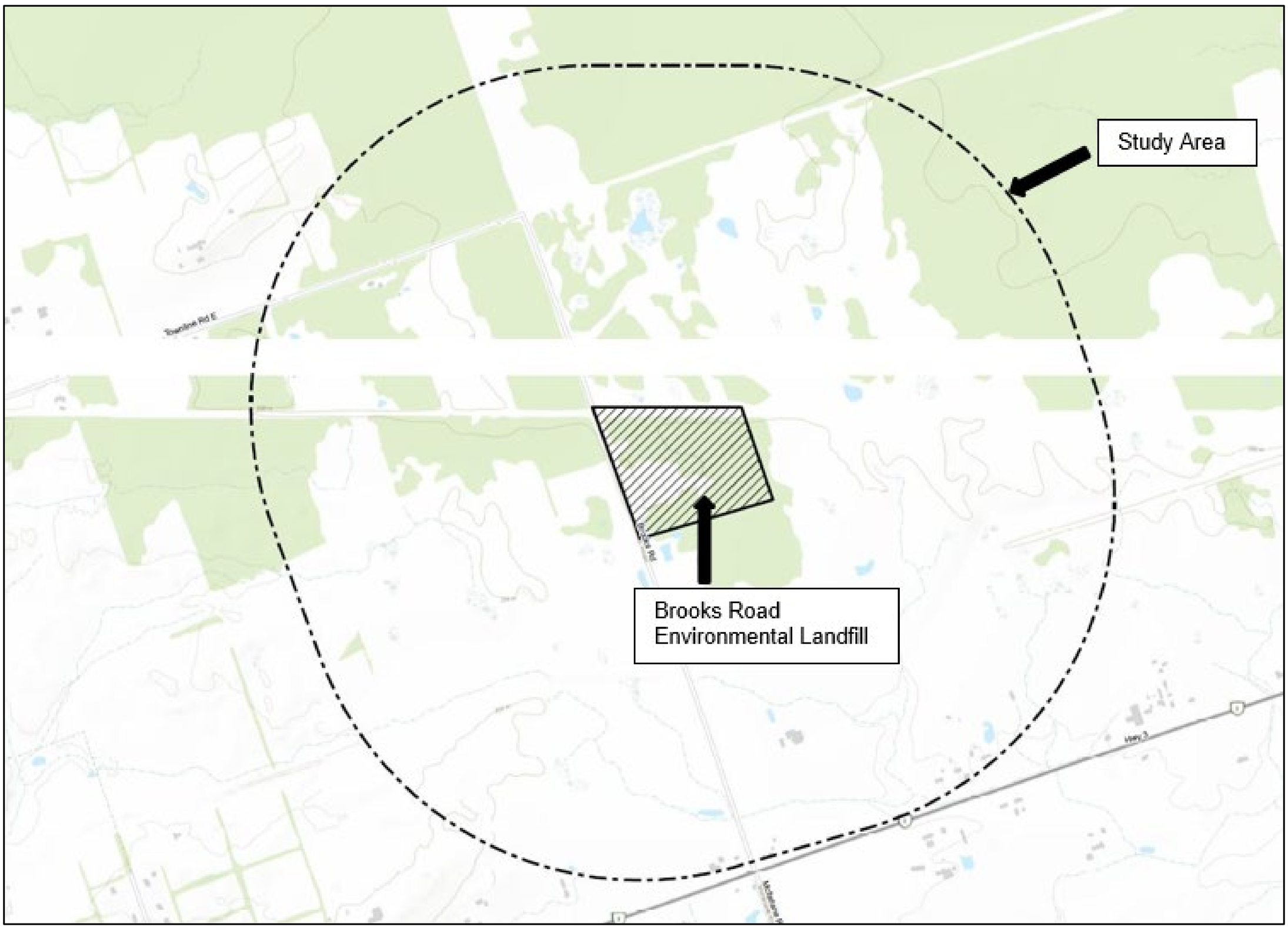
Problem / Opportunity & Project Description

- There is an opportunity to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post diversion solid non-hazardous Industrial, Commercial & Institutional waste (including impacted soils).
- The proposed expansion would increase the capacity of the Site by approximately 219,400 m³, adding capacity equal to approximately two additional years.
- This would be achieved through a combination of re-engineering the Site's final contours to expand the Site vertically, as well as increasing the existing landfill footprint to expand the Site horizontally to the north.
- Modification to the northern perimeter access road and stormwater drainage ditch would be required to accommodate the proposed changes to the final Site contours.
- The former railway property to the north would continue to provide buffer land for the Site.
- Buffer lands to the east, south, and west will be maintained as currently approved.

Proposed Capacity Expansion Concept



Environmental Screening – Study Results



The Environmental Screening Process evaluated aspects of the environment that could be affected by the proposed expansion. The areas of study include:

- Natural Environment
- Geology and Hydrogeology
- Noise
- Surface Water
- Transportation
- Land Use and Socio-Economic
- Air Quality

The studies evaluated potential effects and recommended mitigation measures where effects were identified. Each study:

- Confirmed the study boundary and time frames.
- Collected and analyzed data to assess potential effects.
- Identified mitigation measures and monitoring programs to determine Net Effects and documented the findings by discipline.

Study Results: Natural Environment

The net effects are anticipated to be negligible as all the mitigation measures are already in place.

- No clearing of the vegetation will be conducted outside of the Site boundary.
- Silt fencing is installed to prevent migration of sediments into the wetland.
- Existing chainlink and wildlife exclusion fence prevent wildlife from entering the Site.
- The proposed expansion is confined to the existing Site boundary.

Monitoring

- Annual monitoring of calling amphibians.
- Quarterly monitoring for surface water quality and flow.
- Quarterly inspections of the silt and wildlife fencing.

Study Results: Groundwater & Hydrogeology

The net effects are anticipated to be negligible as the mitigation measures are already in place.

- Continue implementation of these engineered controls:
  - Final cover system
  - Leachate collection and treatment system (The existing leachate treatment system is sized to manage and treat leachate from the proposed expansion)
  - The liner system
- The Site is also situated within a clay-rich stratigraphic sequence with significant vertical thickness. This natural feature provides additional protection of the underlying aquifer as well as some beneficial attenuation capacity.

Monitoring

Continuation of a comprehensive leachate and groundwater monitoring program.

Study Results: Noise

The overall net effects of the proposed expansion are negligible.

- The predicted off-Site noise impact meets the applicable regulatory noise limit.
- Regular equipment inspections and maintenance procedures are in place and are to be continued.
- Best Practices and control measures for landfill activities in place and to be continued.

Monitoring

- No monitoring requirements are needed for ongoing noise compliance.

Study Results: Surface Water

Net effects on surface water quality, quantity, and flow rate are minimal.

- The proposed expansion of the landfill will slightly increase the total contributing drainage areas to the existing Stormwater Water Management Pond (SWM).
- Continuous operation of the existing stormwater controls on-Site including drainage ditches and the SWM.
- Establish good vegetative coverage in the expanded areas to reduce erosion and maintain existing hydrologic conditions.

Monitoring

- Quarterly grab samples from the monitoring locations.
- Laboratory analysis of grab samples.
- Annual monitoring reports.

Study Results: Transportation

The proposed capacity expansion will have negligible transportation effects.

- Truck traffic associated with the proposed capacity expansion will not contribute any additional traffic within the study area due to maintaining the maximum approved fill rates.
- With no additional truck traffic generated by the proposed capacity expansion, no mitigation measures are recommended in order to avoid or minimize impacts on Transportation.

Monitoring

- No further monitoring of the transportation effects is recommended.

Study Results: Land Use & Socio-Economic

The net effects are negligible from a land-use and socio-economic perspective.

- No potential impacts are expected for incompatibility with planning and by-law governing documents for the land.
- Operation of the landfill will not affect land uses within 500 m as all operations take place within Site boundaries.
- No potential impacts are expected for community character, as the Site is already zoned as “Disposal Industrial”.
- No negative impacts on recreation, tourism, and aesthetics of the area.
- Predicted positive financial impacts to the area (economic base, local employment, and labour supply).
- Best management practices will be implemented to manage dust and odour.

Study Results: Air Quality

No change to the net effects from the existing landfill operation is anticipated as a result of the proposed capacity change, based on the continued implementation of the mitigation measures.

- Negligible effects on odour as the estimated landfill gas production for the Site is extremely small and is not expected to result in any off-Site odour impacts.
- Negligible effects on air quality based on air modeling as all particulate matter fractions are well below the MECP ambient air quality criteria (AAQC).
- Standard Operating Procedures (SOPs) in place for odour and dust management and operation of a leachate treatment system.

Next Steps

After this Public Open House, the following next steps in the Environmental Screening Process will be carried out by Brooks Road Environmental

- Prepare a Draft Environmental Screening Report which will document the Environmental Screening Process followed.
- Feedback received from members of the public, agencies, and Indigenous communities from this Public Open House and future consultation events will be considered prior to finalizing the Environmental Screening Report.
- The Draft Environmental Screening Report will be available for review.

Thank You

We appreciate your participation in the Environmental Screening Process and your attendance at today's Public Open House.

Comments

Please consider completing a Comment Form, available at the sign-in desk, and joining our project mailing list.

Brooks Road Environmental

Public Open House: October 24, 2023

Brooks Road Landfill Capacity Expansion Environmental Screening

Things I Didn't Get a Chance to Say ...

Please provide any questions or comments you may have regarding the proposed project, the Environmental Screening process, consultation program, or any other information presented at the Open House

Name: _____

Address: _____ **Telephone:** _____

E-mail Address: _____

❑ Please add me to the contact list to receive updates on this project.

How did you hear about the Open House?

❑ Postal Advertisement ❑ Ad in local newspaper ❑ Other: _____

_____

_____

_____


GHD

From:	Axita Patel
To:	wtowns@grandriver.ca; smastroianni@npca.ca; carolyn.lee@ontario.ca; neil.hannington@ontario.ca; Charlene.anderson@ontario.ca; stephen.burt@ontario.ca; sandra.attias@ontario.ca; joan.delvillarcuicas@ontario.ca; nancy.rutherford@ontario.ca; karla.barboza@ontario.ca; laura.romeo@ontario.ca; joseph.harvey@ontario.ca; paul.bloye@ontario.ca; joanna.roberto@granderie.ca; jennifer.davey@opp.ca; phil.carter@opp.ca; Belinda.Rose@opp.ca; rodney.leclair@opp.ca; lindsay.vanpaassen@opp.ca; erick.boyd@ontario.ca; ian.thornton@ontario.ca; geddes.mahabir@ontario.ca; svandalen@haldimandcounty.on.ca; pmete@haldimandcounty.on.ca; bhedges@haldimandcounty.on.ca
Cc:	Blair Shoniker; Ryan Loveday
Bcc:	12561524
Subject:	Brooks Road Landfill Expansion Environmental Screening
Date:	Monday, January 8, 2024 1:59:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png

---

Dear Government Review Team member,

On behalf of Brooks Road Environmental, a draft Environmental Screening Report (ESR) was prepared as part of the Brooks Road Landfill Expansion EA for your review. Please use this link to view and download the ESR: https://acrobat.adobe.com/link/track?uri=urn:aaid:scds:US:3d1c0177-04c2-4429-bc03-e24bdcab9d39

We are requesting that your written comments be received by no later than **February 5, 2024,** so they can be considered as part of preparing the Final ESR.

Should you determine that your agency/ministry does not wish to be involved in this EA, please let me know and I will remove your name from the contact list.

Please feel free to reach out for any questions and please respond to this email address with any formal comments on the draft ESR.

Kind Regards,
Axita

Axita Patel
Solid Waste Planner

GHD
Proudly employee-owned | ghd.com
100 Milverton Drive, Suite 404, Mississauga, Ontario L5R 4H1 Canada
D 905 712 4479 **M** 905 2464301 **E** Axita.Patel@ghd.com

From:	Axita Patel
To:	wtowns@grandriver.ca; smastroianni@npca.ca; carolyn.lee@ontario.ca; neil.hannington@ontario.ca; Charlene.anderson@ontario.ca; stephen.burt@ontario.ca; sandra.attias@ontario.ca; joan.delvillarcuicas@ontario.ca; nancy.rutherford@ontario.ca; karla.barboza@ontario.ca; laura.romeo@ontario.ca; joseph.harvey@ontario.ca; paul.bloye@ontario.ca; joanna.roberto@granderie.ca; jennifer.davey@opp.ca; phil.carter@opp.ca; Belinda.Rose@opp.ca; rodney.leclair@opp.ca; lindsay.vanpaassen@opp.ca; erick.boyd@ontario.ca; ian.thornton@ontario.ca; geddes.mahabir@ontario.ca; svandalen@haldimandcounty.on.ca; pmete@haldimandcounty.on.ca; bhedges@haldimandcounty.on.ca
Bcc:	12561524
Subject:	Brooks Road Landfill Expansion - Notice of Public Open House 2
Date:	Wednesday, October 11, 2023 2:43:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Vertical Horizontal ESP - Notice of Public Open House 2.pdf

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Dear Government Review Team Members,

I writing to inform you that Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario.

The capacity expansion proposed under this Environmental Screening Process is for approximately 219,400 cubic metres (including waste and daily/final cover). This capacity increase is a change from the previously proposed increase of 100,000 cubic metres due to a change in O. Reg 101/07.

You are invited to join the second public open house being held on Tuesday, October 24th at the Cayuga Kinsmen Community Centre. More information is included in the enclosed notice. You are welcome to drop in anytime between 6:00 and 8:00 p.m. to learn more about the preliminary results of the environmental and technical studies being undertaken as part of the Environmental Screening process.

We will continue to notify you about this Environmental Screening unless we hear from you stating that you do not wish to be consulted on this undertaking. For further information on the proposed study, please feel free to contact me and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,

Axita Patel
Solid Waste Planner

GHD
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100 Milverton Drive, Suite 404, Mississauga, Ontario L5R 4H1 Canada
D 905 712 4479 **M** 905 2464301 **E** Axita.Patel@ghd.com

Erika Brown

From: Sherry Leslie
Sent: Wednesday, June 15, 2022 4:40 PM
To: Erika Brown
Subject: Fw: - Brooks Road Indigenous Communities Confirmed: Regional EA Coordinator Inquiry

Hello Erika,

Below is the response provided by the MECP EA Coordinator confirming the Indigenous communities we should contact.

Warmly,

Sherry Leslie
Environmental Planner

GHD
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65 Sunray St, Whitby Ontario, Canada L1N 8Y3
D 905 429 5004 **E** sherry.leslie@ghd.com

From: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Sent: Wednesday, June 15, 2022 4:14 PM
To: Sherry Leslie <Sherry.Leslie@ghd.com>
Subject: RE: Regional EA Coordinator Inquiry

Hi Sherry,

That list is correct. The only correction would be that Mississauga of the New Credit First Nation dropped the word NEW a few years ago, they now go by Mississauga of the Credit First Nation.

HDI represents HCCC, you can provide the same correspondence to both communities.

Regards,

Joan
Joan Del Villar Cuicas (she/her)

Regional Environmental Planner (A)
Project Review Unit | Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks
Joan.delvillarcuicas@ontario.ca|Phone: 365-889-1180

From: Sherry Leslie <Sherry.Leslie@ghd.com>
Sent: Monday, June 13, 2022 5:41 PM
To: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Subject: Re: Regional EA Coordinator Inquiry

Good afternoon Joan,

We are commencing an Environmental Screening Process for an expansion at the Brooks Road Landfill Site, 160 Brooks Road, near Cayuga, Haldimand County, Ontario (please refer to the map attached to this email) and would like to ask for the Ministry of Environment, Conservation and Parks to please confirm the following list of Indigenous communities to be consulted within our Study Area:

- Mississauga of the New Credit First Nation
- Métis Nation of Ontario
- Six Nations of the Grand River First Nation
- Haudenosaunee Development Institute (HDI)
- Haudenosaunee Confederacy Chiefs Council (HCCC)

Also, would you be able to confirm whether HCCC and HDI should contacted concurrently within the same correspondence?

Warmly,

Sherry Leslie
Environmental Planner

GHD
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65 Sunray St, Whitby Ontario, Canada L1N 8Y3
D 905 429 5004 **E** sherry.leslie@ghd.com

Connect

Please consider the environment before printing this email

From: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Sent: Thursday, June 9, 2022 1:33 PM
To: Sherry Leslie <Sherry.Leslie@ghd.com>
Subject: RE: Regional EA Coordinator Inquiry

> You don't often get email from joan.delvillarcuicas@ontario.ca. Learn why this is important

Hello Sherry,

I am the Regional Planner for West Central Region. Please feel free to reach out.

Thanks,

Joan Del Villar Cuicas (she/her)
Regional Environmental Planner (A)
Project Review Unit | Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks
Joan.delvillarcuicas@ontario.ca|Phone: 365-889-1180

From: Anderson, Charlene (MECP) <Charlene.Anderson@ontario.ca>
Sent: Thursday, June 9, 2022 1:02 PM
To: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Subject: FW: Regional EA Coordinator Inquiry

Hi Joan,

I just received the email below. I'm hoping you are the right person to have her touch base with however if not, I'm hoping you will be able to direct the email to the appropriate person.

Cheers

Charlene Anderson
Provincial Officer Badge #1223
Hamilton District Office
Ministry of the Environment, Conservation and Parks
905 515 0768

From: Sherry Leslie <Sherry.Leslie@ghd.com>
Sent: June 9, 2022 12:53 PM
To: Anderson, Charlene (MECP) <Charlene.Anderson@ontario.ca>
Subject: Regional EA Coordinator Inquiry

Hello Charlene,

I need to confirm the list of Indigenous Communities to be contacted as part of the Environmental Screening Report requirements for a project within the Hamilton MECP District. Would you be able to provide me with the email address for the Regional EA coordinator or the person I should contact to confirm this list within the Hamilton MECP District?

Warmly,

Sherry Leslie
Environmental Planner

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65 Sunray St, Whitby Ontario, Canada L1N 8Y3
D 905 429 5004 **E** sherry.leslie@ghd.com

From:	Erika Brown
To:	joan.delvillarcuicas@ontario.ca; planning@grandriver.ca; smastroianni@npca.ca; carolyn.lee@ontario.ca; nancy.rutherford@ontario.ca; karla.barboza@ontario.ca; laura.romeo@ontario.ca; joseph.harvey@ontario.ca; paul.bloye@ontario.ca; joanna.roberto@granderie.ca; jennifer.davey@opp.ca; phil.carter@opp.ca; Belinda.Rose@opp.ca; erick.boyd@ontario.ca; ian.thornton@ontario.ca; geddes.mahabir@ontario.ca; svandalen@haldimandcounty.on.ca; pmete@haldimandcounty.on.ca; bhedges@haldimandcounty.on.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 2:47:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

---

Dear Government Review Team Members,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

Please find attached a copy of the Notice of Commencement of an Environmental Screening and Public Open House. The Notice of Commencement and Public Open House will appear in the local papers as well as being sent out via mail and email to the public and Indigenous communities.

We would like to hold a Government Review Team update meeting during the Screening. Future update meetings are anticipated to be held around key milestones and will be communicated to you well in advance.

We will continue to notify you about this Environmental Screening, unless we hear from you stating that you do not wish to be consulted on this undertaking. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of

BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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65 Sunray Street Whitby ON L1N 8Y3 Canada
D 905 429 5040 **M** 647 525 9798 **E** Blair.Shoniker@ghd.com

Erika Brown (she/her)
MENV., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From: Del Villar Cuicas, Joan (MECP)
To: Sherry Leslie
Subject: RE: Upcoming Notice of Commencement: Regional EA Coordinator Inquiry
Date: Friday, June 17, 2022 3:49:08 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png

Hello Sherry,

Yes, I am the main contact. I saw the notice, I will take a look at it next week and provide an acknowledgement letter.

Regards,

Joan

Joan Del Villar Cuicas (she/her)
Regional Environmental Planner (A)
Project Review Unit | Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks
Joan.delvillarcuicas@ontario.ca|Phone: 365-889-1180

From: Will Towns <wtowns@grandriver.ca>
Sent: Monday, June 20, 2022 3:32 PM
To: Erika Brown <Erika.Brown@ghd.com>
Subject: RE: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

> You don't often get email from wtowns@grandriver.ca. Learn why this is important

Hi Erika – I've recently been assigned Haldimand County coverage for the GRCA. Please include me on the circulation list for this project going forward.

Many thanks!

Will Towns, RPP
Resource Planner
Grand River Conservation Authority
Office: 519-621-2763 ext. 2232

From:	Will Towns
To:	Erika Brown
Cc:	Sherry Leslie
Subject:	RE: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Tuesday, June 21, 2022 11:39:40 AM
Attachments:	image001.png image002.png image003.png image004.png image005.png

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Thanks Erika – no need to include the general GRCA planning email. Also, wondering if any of the public engagement materials from the open house will be posted on Brooks Road's document library either before or after the session. Not sure if I'll be able to make the session, and they'd also be helpful for circulating our Natural Heritage staff. Let me know if you can.

Cheers,

Will

From: Erika Brown
To: Leclair, Rodney (OPP)
Cc: Emily Cameron; Blair Shoniker
Subject: RE: Brooks Road Cayuga Landfill Capacity Expansion
Date: Monday, November 21, 2022 1:44:00 PM
Attachments: image001.png
image003.png
image004.png
image005.png
image006.png
image007.png

Good afternoon Rod,

Thank you for your message. You have been added to the project contact list, as requested. We will keep you informed of upcoming project events as well as project notices.

Kind regards,
Erika

Erika Brown (she/her)
MEnv., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 416 866 2351 | **E** erika.brown@ghd.com

From: Leclair, Rodney (OPP) <Rodney.Leclair@opp.ca>
Sent: Thursday, November 10, 2022 8:11 AM
To: Erika Brown <erika.brown@ghd.com>
Subject: Brooks Road Cayuga Landfill Capacity Expansion

Good morning Erika,

My name is Rod LeClair and I'm with the OPP Provincial Liaison Team. Our role is to maintain open lines of communication with groups who may be affected by major events such as protests or demonstrations. I'm not sure if you're familiar with our team or not.

We are aware of the Brooks Road Landfill Capacity Expansion project in Cayuga that is currently at the environmental screening process stage.

I have been checking your website for information.

We would like to attend any meetings in the future about this project if you would be so kind to add me to your distribution list.

Thank you Erika.

Rod LeClair #13416
Provincial Constable

Ontario Provincial Police
West Region
Provincial Liaison Team
72 Hwy 54, Cayuga, ON N0A 1E0
Ph: 905-772-3322
Email: rodney.leclair@opp.ca

- OPP 24hr Police Service Province Wide: 1-888-310-1122 *OPP

From:	Leclair, Rodney (OPP)
To:	Erika Brown; Van Paassen, Lindsay (OPP)
Cc:	Emily Cameron; Blair Shoniker
Subject:	RE: Brooks Road Cayuga Landfill Capacity Expansion
Date:	Monday, November 21, 2022 2:22:08 PM
Attachments:	image001.png image003.png image004.png image005.png image006.png image007.png

Thank you Erika.

You can keep those names on the list

Rod

From: Erika Brown <Erika.Brown@ghd.com>
Sent: 21-Nov-22 2:20 PM
To: Leclair, Rodney (OPP) <Rodney.Leclair@opp.ca>; Van Paassen, Lindsay (OPP) <Lindsay.VanPaassen@opp.ca>
Cc: Emily Cameron <Emily.Cameron@ghd.com>; Blair Shoniker <Blair.Shoniker@ghd.com>
Subject: RE: Brooks Road Cayuga Landfill Capacity Expansion

Good afternoon Rod,

Yes, we can certainly add Lindsay as well.

We currently have the following three individuals listed for OPP on our Government Review Team for the Brooks Road Environmental Screening:

Jennifer Davey
Administrative Assistant Research and Program Evaluation Unit /
Research Planning & Analysis Section
Ontario Provincial Police
Phil Carter
Inspector
Detachment Commander
Ontario Provincial Police
Haldimand County
Belinda Rose
S/Sgt.
Operations Manager
Ontario Provincial Police
Haldimand County

Should we replace any of these names with yourself/Lindsay?

Thank you,
Erika

Erika Brown (she/her)
MEnv., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 416 866 2351 | **E** erika.brown@ghd.com

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From: Leclair, Rodney (OPP) <Rodney.Leclair@opp.ca>
Sent: Monday, November 21, 2022 2:06 PM
To: Erika Brown <Erika.Brown@ghd.com>
Cc: Van Paassen, Lindsay (OPP) <Lindsay.VanPaassen@opp.ca>
Subject: RE: Brooks Road Cayuga Landfill Capacity Expansion

Could you also add my partner, Lindsay Van Paassen to the distribution list Lindsay.vanpaassen@opp.ca

I have cc'd Lindsay on this email

Thanks Erika

Rod

From: Leclair, Rodney (OPP)
Sent: 21-Nov-22 2:03 PM
To: Erika Brown <Erika.Brown@ghd.com>
Cc: Emily Cameron <Emily.Cameron@ghd.com>; Blair Shoniker <Blair.Shoniker@ghd.com>
Subject: RE: Brooks Road Cayuga Landfill Capacity Expansion

Thank you Erika.

I don't know if you are familiar with our unit or not. I have attached a pamphlet which outlines what we do.

Looking forward to meeting your team in the future.

Have a great day

Rod LeClair #13416
Provincial Constable
Ontario Provincial Police
West Region
Provincial Liaison Team
72 Hwy 54, Cayuga, ON N0A 1E0
Ph: 905-772-3322
Email: rodney.leclair@opp.ca

- OPP 24hr Police Service Province Wide: 1-888-310-1122 *OPP

From: Erika Brown <Erika.Brown@ghd.com>
Sent: 21-Nov-22 1:45 PM
To: Leclair, Rodney (OPP) <Rodney.Leclair@opp.ca>
Cc: Emily Cameron <Emily.Cameron@ghd.com>; Blair Shoniker <Blair.Shoniker@ghd.com>
Subject: RE: Brooks Road Cayuga Landfill Capacity Expansion

Good afternoon Rod,

Thank you for your message. You have been added to the project contact list, as requested. We will keep you informed of upcoming project events as well as project notices.

Kind regards,
Erika

Erika Brown (she/her)
MEnv., RPP
Waste & Environmental Planner

GHD
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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 416 866 2351 | **E** erika.brown@ghd.com

From: Leclair, Rodney (OPP) <Rodney.Leclair@opp.ca>
Sent: Thursday, November 10, 2022 8:11 AM
To: Erika Brown <erika.brown@ghd.com>
Subject: Brooks Road Cayuga Landfill Capacity Expansion

Good morning Erika,

My name is Rod LeClair and I'm with the OPP Provincial Liaison Team. Our role is to maintain open lines of communication with groups who may be affected by major events such as protests or demonstrations. I'm not sure if you're familiar with our team or not.

We are aware of the Brooks Road Landfill Capacity Expansion project in Cayuga that is currently at the environmental screening process stage.

I have been checking your website for information.

We would like to attend any meetings in the future about this project if you would be so kind to add me to your distribution list.

Thank you Erika.

Rod LeClair #13416
Provincial Constable

Ontario Provincial Police
West Region
Provincial Liaison Team
72 Hwy 54, Cayuga, ON N0A 1E0
Ph: 905-772-3322
Email: rodney.leclair@opp.ca

- OPP 24hr Police Service Province Wide: 1-888-310-1122 *OPP

From:	Erika Brown
To:	khewitt@haldimandcounty.on.ca; jmetcalfe@haldimandcounty.on.ca; spatterson@haldimandcounty.on.ca; dlawrence@haldimandcounty.on.ca; tdalimonte@haldimandcounty.on.ca; rshirton@haldimandcounty.on.ca; bcorbett@haldimandcounty.on.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 2:47:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

---

Good Afternoon,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

Please find attached a copy of the Notice of Commencement of an Environmental Screening and Public Open House. The Notice of Commencement and Public Open House will appear in the local papers as well as being sent out via mail and email to the public, Indigenous communities, and agencies.

For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of
BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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D 905 429 5040 **M** 647 525 9798 **E** Blair.Shoniker@ghd.com

Erika Brown (she/her)
MENV., RPP
Waste & Environmental Planner

GHD

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

The Power of Commitment

Connect

From:	Erika Brown
To:	jocko@sixnationsns.com
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:44:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

---

Good Afternoon Hohahes Leroy Hill,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* (*EA Act*) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

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We will continue to notify you about this Environmental Screening. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of

BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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Erika Brown (she/her)
MENV., RPP

Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From:	Erika Brown
To:	consultations@metisnation.org; pontdj@hotmail.com; cwmc@metisnation.org
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:40:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

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Kind Regards,
Erika Brown

on behalf of
BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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Erika Brown (she/her)
MENV., RPP

Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From:	Erika Brown
To:	Stacey.LaForme@mncfn.ca; Mark.Laforme@mncfn.ca; Fawn.Sault@mncfn.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:39:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

---

Good Afternoon Chief Laforme,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* (*EA Act*) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

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We will continue to notify you about this Environmental Screening. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of
BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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Erika Brown (she/her)
MENV., RPP

Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From:	Erika Brown
To:	Abby.LaForme@mncfn.ca
Subject:	FW: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:48:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

Good afternoon Abby,

I received an automatic reply from Fawn Sault indicating all consultation correspondence should be directed to you.

Please see the email below and files attached.

Kind Regards,
Erika

Erika Brown (she/her)
MENV., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

From: Erika Brown
Sent: Thursday, June 16, 2022 5:40 PM
To: Stacey.LaForme@mncfn.ca; Mark.Laforme@mncfn.ca; Fawn.Sault@mncfn.ca
Cc: tim@gpenvironmental.ca; Blair Shoniker <Blair.Shoniker@ghd.com>
Subject: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

Good Afternoon Chief Laforme,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* (*EA Act*) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road,

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We will continue to notify you about this Environmental Screening. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of
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MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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Erika Brown (she/her)
MENV., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

From:	Erika Brown
To:	markhill@sixnations.ca; darrinjamieson@sixnations.ca
Cc:	tim@gpenvironmental.ca; Blair Shoniker
Subject:	Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Thursday, June 16, 2022 5:35:00 PM
Attachments:	Brooks Road Landfill Capacity Expansion Environmental Screening - Draft Project Description.pdf image001.png image002.png image003.png image004.png image005.png Brooks Road Landfill Capacity Expansion Environmental Screening - Screening Criteria Checklist.pdf Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement & Public Open House.pdf

---

Good Afternoon Chief Hill,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* (*EA Act*) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

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We will continue to notify you about this Environmental Screening. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of

BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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MENV., RPP

Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From:	Erika Brown
To:	Axita Patel
Subject:	FW: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House
Date:	Friday, March 15, 2024 1:58:13 PM
Attachments:	image002.png image003.png image004.png image005.png image006.png

---

From: Abby LaForme <Abby.LaForme@mncfn.ca>
Sent: Monday, August 15, 2022 8:43 AM
To: Erika Brown <Erika.Brown@ghd.com>
Cc: Mark LaForme <Mark.LaForme@mncfn.ca>; Darin Wybenga <Darin.Wybenga@mncfn.ca>; Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: RE: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

Good Morning Erika,

Thank you!

Abby LaForme,
Acting Consultation Coordinator

Mississaugas of the Credit First Nation (MCFN)
Department of Consultation & Accommodation (DOCA)
4065 Highway 6, Hagersville, ON N0A 1H0
Ph: (905) 768 – 4260
Email: Abby.LaForme@mncfn.ca

From: Erika Brown <Erika.Brown@ghd.com>
Sent: Friday, August 12, 2022 3:22 PM
To: Abby LaForme <Abby.LaForme@mncfn.ca>
Cc: Mark LaForme <Mark.LaForme@mncfn.ca>; Darin Wybenga <Darin.Wybenga@mncfn.ca>; Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: RE: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

Good afternoon Abby,

I hope you are enjoying the last few weeks of the summer!

I am writing in follow up to our meeting of July 19 to provide the requested Archaeology & Cultural

Heritage Report from the previous Brooks Road Landfill Vertical Capacity Expansion Individual Environmental Assessment (approved January 2019). I have also included the Ministry of Tourism, Culture & Sport reviewer comments on the Environmental Assessment Report (to which the Archaeology & Cultural Heritage Report was appended) for your records.

Thank you again for the discussion on July 19. We will continue to notify you about this Environmental Screening and please reach out if you have any other questions.

Kind Regards,
Erika

Erika Brown (she/her)
MENV., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

From: Abby LaForme <Abby.LaForme@mncfn.ca>
Sent: Friday, June 24, 2022 11:25 AM
To: Erika Brown <Erika.Brown@ghd.com>
Cc: Mark LaForme <Mark.LaForme@mncfn.ca>
Subject: RE: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

Good Morning Erika,

My name is Abby LaForme, the Acting Consultation Coordinator for the Mississaugas of the Credit First Nation (MCFN), Department of Consultation and Accommodation (DOCA). I have been with MCFN DOCA for the last 3 years and have worked closely with Fawn Sault. So with that, I am very familiar with the consultation process.

Thank you for reaching out to MCFN DOCA. There have been a few staffing changes within our department so thank you for your patience.
Adam LaForme is our Archaeological Operations Supervisor, so if you have any Archaeological inquiries please feel free to reach out and contact him directly at Adam.LaForme@mncfn.ca

I have reviewed the attached *Screening Criteria Checklist Brooks Road Landfill Capacity Expansion Environmental Screening,* in the Natural Environment Section I noticed the proponent checked yes to this project causing a negative effect on wildlife habitat

populations, corridors, or movement. What steps are being taken to fix the negative effects?

Thank you

Abby LaForme,
Acting Consultation Coordinator

Mississaugas of the Credit First Nation (MCFN)
Department of Consultation & Accommodation (DOCA)
4065 Highway 6, Hagersville, ON N0A 1H0
Ph: (905) 768 – 4260
Email: Abby.LaForme@mncfn.ca

From: Erika Brown <Erika.Brown@ghd.com>
Sent: Thursday, June 16, 2022 5:49 PM
To: Abby LaForme <Abby.LaForme@mncfn.ca>
Subject: FW: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

Good afternoon Abby,

I received an automatic reply from Fawn Sault indicating all consultation correspondence should be directed to you.

Please see the email below and files attached.

Kind Regards,
Erika

Erika Brown (she/her)
MENV., RPP
Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

From: Erika Brown
Sent: Thursday, June 16, 2022 5:40 PM

To: Stacey.LaForme@mncfn.ca; Mark.Laforme@mncfn.ca; Fawn.Sault@mncfn.ca
Cc: tim@gpenvironmental.ca; Blair Shoniker <Blair.Shoniker@ghd.com>
Subject: Brooks Road Landfill Capacity Expansion Environmental Screening - Notice of Commencement and Public Open House

Good Afternoon Chief Laforme,

Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have initiated an Environmental Screening Process in accordance with Ontario Regulation (O. Reg.) 101/07 – Waste Management Projects Regulation of the Ontario *Environmental Assessment Act* (*EA Act*) for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill located at 160 Brooks Road, near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 100,000 cubic metres (including waste and daily/final cover).

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We will continue to notify you about this Environmental Screening. For further information on the proposed study, please feel free to contact the undersigned and visit https://www.brenvironmental.com/ for further details to be posted throughout the process.

Kind Regards,
Erika Brown

on behalf of

BLAIR SHONIKER | A GHD PRINCIPAL
MA., RPP.
Senior Waste & Environmental Planner
Impact Assessment & Permitting Service Line Leader, Americas

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D 905 429 5040 **M** 647 525 9798 **E** Blair.Shoniker@ghd.com

Erika Brown (she/her)
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Waste & Environmental Planner

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184 Front Street E #302 Toronto Ontario M5A 4N3 Canada
D 647 989 7353 | **E** erika.brown@ghd.com

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Connect

From: Peter Graham
To: Axita Patel
Cc: Blair Shoniker; Katrina McCullough
Subject: RE: Brooks Road Landfill Expansion
Date: Thursday, January 11, 2024 10:55:13 AM

Good morning Axita,

Yes, we're still meeting tomorrow. There's a door to the boardroom on the NE side of building directly off the parking lot.

Thank you, Peter

From: Axita Patel <Axita.Patel@ghd.com>
Sent: Thursday, January 11, 2024 9:22 AM
To: Peter Graham <LRCS@sixnations.ca>
Cc: Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: [External] RE: Brooks Road Landfill Expansion

Good morning Peter,

Happy New Year and I hope you're well.

I wanted to confirm that we are still meeting tomorrow from 2 pm to 3 pm in person as planned for the Brooks Road Landfill Expansion. Please let me know.

Thank you,
Axita

From: Peter Graham <LRCS@sixnations.ca>
Sent: Friday, December 1, 2023 9:14 AM
To: Axita Patel <Axita.Patel@ghd.com>
Cc: Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: RE: Brooks Road Landfill Expansion

Hi Axita,

Thank you. We can make 1-2, but have a short 12 o'clock meeting and I'd like to give people more time for lunch. Please push the start to 1:30 or 2 if you can.

Best, Peter

From: Axita Patel <Axita.Patel@ghd.com>
Sent: Thursday, November 30, 2023 10:12 AM
To: Peter Graham <LRCS@sixnations.ca>
Cc: Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: [External] RE: Brooks Road Landfill Expansion

Thank you, Peter! We would like to meet in person on the 12th of January from 1-2 p.m. I will send out the invite shortly.

Regards,
Axita

From: Peter Graham <LRCS@sixnations.ca>
Sent: Wednesday, November 29, 2023 11:58 AM
To: Axita Patel <Axita.Patel@ghd.com>
Cc: Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: RE: Brooks Road Landfill Expansion

Hi Axita,

We're fine with either. The 12th will work best for an in-person.

Thanks, Peter

From: Axita Patel <Axita.Patel@ghd.com>
Sent: Wednesday, November 29, 2023 11:29 AM
To: Peter Graham <LRCS@sixnations.ca>
Cc: Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: [External] RE: Brooks Road Landfill Expansion

Good morning Peter,

I wanted to ask whether the community prefers an in-person meeting or an online one. Please let me know.

Thank you,
Axita

From: Axita Patel <Axita.Patel@ghd.com>
Sent: Tuesday, November 28, 2023 10:47 AM
To: Peter Graham <LRCS@sixnations.ca>
Cc: Blair Shoniker <Blair.Shoniker@ghd.com>; Katrina McCullough <Katrina.McCullough@ghd.com>
Subject: RE: Brooks Road Landfill Expansion

Good morning Peter,

Thank you for your email. I think we can accommodate those dates. I will shortly send out an invite.

Thank you,
Axita

From: Peter Graham <LRCS@sixnations.ca>
Sent: Tuesday, November 28, 2023 8:34 AM

To: Axita Patel <Axita.Patel@ghd.com>
Subject: Brooks Road Landfill Expansion

> You don't often get email from lrcs@sixnations.ca. Learn why this is important

Good morning Axita,

We would like a meeting about the proposed expansion. Will your team have availability on the afternoon of Jan 10 or on the 12th?

Thank you,

Peter Graham
Consultation Supervisor
Six Nations of the Grand River Elected Council

From:	Axita Patel
To:	"Stacey.LaForme@mncfn.ca"; "Mark.Laforme@mncfn.ca"; "Abby.LaForme@mncfn.ca"; "markhill@sixnations.ca"; "darrinjamieson@sixnations.ca"; "consultations@metisnation.org"; "pontdj@hotmail.com"; "cwmc@metisnation.org"; "jocko@sixnationsns.com"
Cc:	Blair Shoniker; Ryan Loveday
Bcc:	12561524
Subject:	Brooks Road Landfill Expansion Environmental Screening
Date:	Tuesday, January 16, 2024 3:33:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png

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Good afternoon,

On behalf of Brooks Road Environmental, a draft Environmental Screening Report (ESR) was prepared as part of the Brooks Road Landfill Expansion EA for your review. Please use this link to view and download the ESR: https://acrobat.adobe.com/link/track?uri=urn:aaid:scds:US:3d1c0177-04c2-4429-bc03-e24bdcab9d39

We are requesting that your written comments be received by no later than **February 13, 2024,** so they can be considered as part of preparing the Final ESR.

Please feel free to reach out for any questions and please respond to this email address with any formal comments on the draft ESR.

Kind Regards,
Axita

Axita Patel
Solid Waste Planner

GHD
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100 Milverton Drive, Suite 404, Mississauga, Ontario L5R 4H1 Canada
D 905 712 4479 **M** 905 2464301 **E** Axita.Patel@ghd.com

From:	Axita Patel
To:	claires@mncfn.ca
Bcc:	12561524
Subject:	FW: Brooks Road Landfill Expansion Environmental Screening
Date:	Tuesday, January 16, 2024 3:41:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png

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Good afternoon Claire,

I received an automatic reply from R. Stacey Laforme indicating all correspondence should be directed to you.

Please see the email below.

Kind Regards,
Axita

Axita Patel
Solid Waste Planner

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D 905 712 4479 **M** 905 2464301 **E** Axita.Patel@ghd.com

From: Axita Patel
Sent: Tuesday, January 16, 2024 3:34 PM
To: 'Stacey.LaForme@mncfn.ca' <Stacey.LaForme@mncfn.ca>; 'Mark.Laforme@mncfn.ca' <Mark.Laforme@mncfn.ca>; 'Abby.LaForme@mncfn.ca' <Abby.LaForme@mncfn.ca>; 'markhill@sixnations.ca' <markhill@sixnations.ca>; 'darrinjamieson@sixnations.ca' <darrinjamieson@sixnations.ca>; 'consultations@metisnation.org' <consultations@metisnation.org>; 'pontdj@hotmail.com' <pontdj@hotmail.com>; 'cwmc@metisnation.org' <cwmc@metisnation.org>; 'jocko@sixnationsns.com' <jocko@sixnationsns.com>
Cc: Blair Shoniker <Blair.Shoniker@ghd.com>; Ryan Loveday <Ryan.Loveday@ghd.com>
Subject: Brooks Road Landfill Expansion Environmental Screening

Good afternoon,

On behalf of Brooks Road Environmental, a draft Environmental Screening Report (ESR) was prepared as part of the Brooks Road Landfill Expansion EA for your review. Please use this link to view and download the ESR: https://acrobat.adobe.com/link/track?uri=urn:aaid:scds:US:3d1c0177-04c2-4429-bc03-e24bdcab9d39

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Please feel free to reach out for any questions and please respond to this email address with any formal comments on the draft ESR.

Kind Regards,
Axita

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Brooks Road PLC Meeting Minutes

November 03, 2022

Project name	Brooks Road Landfill	**From**	Blair Shoniker
Subject	2022 Brooks Road PLC #2	**Tel**	+1 905 429-5040
Date/Time	June 1, 2022/7:00pm-8:00pm	**Project no.**	018235
Attendees	Katrina McCullough (KM) – GHD Blair Shoniker (BS) – GHD Ryan Loveday (RL) – GHD Tim Danyliw (TD) – BRE Chris O'Connor (CO) – MECP Hamilton District Dave Bruce (DB) - PLC Member, Chair John Metcalfe (JM) – PLC Member, Councillor Diane Manto (DM) – Public (departed at 7:35) Laurie Woolner (LW) – Public Rudi Horvat (RH) – Public	**Copy to:**	All Attendees

Minutes	Action
Approvals	– BS reviewed Site approvals. – BRE has considered the ability to accommodate additional waste capacity at the Site, BRE will embark on an Environmental Screening Process (ESP) for an additional 100,000 cubic metres (representing an additional estimated one year of life expectancy). DM inquired as to where the waste was going. RL noted the options for where waste is going are currently being developed. BS noted options evaluation for horizontal and vertical would be considered. BS noted that the same ESP will be followed as was completed for the Fill Rate Amendment. – LW inquired if that 100,000 m^3 was in addition to the previous presented slide; BS confirmed that it is on top of the existing approved capacity. BS noted that the undertaking the ESP does not allow for a proponent to take a piecemeal approach (this approach can't be taken again). JM requested confirmation that BRE could not request an additional 100,000 m^3 capacity following the next planned one – BS confirmed that BRE would not be permitted to subsequently apply for additional capacity through the Environmental Screening Process. – BS noted that the process will include public consultation and notification on the Screening process would be sent out to the mailing list as well as broader publications (i.e. newspaper, direct mailings) to the community in advance of a future public meeting.

Brooks Road PLC Meeting Minutes

November 23, 2022

Project name	Brooks Road Landfill	**From**	Blair Shoniker
Subject	2022 Brooks Road PLC #3	**Tel**	+1 905 429-5040
Date/Time	November 2, 2022/7:00pm-8:00pm	**Project no.**	018235
Attendees	Katrina McCullough (KM) – GHD Blair Shoniker (BS) – GHD Ryan Loveday (RL) – GHD Tim Danyliw (TD) – BRE Chris O'Connor (CO) – MECP Hamilton District Dave Bruce (DB) - PLC Member, Chai Dave Glenney (DG) – PLC Member Kim Seaben – PLC Member Rick Armstrong (RA) – Public Diane Manto (DM) – Public Laurie Woolner (LW) – Public	**Copy to:**	All Attendees

Minutes	Action
Approvals	– BS reviewed Site approvals. – BS outlined the Streamlined Environmental Screening Process currently being undertaken for a 100,000 m3 expansion. BS noted this is a similar undertaking that was completed for the previous fill rate amendment. – BS noted that the Environmental Screening studies for each technical discipline continue to be developed. That work includes the development of impact management and mitigation measures. – Currently targeting late 2022 or early 2023 for the next Public Open House (Open House 2). The Public will be notified throughout newspaper ads, email, Canada Post mailouts and email to the PLC. – LW noted that Notice of Commencement was not clear because it did not say that the increase the capacity would be accomplished by expanding the footprint. BS informed that at the time of publishing the Notice it was not confirmed that expansion would be done by expanding the footprint horizontally. BS noted that it will be considered for future notice. – LW noted that the newspaper ad doesn't address expanding the footprint. LW noted that it should note a footprint expansion. BS noted the second sentence in the slide deck summary references the approved footprint. DB noted that the reference going forward should note that it is 100,000 m3 and that the footprint is likely to change. BS noted he doesn't agree with the statement that DB stated, and that timing of the article relative to Open House 1 is the reason why. BS noted the intent here at this PLC was to provide a summary only, rather than get into the details – LW noted that the expansion couldn't be piecemealed, and inquired why this work can. BS noted that the Environmental Screening process can't be piecemealed. BS noted the first process was an Individual EA, and this process is an Environmental Screening. LW noted that people reading the newspaper wouldn't know the details of the expansion. KM noted that Open House 2 will provide more detail with respect to the work. BS noted that this is a summary only, and not

Minutes	Action
	detailed with respect to the Environmental Screening. BS noted that the consultation in the Screening is intended to review the proposal. – DM and LW inquired about the Environmental Screening being different than the Environmental Assessment, the previous approvals (vertical expansion, change to annual amount and this latest expansion of the footprint); and why can Brooks expand vertically and horizontally with both expansions. BS noted they are both instruments under the EA Act, and they both consider consultation and environmental (natural, social, technical) aspects. LW inquired about asking for more volume (horizontal, vertical) in different ways. BS noted that it all has to do with volume – the individual EA was for more than 400,000 m3. BS outlined the steps required for the Individual EA, including Minister Approval of the Terms of Reference as well as the EA. BS noted the previous IEA took seven years. BS outlined the triggers for the Streamlined Environmental Screening including an expansion volume greater than 40,000 m3 but less than 100,000 m3. The current proposal will extend Site life by approximately one year. LW noted she was confusing the vertical expansion with the fill rate amendment relative to the process used. – DG inquired if BRE is trying to expand by digging down into existing landfill, RL replied with a yes. – DG wanted to know the slide slopes, to which RL replied 3:1 to 4:1.

Brooks Road PLC Meeting Minutes

March 23, 2023

Project name	Brooks Road Landfill	**From**	Blair Shoniker
Subject	2023 Brooks Road PLC #1	**Tel**	+1 905 429-5040
Date/Time	March 22, 2023/ 7:00pm-8:00pm	**Project no.**	018235
Attendees	Katrina McCullough (KM) – GHD Blair Shoniker (BS) – GHD Ryan Loveday (RL) – GHD Tim Danyliw (TD) – BRE Michael Durst (MD) – MECP Hamilton District Dave Bruce (DB) - PLC Member, Chair Dave Glenney (DG) – PLC Member John Metcalfe (JM) – PLC Member Diane Manto (DM) – Public Laurie Woolner (LW) – Public Rod Leclair (RL) – OPP Liaison	**Copy to:**	All Attendees

Minutes	Action
Approvals	– BS reviewed Site approvals. – BS outlined the Streamlined Environmental Screening Process currently being undertaken for a 100,000 m3 expansion. Open House #1 was held in June 2022, it is anticipated that Open House #2 will be June 2023. BS noted that the Environmental Screening studies for each technical discipline continue to be developed. – Beyond Open House #2, everything is documented in the Environmental Screening Report, which is available for MECP and Public Review. The MECP will then need to make a decision on if the Screening moves forward. – DM inquired about the definition of net effects and that it notes negative effects. BS clarified that it can be net-negative effects or net-positive effects and they are the effects that are remaining after mitigation measures are applied. BS noted the previous EA utilized the same methodology, which is an accepted approach by the MECP. – DM noted that the public only has 60 days to review. BS noted that comments are received and considered at any time.

Brooks Road PLC Meeting Minutes

June 07, 2023

Project name	Brooks Road Landfill	**From**	Katrina McCullough
Subject	2023 Brooks Road PLC #2	**Tel**	+1 416-866-2365
Date/Time	June 7, 2023/ 7:00pm-8:00pm	**Project no.**	018235
Attendees	Katrina McCullough (KM) – GHD Ryan Loveday (RL) – GHD Tim Danyliw (TD) – BRE Michael Durst (MD) – MECP Hamilton District Charlene Anderson (CA) – MECP Hamilton District Dave Bruce (DB) - PLC Member, Chair Dave Glenney (DG) – PLC Member Diane Manto (DM) – Public Kim Seabon (KS) – PLC Member Rod Leclair (RL) – OPP Liaison	**Copy to:**	All Attendees

Minutes	Action
Approvals	– KM reviewed site approvals. Noted that we are currently looking at Summer 2023 for Open House 2 and the PLC will be updated once a date is set. No date is currently set.

Brooks Road PLC Meeting Minutes

November 21, 2023

Project name	Brooks Road Landfill	**From**	Katrina McCullough
Subject	2023 Brooks Road PLC #3	**Tel**	+1 416-866-2365
Date/Time	November 1, 2023/ 7:00pm-8:00pm	**Project no.**	018235
Attendees	Katrina McCullough (KM) – GHD Ryan Loveday (RL) – GHD Axita Patel (AP) – GHD Tim Danyliw (TD) – BRE Jeremy Gamble (JG) – MECP Hamilton District Charlene Anderson (CA) – MECP Hamilton District Dave Bruce (DB) - PLC Member, Chair Kim Seabon (KS) – PLC Member Richard Clark (RC) - Member of the Public Laurie Woolnor (LW) – PLC Member Tara Lindemann – Haldimand Press	**Copy to:**	All Attendees

Minutes	Action
Approvals	– AP reviewed the current EA approval process, noting the change in Ontario regulation. AP noted we recently held Open House 2 and are currently in the public commenting phase. The Draft Environmental Screening Report will be completed in draft by the end of November. The final report will be submitted and available for 60 days and then GHD will issue a Notice of Completion. – DB was invited to a Council meeting in June 2014 (June 17, 2014) when BRE wanted to incorporate the north rail line into the zoning of the dump site and DB has a notice of Public Meeting for Zoning and Official Plan amendment. DB noted that the councillors were well informed about everything

	going on. DB inquired as to what benefit there was to the public in incorporating the north rail line into the dump site. – DB noted the details of the application for public meeting; “the purpose of this application is to amend the Designation of the official plan and zoning of the town of Haldimand zoning by-law 1H86 of the subject property to facilitate the extension of the northern rail line to act as an additional buffer zone and temporary storage of clean clay and relocation of groundwater monitoring wells. It has been assured by the proponent that there will be no landfilling on added lands and no change to the existing waste footprint of the land site will take place”. DB says that BRE says something, and you can’t believe them, they will say what they want and get what they want. KM noted she would put that into the meeting and asked if he could share the document. DB agreed to let KM take a photo of the document. MECP inquired about the date of the document and DB replied it was June 17, 2014. DB said he wished John Metcalfe was here to hear it and DB will make sure he gets a copy of it. – DB asked if the approval for the expansion goes through, is it correct that you have to dig down to the bottom of the current cell where a liner and another liner would be fused? RL said that the northern expansion cell adjacent to the current landfill doesn’t go as deep. The base is projected to be about 4-5 m higher than the existing low point in the current cell. – DB asked how the leachate would be handled in the new cell. RL responded that there would be a new pipe on the side slope that would pump into the same leachate treatment system. – DB noted that Stoney Creek is expanding horizontally, and they have nothing but problems, they have dug down to the bottom level which is causing odour issues. He thinks that if the same will happen here and they dig down the leachate, you can expect the same thing with odour problems. KM disclosed that GFL is a client and can speak to what has been released from GFL. KM explained that odour issues were caused by leachate and not cell construction. KM noted there was cell construction prior to the leachate odour issue and that was causing odours, but the odour issues since the summer have been caused by leachate. KM noted that the leachate is treated at BRE in a closed system and that GFL treats leachate in an open pond. DB asked CA if she is involved. CA noted she has previously responded to after-hours complaints and that others are on that file. CA noted that yes there are odour issues, and it is being dealt with by the area officer. There have been many meetings with GFL, MECP, and GHD. CA confirms that both the landfills are not designed the same way.

	– DB inquired if odour complaints have been since the start or recent; CA said she isn't aware. DB asked is an open pond to mange leachate is permitted, CA responded yes. – KS asked if you can guarantee there won't be odors. TD responded that the design is intended to minimize odour and that the expansion drainage layer will not be hydraulically connected to the existing landfill drainage layer. This manner of construction will drastically reduce the need for waste excavation and thus avoid odours as best as possible. – KM noted that GFL had construction into an existing cell, and they anticipated odour (with advanced notification) – there were some odour complaints and then the leachate issue occurred later. LW inquired if GFL offered air conditioners like Glanbrook did so that owners could keep windows shut. KM noted that she is not aware. – RC noted that multiple expansions have occurred and inquiring if there are plans for more. He noted that it's a dog and pony show and that they never got the truth. He asked what the reality of this in the long term is and what is to say that we are not going to purchase more land. He mentioned that the reason there are no complaints is because the people have given up and it's a horrendous situation. RL noted it is a business and supply/demand decision. RC asked where those people are who makes these decisions. RC noted that he saw a dental hygienist and she apologized for odour and he noted it was the dump. The hygienist didn't know that there is a landfill nearby. He noted that it would be better if there was truth behind it. He has written many emails and phone calls and hasn't heard back. – KM noted that there is a business decision once capacity is reached so that it is impossible to say exactly when a business case would continue. RC said that they made statements. RC called them a used car salesman. – KS asked why was this land chosen to be a landfill? DB noted that it was a garbage dump and nothing was regulated and later the government gave that piece of property it's designation. DB noted that the property was purchased by a couple of guys (who borrowed money from Romspen). Over 2-3 years the site went into receivership and Romspen took it over and still owns it. RC noted that a dump was also permitted as a wrecking yard; KS noted that is the case as long as it is open. – DB inquired about silt fence/chain-link around the Site. TD noted that there is a silt fence and an exclusion fence. DB mentioned that Amy from GHD at the Open House said that in case of heavy rainfall, the water would come off the dump site if it ever got out of the leachate collection ditches it would flow across and the silt fence would stop the debris and any water

Minutes	Action
	that got off the site would be tested. KM noted that she was present during this conversation and that Amy didn't realise that you were talking about the active landfill. She was talking about the outside of the landfill area. RL noted yes, she was talking about the perimeter fence not the landfill site. DB inquired if you also test the water outside the boundaries. RL noted that surface water is tested as part of the quarterly system. – RC inquired about studies to Grand River – RL noted he doesn't have all the details, but that discharge to the roadside ditch and to the south was part of the discharge approval.

Comments on Brooks Road Landfill expansion ESR

Table 1 **Comments from MECP on the ESR**

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
02/06/2024	Email	Report Inconsistencies	Several sections of the draft ESR are displaying error messages. This should be corrected in the final ESR. Examples: Sections: 6. Summary of Comments Received, 3.1.4 Description of Surface Water Existing Conditions, 4.2.3 Surface Water Net Environmental Effects, etc.	Comment addressed
		Screening Criteria Checklist	The Screening Criteria Checklists in Section 2.2, Appendix C Section 2, and Appendix B contain inconsistences: • Row 1.3 in Section 2.2 checks “No” and states that the sedimentation effects caused by the project are “not anticipated to be significant”; Row 1.3 in Appendix B checks “Yes” and states that the project “may cause sedimentation”.	Criteria 1.3 is addressed in Appendix A – Surface Water Assessment Report and matches with Section 2.2 of ESR. The text in the “additional information” column is updated to match the ESR.
			• In Appendix B, Row 2.1 is omitted, and Row 2.2 is duplicated.	Comment addressed
			• Row 2.5 in Section 2.2 and in Appendix C Section 2 check “Yes” and state that the project “may require the use of hazard lands”; Row 2.5 in Appendix B checks “No” and states that the project “would not require the use of hazard lands”.	Appendix B of the Open House Summary Report contains the Display Boards presented during Open House 1 in June 2022. The Screening Criteria Checklist in Appendix B was prepared at the start of this project and has been updated based on the feedback received at the Open House and subsequent consultation with interest holders, along with information obtained through investigation and technical studies.
			• Row 4.1 in Section 2.2 checks “Yes” and states that “numerous” Species At Risk exist within the project site; Row. 4.1 in Appendix B checks “No” and states that “no” Species At Risk exist within the project site.	
			• Row 4.4 in Section 2.2 states that a Wildlife Activity Area is “present within the Study Areas”; Row 4.4 in Appendix B states that “none have been identified as being present on-site”.	
			• Row 4.7 in Section 2.2 checks “No” and states that the land changes cause by the project are “unlikely to cause an increase in bird hazards”; Row 4.7 in Appendix B checks “Yes” and states that land changes “may cause an increase in bird hazards”.	

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			• Row 6.1 in Section 2.2 and Appendix C Section 2 check “No” and state that the project “will not cause negative effects” to character; Row 6.1 in Appendix B checks “Yes” and states that the project “may cause negative effects” to character.	
			• Row 6.3 in Section 2.2 checks “No” but states that the project “may cause negative effects” on local businesses; Row 6.3 in Appendix C Section 2 checks “No” and states that the project “would not result in negative effects” on local businesses; Row 6.3 in Appendix B checks “Yes” and states that “may cause negative effects” on local businesses.	Updates made to “additional information” text in the ESR Section 2.2, Row 6.3 to align with Appendix C. Appendix B of the Open House Summary Report contains the Display Boards presented during Open House 1 in June 2022. The Screening Criteria Checklist in Appendix B was prepared at the start of this project and has been updated based on the feedback received at the Open House and subsequent consultation with interest holders, along with information obtained through investigation and technical studies.
			• Row 6.9 in Section 2.2 and Appendix B state that a “private airfield used for soaring” is located near the project site; Row 6.9 in Appendix C Section 2 states that the “Cayuga East Airport” and “a private airfield used for soaring” are located near the project site.	Text updated in the ESR to align with Appendix C. Appendix B of the Open House Summary Report contains the Display Boards presented during Open House 1 in June 2022. The Screening Criteria Checklist in Appendix B was prepared at the start of this project and has been updated based on the feedback received at the Open House and subsequent consultation with interest holders, along with information obtained through investigation and technical studies.
			• Row 6.11 in Section 2.2 checks “No” but states that the project “may cause negative effects” on public health and safety; Row 6.11 in Appendix C Section 2 checks “No” and states that the project “would not cause any negative effects” on public health and safety; Row 6.11 in Appendix B checks “Yes” and states that the project “may cause negative effects” on public health and safety. Please review and correct accordingly. If no correction is needed, please provide the reasoning of these discrepancies.	
		Surface Water	All the comments regarding surface water refer to the Surface Water Assessment Report in Appendix A. Section 3.2.1 describes the current surface water monitoring program that quarterly sampling of a comprehensive list of parameters at three off Site background locations (SW1, SW8, and SW9), two on – site locations (SW2 and SW5), and four locations downstream (SW3, SW4, SW6, and SW7). Surface water quality is assessed against the Provincial Water Quality Objectives (PWQO), and an attempt is made to correlate surface water monitoring with rainfall events using the precipitation data from John C. Munro Hamilton International Airport (HIA). The proposed expansion does not appear to impact the access or remove any of the current monitoring locations. As such, there is no need to relocate or establish new monitoring locations due to the expansion. The current monitoring program is sufficient to determine impacts from landfilling activities on the site.	Comment noted.
			The ministry previously conducted review of recent Operations and Monitoring Reports (2020, 2021, 2022) and noted that quarterly samples at various locations are often missed due to dry or stagnant water conditions at the monitoring locations. A better effort to collect surface water samples under appropriate conditions should be made, so that there is an adequate data set to determine impacts from the landfill. The HIA rainfall data is not representative of the actual rainfall that the site receives as it is too far away from the site. The HIA data is also not available in real-time making it difficult to plan sampling events that are dependent on adequate rainfall. The Grand River Conservation Authority (GRCA) operates a real-time rainfall gauge in York (York, Station 12122042) that is	The suggested station will be reviewed by the team that prepares the Operations and Monitoring Reports and appropriate changes will be implemented, as required.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			approximately 8 km to the northwest of the site, as compared to HIA that is 24 km to the north. Real-time data can be accessed from the GRCA website at the hyperlink below. Using the rainfall data from the GRCA's York station will not only more accurately reflect rainfall totals experienced at the site, but also be more useful in planning surface water sampling events. Historical data can be accessed from GRCA upon request from the second hyperlink below. GRCA Real Time Rainfall Data Link: https://apps.grandriver.ca/waterdata/kiwischarts/rf_rainfallsummary.aspx#gsc.tab=0 GRCA Historical Data Downloads: **https://data.grandriver.ca/downloads-monitoring.html**	
			While assessing surface water quality against the PWQO is sufficient for many parameters, the owner should consider assessing surface water quality against the Canadian Water Quality Guidelines (CWQG) for the protection of aquatic life (long-term exposure) values as well. PWQO values are no longer being updated based on recent science and it is the intent of the Ministry to adopt CWQG as they are updated from time to time. In general, it is good practice to use the more recently developed of the PWQO or CQWG to assess surface water quality. In many cases the CWQGs are based on more recent science and toxicity data than the PWQO and are more appropriate for assessing impacts to surface water. It should be noted that some CWQG include calculations considering toxicity modifying factors or are based on the dissolved proportion of a contaminant. For example, the CWQG for zinc is based on dissolved zinc using a calculation that considers hardness and dissolved organic carbon (DOC). To assess surface water quality against the CWQG the sampling program may need to be modified to include toxicity modifying factors (hardness, DOC, pH, etc.) and sampling requirements (i.e., field filtering for dissolved metals). That being said, a number of contaminants are naturally elevated in the surface water features near the site as demonstrated by background water quality data. For these contaminants, it is still appropriate to compare concentrations at potentially impacted locations to the historical range of background concentrations. Section 4.1 includes a summary table of proposed capacity expansion design (Table 4.1) on page 10 and 11.	The Owner will consider this information and review with the team that prepares the Operations and Monitoring Report, and appropriate changes will be implemented, as required.
			The existing stormwater pond capacity is sufficient for the proposed expansion based on the existing stormwater management plan. Further to a review of the stormwater management plan prepared by Conestoga Rovers and Associates dated September 2013, it is confirmed that the existing pond has sufficient capacity for the proposed expansion. As such, no changes to the existing stormwater pond are required.	Comment noted.
			The proposed expansion requires that the stormwater drainage ditch along the northern expansion is to shift by approximately 30 meters. Additionally, the perimeter access road along the northern expansion area is to be shifted by 29 meters. Currently, the northern extent of the access road and stormwater ditch are	Construction period erosion and sediment control measures will be part of detailed design. Changes have been made to the Mitigation Measures section of the Surface Water Assessment Report as well as the ESR in response to the comments.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			adjacent to the former railway that ran along the northern edge of the site. As such, it is possible that there are historical contaminants associated with railway ballast may be disturbed by the excavation of the existing berm and construction of new access road and drainage ditch. • Will the quality of the soils/materials to be removed be assessed, and what mitigation strategies will be in place to prevent the mobilization of these contaminants into the stormwater management system or of-Site drainage? • Additionally, it is recommended that an erosion and sediment control plan be followed during construction to prevent the downstream transport of excess sediments. • If significant dewatering (e.g. greater than 50,000 liters/Day) is required to construct the roadway and ditch, then a Permit to Take Water (PTTW) may be required or if the water taking meets the requirements of the Environmental Activity Sector Registry (EASR) then the activity would need to be registered. Further information on the PTTW program and water taking EASR can be found at the following links: o PTTW Link: https://www.ontario.ca/page/permits-take-water o EASR Link: https://www.ontario.ca/page/water-taking-user-guide-environmental-activity-and-sector-registry#section-2 Sections 4.3.1 and 4.3.2 discuss potential effects on surface water and proposed mitigative measures, respectively. These include potential surface water quality impacts and surface water quantity impacts.	
			Potential water quality impacts include minor erosion/soil loss from the landfill cap due to steeper slopes. This may lead to increases total suspended solids (TSS) and associated contaminant (e.g. metals entrained in the soil) runoff into the stormwater management system. The existing stormwater management ditches and pond should be sufficient to mitigate these impacts. However, increased TSS loads to the pond may result sedimentation within the pond that could lead to reduced capacity or increased maintenance (i.e. cleanout, dredging of pond sediment). Reductions in pond capacity and inspection and maintenance of the pond should be addressed through the stormwater ECA. Additionally, the final cover should be revegetated with native plants to increase soil stability and reduce erosion/soil loss from the final cover.	The operations and maintenance requirements of the pond include checking for sediment accumulation and requiring cleanout when maintenance threshold is reached.
			The proposed expansion is not anticipated to result in a significant increase in peak flow rates or runoff volumes. The hydrological modeling that was conducted based on the proposed expansion scenario included analysis of storm events from the 2 year up to 100 year, 24 hour SCS Type 2 distribution. This is consistent with the guidance provided in the MECPs Stormwater Planning and Design Manual, 2003. It is expected that the expanded stormwater drainage ditch and SWM pond have sufficient capacity for any minor increases in peak flow or volume that may occur as a result of the expansion. As such, no modifications to the existing stormwater management works are required, other than the proposed modifications to the stormwater drainage ditches to capture stormwater from the capped landfill areas.	Comment noted

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			Section 5.2 summarized previous monitoring results. In addition, the ministry recently reviewed the 2020, 2021 and 2022 operations and monitoring reports for the site (see attached). The ministry provides the following comments from that review. In General, water quality on Site and downstream are similar within the historical ranges of the background locations with some exceedances of the relevant PWQO values for select metals and general chemistry parameters noted. However, there are some notable exceptions, as follows: • SW5 – Boron concentrations were elevated above historical background concentrations and have shown a slight increasing trend since 2017. • SW3 – while SW3 was not sampled in 2022 due to dry conditions, the historical data record indicates occasional concentrations of select metals (Iron in 2019) and PAHs greater than the background locations. GHD has suggested that elevated metals and PAH concentrations are not associated with leachate but may be related to historical slag piles and road ballast along the site entrance. SW2 has also experienced similar elevated concentrations in the past, however it appears to be locally isolated as results from further downstream at SW4 are within the range of historical background concentrations. • SW6 – The 2021 data showed some detections of PAH above background concentrations, which GHD suggested may be relate to historical slag piles rather than landfill leachate. GHD also noted an increasing trend in boron concentrations since 2012. While GHD indicated that surface water quality is not impacted by landfill leachate, there are some concerning trends including increasing boron concentrations at SW5 and SW6, and occasional detections of PAH above background concentrations at SW2, SW3 and SW6. • The increasing boron concentrations may be related to landfill leachate as boron has been selected as a leachate indicator for the site. This trend should be monitored closely as it could be an indication of a failure in the leachate collection system or leachate seeps. • While the PAH exceedances may not be related to landfill leachate, it is recommended to maintain the current monitoring program to determine if any additional actions may be required. This could include delineation of the impacts from the historical slag piles and road ballast that have been suggested by GHD as a potential source of observed metals and PAH exceedances.	The trend for Boron and PAHs will be reviewed and actions may be proposed, if warranted. This could include potential delineation of historical activities that have the potential to cause impacts.
			I have the following comments as relates to surface water content in the referenced reports and the requirements of the ECAs. While reviewing each individual report (2020, 2021, 2022) I noted the conclusions, recommendations and concerns from a surface water perspective were similar. As such, the comments noted below, and section references correlate to the latest report (2022 Operation and Monitoring Report) 1) Section 4.1.3 describes the Surface Water Monitoring program that is conducted at nine locations (two on Site, and seven off Site). Surface water samples are collected on a quarterly basis during flowing conditions that correlate with rainfall events where possible. GHD notes that they use precipitation data from John C. Munro Hamilton International Airport (HIA) in Mount Hope, Ontario that is 24 kilometers to the north. In the 2020, 2021, and 2022 reports it is noted	The suggested station will be reviewed by the team that prepares the Operations and Monitoring Reports and appropriate changes will be implemented, as required.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			that conditions are often dry during the sampling events resulting in missed opportunities to assess off-Site impacts. Comment 1: The HIA precipitation data is not representative of the actual rainfall that the Site receives as it is too far away from the Site. The HIA data is also not available in real-time making it difficult to plan sampling events that are dependent on adequate rainfall. The Grand River Conservation Authority (GRCA) operates a real-time precipitation gauge in York (York, Station 12122042) that is approximately 8 km to the northwest of the Site. Real-time data can be accessed from the GRCA website at the hyperlink below. Using the precipitation data from the GRCA's York station will not only more accurately reflect precipitation totals experienced at the site, but also be more useful in planning surface water sampling events. Historical data can be accessed from GRCA upon request from the second hyperlink below. GRCA Real Time Precipitation Data Link https://apps.grandriver.ca/waterdata/kiwischarts/rf_rainfallsummary.aspx#gsc.tab=0 GRCA Historical Data Downloads https://data.grandriver.ca/downloads-monitoring.html It is recommended that the GRCA York (station 12122042) precipitation gauge be used for planning and correlating surface water monitoring with precipitation events. Precipitation data from HIA may also be used for verification, but the GRCA York station is likely more representative. A better attempt should be made to plan sampling events following significant rainfall event (i.e., greater than 15mm over 24 hours) to ensure off Site impacts can be properly assessed.	
			2) Section 5.1 on page 9 includes a table with reasoning for samples that were not collected in 2022. The 2020 and 2021 reports also contain similar tables. The table notes that many samples were not collected due to dry conditions or insufficient volume. Comment 2: Following my recommendation noted in comment 1 may result in more samples collected at more monitoring locations by targeting sampling after rainfall events of adequate volume (i.e., greater than 15mm over 24 hours).	Comment noted and will be addressed during operations and monitoring.
			3) Section 5.5 notes that surface water quality is assessed against the Provincial Water Quality Objectives (PWQO) where available. Comment 3: While assessing surface water quality against the PWQO is sufficient for many parameters, the consultant (GHD) should consider assessing against the Canadian Water Quality Guidelines (CWQG) for the protection of aquatic life (long-term exposure) values as well. In many cases the CWQGs are based on more recent science and toxicity data than the PWQO and are more appropriate for assessing impacts to surface water. It should be noted that some CWQG include calculations considering toxicity modifying factors or are based on the dissolved proportion of a contaminant. For example, the CWQG for Zinc is based on dissolved zinc using a calculation that considers hardness and dissolved organic carbon (DOC). To assess surface water quality against the CWQG the sampling program may need to be modified to include toxicity modifying factors (hardness, DOC, pH, etc.) and sampling requirements (i.e., field filtering for dissolved metals).	The Owner will consider this information and review with the team that prepares the Operations and Monitoring Report, and appropriate changes will be implemented, as required.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			4) Section 5.5 discusses surface water quality both on and off Site and the results historical results are presented in Appendix G. In General, water quality on Site and downstream are similar within the historical ranges of the background locations with some exceedances of the relevant PWQO values for select metals and general chemistry parameters noted. However, there are some notable exceptions. a. SW5 – Boron concentrations were elevated above historical background concentrations and have shown a slight increasing trend since 2017. b. SW3 – while SW3 was not sampled in 2022 due to dry conditions, the historical data record indicates occasional concentrations of select metals (Iron in 2019) and PAHs greater than the background locations. GHD has suggested that elevated metals and PAH concentrations are not associated with leachate but may be related to historical slag piles and road ballast along the site entrance. SW2 has also experienced similar elevated concentrations in the past, however it appears to be locally isolated as results from further downstream at SW4 are within the range of historical background concentrations. c. SW6 – The 2021 data showed some detections of PAH above background concentrations, which GHD suggested may be relate to historical slag piles rather than landfill leachate. GHD also noted an increasing trend in boron concentrations since 2012. Comment 4: While the results indicate that surface water quality is not impacted by landfill leachate, there are some concerning trends including increasing boron concentrations at SW5 and SW6, and occasional detections of PAH above background concentrations. The increasing boron concentrations may be related to landfill leachate as boron has been selected as a leachate indicator for the site (see section 5.2.2. of the 2022 report). This trend should be monitored closely as it could be an indication of a failure in the leachate collection system or leachate seep to surface water. While the PAH exceedances may not be related to landfill leachate, it is recommended to maintain the current monitoring program to determine if any additional actions may be required. This could include delineation of the impacts from the historical slag piles and road ballast that have been suggested by GHD as a potential source of observed metals and PAH exceedances.	The trend for Boron and PAHs will be reviewed and actions may be proposed, if warranted. This could include potential delineation of historical activities that have the potential to cause impacts.
			5) The reports discuss SWMS pond sampling in section 6.2. On occasion the samples indicated trigger level exceedances of pH (both field and lab), arsenic and boron. It is noted in the 2020 report that the trigger level for boron was increased from 0.2 mg/L to 1.5 mg/L which is consistent with the newer developed CWQG for boron. Since this change there have been no trigger exceedances for Boron. GHD noted a well that on occasion in 2021, re-sampling within 2 weeks of an exceedance was not completed, which does not conform with Condition 11 (10) of the SW ECA. Regardless of some occasional minor exceedances of the trigger levels the data indicates the SWMS Pond is functioning adequately to prevent impacts from the on-Site stormwater to the Brooks Road ditch and Norton Creek.	Comment noted and will be addressed during operations and monitoring.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			Comment 5: The owner should ensure that re-sampling following trigger level exceedances is completed, as it was shown that was not for some events in 2021. This represents a non-compliance with Condition 11 (10) of the SW ECA.	
		Consultation and Engagement	11. Appendix J.1 Stakeholder Tracking Database should be updated with the following changes: • Charlene Anderson is no longer the Environmental Officer of the site of this project and should be removed from the stakeholder list. Instead, the current Environmental Officer, Jordan Balch's, contact information should be added to the list: Jordan.Balch@ontario.ca. • Joan Del Villar Cuicas is no longer acting in the position. The word acting can be removed. • Carolynn Lee is no longer the Special Project Officer for this site and should be removed from the stakeholder list. Please include Andrew Evers, Project Coordinator Unit Supervisor, Environmental Assessment and Permissions Division, Andrew.Evers@ontario.ca.	Noted and changes made accordingly.
			12. Please ensure all the consultation records are included in the final report (i.e., correspondence from virtual meeting with the Mississaugas of the Credit First Nation was held on July 19, 2022, and An in-person meeting with members of the Six Nations scheduled for January 12, 2024.	All correspondence with Indigenous Communities including the correspondence with Mississaugas of the Credit First Nation and with the Six Nations is included in Appendix I.5
		Notice of Completion	13. Please ensure that the Notice of Completion, the follow-up correspondence, and the responses from stakeholders are included in the final Environmental Screening Report.	Notice of Completion is included as Appendix J in the ESR. Comments received on the draft ESR from Government Review team and Public are included in Appendix I7 in the form of comment-response tables.
			14. It is recommended to circulate the Notice of completion to the updated Indigenous consultation contacts below, as the contacts that were used initially may no longer be available. • Six Nations (elected) Chief- Sherri-Lyn Hill sngr.chief@sixnations.ca 2498 Chiefswood Rd. P.O Box 5000, Oshweken ON N0A 1M0 519-445-2201 cc. Dawn Russell- dawnrussell@sixnations.ca (consultation) Peter Graham- LRCS@sixnations.ca • HDI- info@hdi.land Haudenosaunee Confederacy c/o- HDI P.O. Box 714 Oshweken, ON N0A 1M0 • Mississaugas of the Credit First Nation- Chief Clara Sault claires@mncfn.ca 2789 Mississauga Rd. Hagersville, ON N0A 1H0 905-768-1133 cc. Abby LaForme abby.laforme@mncfn.ca (consultation) Adam LaForme adam.laforme@mncfn.ca (consultation)	Comment noted

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
		Species at risk	15. It is the responsibility of the proponent to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities cannot avoid impacting protected species and their habitats, then the proponent should contact SAROntario@ontario.ca and an Information Gathering Form will be required.	Comment noted. Given that the proposed expansion is within the Site boundary, no impacts to SAR species habitats are anticipated. Mitigation measures have been included in Section 4.3.2 detailing general best management practices for encountering any wildlife or potential SAR on Site. Should the proposed activities change, an IGF will be completed if required.
		Climate Change	16. Climate change considerations have not been documented in the ESR. The document “Considering Climate Change in the Environmental Assessment Process” (Guide) (www.ontario.ca/page/considering-climate-change-environmental-assessment-process) is now a part of the EA’s program’s Guides of Codes of Practice. The Guide sets out the ministry’s expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes/ The Guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. The proponent should review this Guide in detail. The ministry expects proponents of Waste Regulation projects to: • Consider the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation), as well as resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation). • Include a discrete section in the ESR detailing how climate change was considered in the EA. How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project’s level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.	New section 4.5.1 is added to the ESR addressing GHG emissions and impacts on Carbon Sinks.
		Air Quality	17. It is understood that the proposed expansion is to allow operations to continue at the current approved annual fill rate and waste filling capacity and that there are no proposed changes to these limits as part of this project. The proposed expansion would increase the capacity of the landfill by 219,400 m3 , which would result in a total capacity of 1,264,4651 m3 . Ontario Regulation 232/98 requires the mandatory collection of landfill gas for new or expanding sites with a total waste disposal capacity greater than 1.5 million cubic metres. Given, that the proposed expansion is below this threshold, the mandatory collection of landfill gas is not required. In some cases, air emissions control may still be recommended for smaller sites based on factors such as waste type, site location near a populated area, and operational practices. In this case, the proposed expansion does not include any changes to the waste type currently received at the site (post-diversion solid non-hazardous Industrial, Commercial & Institutional waste) or changes to operational practices. Another important factor is that the site is not located in a populated area and is primarily surrounded by agricultural land uses. It was also noted that there are currently no planned developments around the site. Based on these and other considerations, it was determined that a recommendation for air emissions control was not warranted at this time.	Comment noted.
			18. Section 3.3.1 of the ESR states that the Site-Vicinity Study Area is the area within the vicinity of the Site extending approximately 500 m in all directions. Section 3.3.3.1 states that “there are no residential, institutional, or recreational	Inconsistencies addressed in the ESR. A new sensitive receptors map (Figure 3.10 in the ESR) is included showing the eleven residential properties and the approximate distance of the closest sensitive receptor within the Study Areas.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			lands designated within the Site-Vicinity Study Area". However, in Section 3.3.3.11 it states that "the closest residential dwelling is located approximately 232 m northwest of the Site" and that in the overall Local Study Area (LSA), which is within 1 km of the Site-Vicinity Study Area, there are 11 residential dwellings. Section 3.4.4.1 then states that the closest receptor is approximately 165 m from the Site. Based on these statements, the location of the nearest sensitive receptors/residences is unclear. Please clarify. If available (e.g., as part of the ESDM or Odour Management Plan), please also provide a map of the nearest sensitive receptors.	
			19. In Table 2.1 (Screening Criteria Checklist), it was indicated that the proposed expansion may result in an increase in emissions of greenhouse gases associated with continued operation of the Site. Though carbon monoxide concentrations are briefly discussed in the ESR, a more fulsome discussion of greenhouse gases, their mitigation and climate change are omitted. The expectation is that the ESR should include a section dedicated to the discussion of greenhouse gases and climate change and that this discussion includes an assessment of greenhouse gas emissions, and consideration of the following: • The effect of the project on climate change; • The effects of climate change on the project; and • Various means of identifying and minimizing negative impacts during project implementation. The goal is to ensure that the project has taken into account alternative methods to reduce its greenhouse gas emissions and negative impacts on carbon sinks and that the project has been planned in a manner that takes into account future changes in climate and the impacts a changing climate could have on the project. Please revise accordingly.	New Section 4.5.1 has been added to the ESR addressing GHG emissions and impacts on Carbon Sinks.
			20. It was noted that odour was one of the concerns raised during the public consultation. It is understood that the site has an Odour Management Plan and standard operating procedure to address odour and odour complaints and that the Odour Management Plan will be updated and submitted as part of the ECA process. In Appendix E the 2021 Operations and Monitoring Report indicates that there were two odour complaints documented in 2021. Please confirm the odour complaint history for 2022 and 2023. Please also include any other complaints related to dust and general air quality.	Three complaints were recorded in 2022 in the months of March, April, and October. No complaints were received in 2023.
			21. In Section 1.5, the ESR notes that some level of construction will be required for the expansion, including re-engineering the Site's final contours and modification of the northern perimeter access road and stormwater drainage ditch. Though Section 4.4.3 does state that the potential negative environmental effects during construction related to dust and odour will be mitigated through the use of best management practices, Section 4.5 (Air Quality) should also include a discussion of construction impacts and mitigations. In particular, given that TSP levels at the property boundary are already slightly over the Ambient Air Quality Criteria, a specific dust management plan should be developed for the construction period that includes additional/enhanced measures to mitigate dust impacts. Creating a version of the mended. Please revise the ESR accordingly.	Text has been added to Section 4.5.2 of ESR commenting on construction and Dust Management Plan.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			22. It is understood that the project's air quality and odour assessment was based on a number of supporting documents including the site's existing Emission Summary and Dispersion Modelling (ESDM) Report and Odour Monitoring Program results. Ideally, the air quality assessment documentation in the appendices should include a copy of these reports or sufficient details to support the conclusions made in the body of the ESR. However, the Air Quality and Odour Assessment Report in Appendix D essentially repeats the information provided in the body of the report. Please provide a copy of the site's most recent ESDM and Odour Monitoring Program results to permit a more complete review of the ESR's air quality assessment conclusions.	Copies of the most recent ESDM and Odour Management Plan have been added to the Air Quality and Odour Assessment Report appendices.
		Air Compliance	23. Odour/Odour Management Plan – A revised Odour Management Plan should be provided that incorporates the future configuration and operations at the site and updated sensitive receptors.	A copy of the most recent Odour Management Plan has been added to the Air Quality and Odour Assessment Report appendices
			24. ESDM Report / Reg.419/05 compliance – The ESR document indicates a modelled off-site concentration for Suspended Particulate Matter above the Ministry's 24-hour limit of 120 ug/m3 (at 122.4ug/m^3). The non-compliance should be addressed.	Particulate matter was previously assessed and approved. There have been no changes to the concentrations that were originally approved.
			25. Leachate Treatment System – How will the prolonged operation of the site and the potential for increased leachate generation rates impact the design, operation or effectiveness of the leachate treatment system?	The incorporation of Stage 9 is predicted to increase the peak leachate generation rate from 46 to 49 m^3/day. Post-closure leachate generation rates are estimated at 39 m^3/day. The Leachate Treatment System is designed with a treatment capacity of 200 m^3/day. As such, no impacts to the design, operation, or effectiveness of the leachate treatment system are anticipated due to construction of Stage 9. As with the current approved design, peak leachate generation rates are predicted to exceed the approved daily average of 45 m^3/day for discharge to the roadside ditch. During periods where leachate generation is greater than 45 m^3/day, excess treated effluent will be temporarily stored in effluent discharge holding tanks prior to loading into tanker trucks for hauling off-Site for disposal at an approved facility. Post-closure leachate generation rates are predicted to remain below the average daily roadside ditch discharge limit.
		Noise Quality	26. Screening Report Section 3.5.3.1 / Appendix E Section 3.1.3: How is the concern with tracked vehicle noise being addressed?	Tracked vehicles were evaluated as steady state noise sources in App E report & Feb 2024 ECA AAR update. See Section 3.2.5.
			27. Screening Report Section 3.5.4.2 / Appendix E Section 3.2.2: Please refer to the MECP guideline document "Noise Guidelines for Landfill Sites" dated October 1998 for assessment of noise impact(s) of the offsite haul route.	Per Noise Guidelines for Landfill Sites 1998, "*For a landfilling site employing off-site source vehicles (i.e. vehicles hauling waste or cover material to the site) that constitute a predominant component of the background noise, an access route should be selected which will result in a minimum noise impact. The selection process should be based on a detailed quantitative assessment of noise impact on individual receptors and the number of affected receptors along the alternative routes.*" This EA is for the vertical and horizontal expansion of the landfill capacity and there are no operational changes proposed to the daily or annual tonnage of waste received or routes used by haul trucks. Therefore, off-site haul routes were not evaluated. The landfill guideline is to evaluate potential alternatives during the design phase which is not applicable in this instance.

Date of Comment	Method of Communication	Topic	Comment from MECP	How the Comment was Considered
			28. Screening Report Section 3.5.5.1 / Appendix E Section 3.2.5: • It appears that the numbers of some noise sources (i.e., enclosed leachate aerator, bulldozers) are not the same as those given in the Acoustic Assessment Report submitted in support of the application for ECA No. 7323-C6EJUM. Please clarify. • Will there be cover moving operations outside of the daytime operating hours? • Please note that NPC-300 is the basis for assessment of ancillary noise sources. • It is preferred that the sound emission levels of any existing equipment for which access can be provided be obtained through sound level measurements.	• The only difference is that the ESR noise assessment includes 2 compactors and the new Feb 2024 Acoustic Assessment Report (AAR) has 1. As the ESR report is conservative with the higher number of compactors, no edit is required. • Both the ESR and AAR confirm no cover operations outside daytime operations. • Noted. ESR and AAR document the evaluation of ancillary sources separately against NPC-300. • Noted.
			29. Please comment on any possibility of vacant lot points of reception in the agriculture zones near the facility.	Per previous MECP reviews of the ECA AARs the review of potential vacant lots has been completed and approved by the MECP. Anthony Martella (noise review engineer) confirmed this back in 2021 ECA review. GHD again reviewed the zoning to confirm there is no potential vacant lots that need to be evaluated.
		Final Comments	Thank you for circulating this draft ESR for the ministry's consideration. Please document the provision of the draft Report to the ministry as well as this Project Review Unit Comments letter in the final report, and please provide an accompanying response letter to support our review of the final report. A copy of the final Notice should be sent to the ministry's West Central Region EA notification email account (eanotification.wcregion@ontario.ca).	Comment noted

Comments on Brooks Road Landfill expansion ESR

Table 2 **Comments from MCM on the ESR**

<table>
<tr><th>Date of Comment</th><th>Method of Communication</th><th>ESR Section</th><th>Comment from MCM</th><th>Response</th></tr>
<tr><td rowspan="2">02/05/2024</td><td rowspan="2">Email</td><td>General comments</td><td>The draft ESR should better document the due diligence related to cultural heritage resources, e.g., the screening carried out to identify them, or measures to be taken to avoid or mitigate impacts on them. MCM's letter, dated December 4, 2023, included advice on how to screen the project area for cultural heritage resources. We have the following comments and recommendations:
• We continue to recommend that the EA project be screened using the Ministry's Criteria for Evaluating Archaeological Potential to determine if an archaeological assessment is needed. If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) shall be undertaken by an archaeologist licensed under the Ontario Heritage Act (OHA), who is responsible for submitting the report directly to MCM for review during this planning phase. Any further recommended archaeological assessments (e.g., Stage 2,3,4) should be completed as early as possible during detailed design and prior to any ground disturbing activities.
• The screening checklist, Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, developed by the Ministry of Citizenship and Multiculturalism, was completed as part of the Environmental Screening Report (see Appendix G) determining that the study area has low potential for built heritage resources and cultural heritage landscapes. Therefore, no technical cultural heritage studies have been undertaken.</td><td>The Checklist for evaluating Archaeological Potential is completed and attached as Appendix G1 in the ESR.

The Checklist for evaluating the Potential for Built and Cultural Heritage Resources and Landscapes is completed and attached as Appendix G2 in the ESR</td></tr>
<tr><td>3.7 (Cultural Heritage)
p. 79-80</td><td>
<table>
<tr><th>Original Text</th><th>Proposed Changes</th></tr>
<tr><td>3.7 Cultural Heritage Existing Conditions
3.7.1 Study Area
The Cultural Heritage Study Areas to be discussed in relation to the preparation of this ESR are as follows:
- SSA: Including all lands (i.e., 14.3 ha) within the existing, approved boundaries of the Site
- LSA: Including all lands and waters within a 1 km radius of the SSA boundaries including agricultural, residential, and municipal properties

3.7.2 Methodology
Available secondary sources of information were collected and reviewed to determine Heritage and Culture existing conditions within the LSA. The following sources of secondary information were collected and reviewed:
- Heritage Haldimand Designated Properties Inventory

3.7.3 Existing Conditions
3.7.3.1 Heritage
Following a review of the Heritage Haldimand Designated Properties Inventory it was concluded that there are no heritage properties located within the LSA. The completed "Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes: A Checklist for the Non-Specialist" (See Appendix G) identifies the Site as having no potential for cultural heritage resources. The Brooks Road Landfill Site is</td><td>Please note that the description of existing conditions for the cultural environment should be separate from the description for natural heritage and agriculture as these are different aspects of the environment. We recommend re-organizing and revising section 3.7 in the following manner:
See text to be removed crossed out and to be included underlined.

3.7 Cultural Heritage ~~Existing Conditions~~ Environment
Cultural heritage resources include archaeological resources, built heritage resources and cultural heritage landscapes.

3.7.1 Study Area
The Cultural Heritage Study Areas to be discussed in relation to the preparation of this ESR are as follows:
- SSA: Including all lands (i.e., 14.3 ha) within the existing, approved boundaries of the Site
- LSA: Including all lands and waters within a 1 km radius of the SSA boundaries including agricultural, residential, and municipal properties

3.7.2 Methodology
Available secondary sources of information were collected and reviewed to determine Heritage and Culture existing conditions within the LSA. The following sources of secondary information were collected and reviewed:
- Heritage Haldimand Designated Properties Inventory</td></tr>
</table>
</td><td>Comment noted and proposed changes made to the ESR.</td></tr>
</table>

Date of Comment	Method of Communication	ESR Section	Comment from MCM		Response
			within the Grand River watershed, which is considered to be a Canadian Heritage River watershed and, therefore, the checklist indicates that there is potential for cultural heritage resources on the property. However, given that the entire Site has been disturbed, it can be confirmed that there is no potential for cultural heritage resources on-Site. 3.7.3.2 Cultural In the Study Areas disturbed and actively managed areas of the clay stockpile are classified as areas with cultural heritage potential. The vegetation community of the vegetated portion of the clay stockpile is comprised of low growing pigweed (Chenopodium album), white sweet clover (Melilotus Alba), bird's foot trefoil (Lotus corniculatus), and Queen Anne's lace (Daucus carota), many of which are non-native. Somme remnant woody debris and stumps are present at the toe of the stockpile on Site property. 3.7.3.3 Agricultural The entire Site has been subjected to recent, extensive and intensive disturbance and it is therefore considered that the Site does not have any archaeological potential. While there may be areas within the LSA that have archaeological potential, as these areas will not be disturbed by the proposed expansion, it was concluded that an assessment of the archaeological potential within the LSA was not necessary. The completed "Criteria for Evaluating Archaeological Potential: A Checklist for the Non-Specialist" confirms the site does not possess archaeological potential. See Appendix G for Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes form.	3.7.3 Existing Conditions ~~3.7.3.2 Cultural~~ ~~In the Study Areas disturbed and actively managed areas of the clay stockpile are classified as areas with cultural heritage potential. The vegetation community of the vegetated portion of the clay stockpile is comprised of low growing pigweed (Chenopodium album), white sweet clover (Melilotus Alba), bird's foot trefoil (Lotus corniculatus), and Queen Anne's lace (Daucus carota), many of which are non-native. Somme remnant woody debris and stumps are present at the toe of the stockpile on Site property.~~ 3.7.3.1.~~3~~ Archaeological Resources ~~Agricultural~~ ~~The entire Site has been subjected to recent, extensive and intensive disturbance and it is therefore considered that the Site does not have any archaeological potential. While there may be areas within the LSA that have archaeological potential, as these areas will not be disturbed by the proposed expansion, it was concluded that an assessment of the archaeological potential within the LSA was not necessary. The completed "Criteria for Evaluating Archaeological Potential: A Checklist for the Non-Specialist" confirms the site does not possess archaeological potential.~~ ~~See Appendix G for Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes form.~~ [The suggested text below is if the checklist indicates that there is low potential for archaeological resources] The screening checklist, Criteria for Evaluating Archaeological Potential, developed by the Ministry of Citizenship and Multiculturalism, was completed as part of the Environmental Screening Report (see Appendix X) determining that archaeological potential within the study area is low and therefore archaeological assessment was not undertaken. [The text below would apply if the checklist indicates that the study area has archaeological potential] A Stage 1 archaeological assessment (AA) (under Project Information Form number XX) was undertaken on [Date] by [Consultant] in support of this project. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g., Stage 2, 3, and 4) as necessary. The Stage 1 AA has been entered into the Ontario Public Register of Archaeological Reports. The Stage 1 AA is included in Appendix X. [Please include the Stage 1 and MCM letter indicating that the report has been entered into the Register. Then include the outcomes and	

Date of Comment	Method of Communication	ESR Section	Comment from MCM		Response
				recommendations of the report, as is in the Executive Summary – just copy and paste, don't summarize.] 3.7.3.2. ~~1~~ Built Heritage Resources and Cultural Heritage Landscapes Following a review of the Heritage Haldimand Designated Properties Inventory it was concluded that there are no heritage properties located within the LSA. The completed "Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes: A Checklist for the Non-Specialist" (See Appendix G) was completed and identifies the Site ~~as having~~ ~~no potential for cultural heritage resources. The Brooks Road Landfill Site~~ is within the Grand River watershed, which ~~is considered to be~~ a designated Canadian Heritage River watershed. ~~and, therefore, the checklist indicates that there is potential for cultural heritage resources on the property~~ However, [Please explain whether there could be any known heritage attributes that could be impacted] ~~given that the entire Site has been disturbed, it can be confirmed that there is no potential for cultural heritage resources on Site.~~ [MCM may have additional advice once it has reviewed the final ESR.]	
		4.9 (Cultural Heritage - Potential Environmental Effects, Mitigation Measures, and Net Environmental Effects) p. 109	**Original Text** There are no known heritage buildings, structures or sites, archaeological sites or areas of archaeological importance, or cultural heritage landscapes on the Site, which was confirmed through completion of the Vertical Capacity Expansion EA via the Ministry of Heritage, Sports, Tourism, and Culture Industries (MHSTCI) checklists: the Criteria for Evaluating Archaeological Potential; and the Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes. If there are areas within the LSA that may have heritage, cultural archaeological potential, these areas will not be disturbed by the proposed expansion.	**Proposed Changes** We recommend removing this section in its entirety and replacing it with the following mitigation measures addressing impacts to the cultural environment: - Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*. - The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that *Act* related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*. [MCM may have additional advice once it has reviewed the final ESR.]	Comment noted and proposed changes made to the ESR.

Date of Comment	Method of Communication	ESR Section	Comment from MCM	Response
		4.11 (Summary of Net Environmental Effects) Table 4.5 p. 111	**Original Text** Environment Component - Cultural Heritage Summary of Predicted Net Environmental Effects - There are no known heritage buildings, structures or sites, archaeological sites or areas of archaeological importance, or cultural heritage landscapes on the Site; therefore, no net negative effects in terms of Cultural Heritage are expected from the proposed expansion. **Proposed Changes** We recommend removing this table row in its entirety and replacing it with the following text for consistency with ESR section 3.7: Environment Component - Cultural Heritage Summary of Predicted Net Environmental Effects [The suggested text below is if the checklist indicates that there is low potential for archaeological resources] - The screening checklist, Criteria for Evaluating Archaeological Potential, developed by the Ministry of Citizenship and Multiculturalism, was completed as part of the Environmental Screening Report (see Appendix X) determining that archaeological potential within the study area is low and therefore archaeological assessment was not undertaken. [The text below would apply if the checklist indicates that the study area has archaeological potential] - A Stage 1 archaeological assessment (AA) (under Project Information Form number XX) was undertaken on [Date] by [Consultant] in support of this project. The Stage 1 AA has been entered into the Ontario Public Register of Archaeological Reports recommending [Insert whether further AA is recommended (e.g., Stage 2,3,4). The Stage 1 AA is included in Appendix X. [Please include the Stage 1 and MCM letter indicating that the report has been entered into the Register. Then include the outcomes and recommendations of the report, as is in the Executive Summary – just copy and paste, don't summarize.] - The screening checklist, Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, developed by the Ministry of Citizenship and Multiculturalism, was completed as part of the Environmental Screening Report (see Appendix X) determining that the study area has low potential for built heritage resources and cultural heritage landscapes. Therefore, no technical cultural heritage studies have been undertaken. [MCM may have additional advice once it has reviewed the final ESR.]	Comment noted and proposed changes made to the ESR.

Comments on Brooks Road Landfill expansion ESR

Table 3 **Comments from GRCA on the ESR**

Date of Comment	Method of Communication	ESR Section	Comment from GRCA	Response
02/13/2024	Email	General comments	Due to the length of time since wetland boundaries were last confirmed (nearly 10 years ago), a reconfirmation of these boundaries with GRCA staff should be completed for wetlands within our jurisdiction. • Please contact GRCA with a preferred date for wetland confirmation in the growing season. Boundaries should be pre-flagged by a qualified professional prior to GRCA's arrival on-site. Clear demonstration that the proposed expansion will not have long-term hydrologic impacts on the water balance of adjacent wetlands compared to existing (pre-expansion) conditions should be provided. The assessment should be scoped to the sensitivity of the wetland features present, and the scale of the proposed expansion's potential impact on the wetlands' hydrology. Additionally, potential temporary impacts of site grading, construction and dewatering activities on groundwater and surface flow towards the adjacent wetlands should be assessed, with mitigation measures proposed as needed. In light of this outstanding information, we would request that an environmental impact study (EIS) be completed as part of the Class EA process to clearly address potential wetland impacts. Terms of Reference should be submitted to our office for confirmation prior to work being undertaken.	An EIS will be completed prior to applying for GRCA permit (including consultation with the GRCA and preparation of a Terms of Reference). Long-term effects to water levels within the wetlands to the north are not expected given that the cell construction period will be temporary and groundwater discharge to the cell during the construction phase will be minor. Based on the relatively low hydraulic conductivity of the natural soils and associated slow groundwater flow velocity, it is not anticipated that significant effects to groundwater levels in the vicinity of the wetlands will be observed during the cell excavation/construction period. All non-contact stormwater and run-off on the site currently discharges to the on-site stormwater management pond. This water management practice will not change under the scenario of cell construction. Accordingly, it is not expected that changes to site grading will affect run-off or stormwater contributions to the wetland to the north.

Comments on Brooks Road Landfill expansion ESR

Table 4 Public comments on the ESR

Comment #	Date of Comment	Method of communication	Topic	Public comment	Response
1	01/29/2024	Letter	Paving the on-site road	In the Ministry Review of 2017 the BRE landfill site vertical capacity expansion assessment, BRE stated “omission of commitment to pave the future on-site road from table 7.4 was an oversight on our part. BRE is committed to paving the on-site road as part of the site design for the vertical expansion. This was considered as a mitigation measure through design, as noted in table 5.16, and is essential to ensuring on-site operations remain in compliance with ministry standards.” My question, has the on-site road been paved?	Road is scheduled for paving in 2024.
2			Water run-off/collection	In the spring of 2023, after very heavy rains, I observed from the air, what appeared to be water run-off from the waste site on the northeast face into neighbouring land. This was mentioned at the June PLC meeting, and I requested a site visit to see the method of water collection. It took until October to get the site visit, which was interesting. However, Diane and I were kept so far away from the northeast corner (approximately 250 meters) as to be useless to see what I had requested. I have no proof that the contouring and ditches were inadequate. However, during the visit there was machinery working on the face and perimeter. In November, further observation showed large perimeter ditches and contouring to handle water run-off. I am convinced the work was accomplished because of my inquiries.	Comment Recorded
3			Method of calculating tonnes to cubic meters	In the environmental assessment of 2017, a Rick Li from MOECC questioned the method of calculating tonnes to cubic meters. BRE uses 1 tonne to a cubic meter. Rick Li stated it is normally 0.7 tonnes to a cubic meter. Anything less than 1 tonne per cubic meter would trigger a mandatory landfill gas collection system at BRE. It would financially be in BRE’s interest to not need a gas collection system. Who does the calculations? Does the MOECP do any oversite on this?	Waste density varies by type of waste and compaction efforts. Waste densities are calculated annually based on weigh scale records and air space usage, based on topographic surveys. The density estimate is included in annual reports submitted to the MECP. The average waste density between 2018 and 2022 was 1.956 tonnes per cubic metre. With that said, the threshold for a mandatory landfill gas collection system is a total waste disposal volume of 1.5 million cubic metres. The total Site waste volume is based on the approved base grades (top of granular drainage blanket) and final contours (top of waste). Including Stage 9, the total Site waste volume (1,264,465 cubic metres or 1.26 million cubic metres) remains below the 1.5 million cubic metre threshold. Additionally, and based on the type of waste accepted at the Site, Section 15(3) of Ontario Regulation 232/98 generally exempts sites from requiring a landfill gas collection system where it can be demonstrated that “the nature and quantity of landfill gas generated at the site is not likely to be of significant concern”. Appendix H of the Design and Operations Report Rev. 2 provides an evaluation of the landfill gas generated at the Site and demonstrates that a landfill gas collection system is not feasible for the Site, based on low landfill gas generation rates.

Comment #	Date of Comment	Method of communication	Topic	Public comment	Response
4			Waste diversion protocol	Waste Diversion- In the environmental assessment of 2017 the ministry was not satisfied with the response from BRE. BRE was to develop a waste diversion protocol which provides information on the ways that BRE will work with waste generators to provide at source diversion. Was a waste diversion protocol made? If so, what is it?	Yes, a Waste Diversion Protocol was prepared and is included in the Design and Operations Plan (Waste Screening and Acceptance). Based on the waste material accepted, limited recyclable materials are encountered. BRE maintains a portion of the Site for collection and temporary staging of segregated recyclable materials.
5			Gas emissions	In the draft BRE environmental screening document under the yes and no criterion there a yes to every gas emission question. How can anyone approve the expansion? Who would be responsible if it turns out like the Stony Creek expansion?	The screening criteria is used to determine if that criterion is to be assessed as part of the EA. The assessment of potential effects, proposed mitigation and resultant net effects related to gas emissions are documented in Section 4.5. The proponent, Brooks Road Environmental, is responsible for implementing the undertaking as outlined in the ESR, including implementing identified mitigation and monitoring measures.
6			Risks to aviation	In the draft BRE environmental screening document it mentions airports. It states, “A private airfield used for soaring is located approximately 7.5 km north of the site”. The distance is accurate, but the rest is not. The airport name “Grand River Executive Airport”. There are approximately 20 aircraft parked there. There is a flight training school and an aircraft maintenance base. There is a private airport 1.2 km south of the dump site and a sky diving airport approximately 2.5 km east of the site. Any organic waste will bring birds. This is a hazard to aviation.	According to the ECA, the landfill is permitted to receive only solid non-hazardous ICI waste, including contaminated soils, and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant). Since the landfill does not accept municipal organics, it significantly reduces birds on site. Daily landfilling activities (e.g., noise, human presence, heavy machinery) as well as operational practices (i.e., daily cover) provide deterrents for use of the Site by birds.
7			Gates, daily cover, fencing	Over the years I and neighbours have caught BRE not putting on daily cover. We have pictures. It was reported to the MOE at the time. We do not inspect every day and I’m sure this was a common occurrence. Gates were left open when nobody was at the site, contrary to the ECA. We have pictures. There was inadequate fencing for many years. It was not up to the ECA standard. This was reported to the MOE. It took a long time but was finally fixed.	Comment Recorded
8			Expansion on north rail line	Why is there a screening process for expansion of landfill on the North rail line. I attended a notice of public meeting, June 17, 2014. The meeting was to rezone a portion of the north rail line into the waste disposal area. It was assured by the proponent that no land filling on the added lands would occur, and no change to the existing waste footprint would take place. I have documentation if necessary. The rail line was to be used for a buffer zone. This was also mentioned again in a capacity expansion environmental assessment of July 2017.	The assurances made at the time of the zoning change are correct. Landfilling of waste is designated for the existing waste site and within the original property boundary. Waste placement will not occur on the rail land property. The rail lands continue to be used as a buffer zone.
9			Genera comments against expansion	BRE is a company that will say something to get what they want, but not follow through. Can we believe what they say? BRE have not followed the ECA and the MOECP does very little oversight. The environmental screening should not be granted because they have shown they cannot manage what they already have according to government guidelines. I would be interested in the name of the person who decides to grant or reject the application.	Comment Recorded. The Brooks Road Landfill Expansion project is undergoing an Environmental Screening Process, which is a proponent-driven, self-assessment process, and does not require approval by the Ministry. However, as required, BRE has consulted with affected government agencies including the MECP regional office. The Ministry has provided comments on the Draft ESR, which are being addressed. Our Regional office MECP contact is: Joan Del Villar Cuicas Environmental Resource Planner & EA Coordinator

Comment #	Date of Comment	Method of communication	Topic	Public comment	Response
					joan.delvillarcuicas@ontario.ca
10	02/01/2024	Letter (maybe email)	General protest and comments against expansion	This is a protest from Haldimand County Residents against the Brooks Road Landfill Capacity Expansion. Presently the Brooks Landfill is at 100,000 cubic metres and they want to increase it to 219,400 cubic metres. The information that received at the on going PLC meetings that the dump should have been filled to capacity roughly by the past June or end of this year.	Comment Recorded
11	02/08/2024	Letter	General comments against expansion	I have lived on Concession 1 with my family for the past 45 years. Since 2016, I have been faithfully going to meetings to try and understand the proposed expansion of the Brooks Road Landfill and its impacts, to no avail. The information provided to date has been inadequate to fully understand and comment on the impacts of the expansion of the landfill. Because of this and concerns I have about BRE's ability to comply with existing requirements, I am against this expansion for the Brooks Road Landfill. While BRE has undertaken "consultation" the quality of the information provided is not sufficient to understand the impacts from the expansion and proposed mitigations. Their history of non-compliance and lack of consideration for social impacts means I do not have confidence the expansion won't negatively impact the environment and the local community. I do not support the expansion of the landfill site.	Comment Recorded
12			Financial impacts to the area	BRE has suggested the expansion to the landfill will provide positive financial impacts to the area. The following statement was in the request for the vertical expansion... "BRE also considered employment opportunities provided by the continued operation of the Brooks Road Landfill Site." Is the Brooks Road Landfill employing Haldimand County residents and if so how many?? How many out of county people are employed? What economic development is Haldimand County receiving from the landfill? How are we (the residents of Haldimand County) going to benefit financially? This idea was also questioned by our former CEO Don Boyle, in the fall of 2016 and the question that still remains is why are we allowing the Brooks Road Landfill to keep growing when Haldimand County closing down live landfill sites and not receiving any major benefit, other than some donations to the food bank. Why is there no broader community benefits sharing approach, or proximity payments to neighbours of the site who have to deal with all the impacts?	BRE employs a combination of people who reside within the boundary of Haldimand County and adjacent municipalities. BRE provides a positive economic impact by: • accepting waste material from Haldimand's Operation department; • Payments associated with hauling treated effluent to Haldimand's waste water treatment plant; • Sourcing fuel, potable water, equipment, materials, and many on-going services to companies located in Haldimand County and the adjacent areas; • Donating clay material to assist 6 Nations with the material needed for final cover installation to allow their landfill to meet closure requirements. BRE would be willing to restart a program that would provide to support to the broad community programs such as the food bank or community related projects that benefit the entire community. BRE would be pleased to support local sports teams through jerseys, sponsoring which provides wide benefits to the whole community .
13			Leachate	Leachate – The last leachate volume we were provided was October 2023 which was 192.5 metres (leachate elevation) and that 1,936,000 litres of leachate had been trucked out in October.	Leachate or contact water is contained within the landfill cell footprint and is either hauled out of the landfill by truck (and discharged at an approved wastewater treatment plant receiver) or treated in the on-site leachate treatment system. The Site is graded to convey clean stormwater away from active landfilling areas to reduce leachate generation.

Comment #	Date of Comment	Method of communication	Topic	Public comment	Response
				How is BRE managing additional run-off and ensuring ground water is not contaminated. There was no information provided on how environmental changes and an increase in abnormal weather events, including heavy rainfalls and flooding will affect measures in place to stop contamination. Is the runoff being contained to the outer ditch or did it flood into nearby areas, ditches and streams like flooding everywhere else in the County?	Clean stormwater is conveyed to on-Site internal perimeter ditching that directs collected stormwater to the existing stormwater management (SWM) pond. Site grading, ditching, and the SWM pond have been designed to manage storms up to and including the 100-year storm, noting that the stormwater management pond performance allows sufficient capacity for multiple storm events. Modelling of the 100-year storm event indicates that approximately 0.44 metres of vertical capacity will remain in the SWM pond prior to overflow conditions occurring.
14			Draft summary of the ESR is long and technical	The Draft Environment Screening document is 2617 pages. The "summary" presentation provided contains very little information and suggests the expansion of the landfill site will have no impacts on anything. How does BRE expect the general public to read and interpret 2617 pages of technical information and why hasn't the information been provided in a simplified format which actually contains information people require to make an informed submission?	The Environmental Screening Report itself is a 120-page document that provides a summary of technical studies undertaken for the project. The appendices include technical reports to support the results and findings of the studies. BRE conducted two Public Open Houses to provide information regarding the project in a simplified format including display boards with figures and key points.
15			Advantages of the expansion unclear	Page 127 Summary and Conclusion Environmental Screening Report says, "It was concluded that minor environmental impacts are expected....As a result the advantages of the project outweigh the disadvantages". I am still unclear as to what the advantages of the expansion are. And have the social impacts of the expansion been considered as part of that conversation.	The advantage of the Project is that it will provide BRE with an opportunity to respond to the growing demands from existing customers (waste generators) who need a safe and reliable waste management facility for their residual material for approximately two additional years.
16			Methane gas emissions	Methane Gas Emissions – The monitoring network comprises six nested gas probes installed in three on-site locations (two gas probes per nest) additional pair of gas probes will be installed adjacent to the leachate treatment facility following commissioning. Landfill gas monitoring activities are to be conducted monthly from December 1 to April 30 and on a quarterly basis from May through November. This is "IN Progress". In response to initial comments on the expansion BRE noted, " based on the GHG modeling that has been conducted, the low level of methane generation at the Brooks Road Landfill and the negative energy and economic factors associated with a gas collection and control system, it has been demonstrated that the operation of a landfill gas collection system is not feasible." They note this will be revisited in future if it becomes a problem. I take this to mean, we don't want to spend money on management measures to reduce methane gas emissions. If the landfill will make more money through expansion and intends to take in more refuse which will produce more methane gas, a gas collection and control system should be required, and the cost to implement should not be a relevant consideration for an environmental impact assessment.	Inclusion of Stage 9 will increase the capacity of the landfill by 219,400 cubic metres, which will result in a total capacity of 1,264,465 cubic metres (or 1.26 million cubic metres). As noted in the response to Comment #3, Ontario Regulation 232/98 requires the mandatory collection of landfill gas for new or expanding sites with a total waste disposal capacity greater than 1.5 million cubic metres. Given, that the inclusion of Stage 9 remains below this threshold, the mandatory collection of landfill gas is not required. Additionally, based on the type of waste accepted at the Site and as demonstrated in Appendix H of the Design and Operations Report Rev. 2, a landfill gas collection system is not feasible for the Site. The Site is exempt from requiring a landfill gas collection system in accordance with Section 15(3) of Ontario Regulation 232/98 as it has been demonstrated that "the nature and quantity of landfill gas generated at the site is not likely to be of significant concern". There are 12 landfill gas probes installed at five locations around the landfill cell that are monitored, as required in the ECA. The landfill gas probes are intended to monitor for subsurface migration of landfill gas outside the landfill footprint (i.e., prior to Site boundary and near buildings/structures).
17			Transparency regarding current and future plans for the site	In 2016 when the application for the vertical expansion was being reviewed..."Since the landfill will be expanded vertically and there will be no change to the footprint of the landfill area or vegetation removal, no impacts to vegetation communities and the North Cayuga Swamp Wetland Complex are anticipated. There are also no anticipated impact to aquatic ecosystems as leachate and stormwater runoff will be contained and treated within the landfill Site prior to discharge to the natural environment." BRE received approval for the vertical expansion and now BRE is asking for a footprint increase? One of my	BRE intends to continue serving its existing customer base and is responding to the economic opportunity of providing waste management services to address the continued and growing demand from local and regional customers that require a facility that is permitted to manage the residual materials they generate. With this in mind, BRE reviewed the potential to expand this site further based on: – The current post-diversion solid, non-hazardous industrial residual material generated in Ontario, requiring a local, safe, and secure disposal facility

Comment #	Date of Comment	Method of communication	Topic	Public comment	Response
				comments in 2016 was “when will this (expansions to Brooks Road Landfill) stop? Will it ever? Once BRE gets approval they begin plans for another expansion. Expansion after expansion and all we hear is there won’t be impacts, current mitigation measures are enough. How can that be true? And why has the company not been transparent with the community about current and future plans for the site?	– Future post-diversion solid, non-hazardous industrial residual material generated in Ontario, requiring a local, safe, and secure disposal facility – Development and analysis of potential long-term disposal capacity options that BRE could implement in order to continue providing waste management disposal services to their current businesses and customers. Extending the life of the Site will provide BRE with increased flexibility in terms of how best to serve its existing waste clients while remaining competitive within the marketplace. The scarcity of licensed approved disposal sites makes Brooks Road landfill an essential service to the community and region at large and by providing proximity to various construction sites, it reduces the carbon transportation footprint by reducing transportation distances thereby reducing GHGs.
18			Site design	Site design and operations 5.0 in the Annual Compliance report for 2022-2023 – Vegetating by planting trees or shrubs on top of the berm along the western property as required will minimize visual and noise impacts...it says “Compliance Achieved”. All the vegetation on the west berm by the Brooks Road is weeds, so you can see the landfill from the road because of the vertical expansion and also from highway 3 and neighbouring residents. Visual impact continues to remain an issue and will have more of an impact once the vertical footprint increases. Minimal planting of ground cover is not an effective mitigation to visual impact and noise.	The landfill is screened along the western property boundary by a vegetated screening berm constructed to an elevation of approximately 203 to 204 metres above mean sea level (m AMSL), approximately 5 to 6 m higher than the Brooks Road approximate elevation of 198 m AMSL. A fence with a privacy screen has been installed on top of the western screening berm, increasing the visual barrier to an elevation of approximately 205 to 206 m AMSL (almost 8 m higher than Brooks Road).
19			Expansion on north rail line	The former CSR rail bed (4.7 acres), which BRE was given to be used for clean spoil stockpiling, also to form a hydrological divide between the landfill and the wetland complex to the north. Permanent erosion and sediment control measures such as heavy duty silt fencing and a vegetative buffer are in place at the north toe of the clay stockpile slope. The CSR corridor will remain as a buffer between the landfill Site and the wetland complex. This expansion will change the buffer zone and there will be less space for the clean spoil. Is this expansion on the 4.7 acres? My understanding is that is not the intended land use for that area.land!!	Landfilling is designated for the existing waste site and within the original property boundary. Waste placement will not occur on the rail land property. The rail lands continue to be used as a buffer zone, and will continue to be used for stockpiling of clean soil during construction, filling, and closure activities at the Site.
20			Paving the on-site road	A potential condition of approval for the vertical expansion was the commitment to pave the future on-Site road, as mentioned by the ministry's Air Quality Analyst; therefore road paving is imperative in conjunction with other mitigation strategies for controlling fugitive dust emissions from the landfill operations. Omission of the commitment to pave the future on-Site road was an oversight on the part of BRE, as BRE is committed to paving the on-Site road as part of the Site design for the vertical expansion. This was considered as a mitigation measure through design and is essential to ensuring on-Site operations remain in compliance with Ministry standards. This still has not been done. If BRE can not comply with this simply request, how can we be confident they will manage their other environmental mitigation obligations.	Road is scheduled for paving in 2024.

Comment #	Date of Comment	Method of communication	Topic	Public comment	Response
21			Traffic and road maintenance	When passing by the Landfill the week of January 29th Brooks Road was extremely muddy with large clumps of mud from the Landfill right out to highway 3. Also the Brooks road is damaged with lots of potholes due to all the heavy truck traffic. Trucks don't always use the approved haulage route. The summary report noted there would be no impacts from traffic as truck traffic wasn't set to increase. I'm curious to understand the methodology used to assess this. Was it only a desktop assessment with tonnage figures and approved haulage routes. Or did the subject matter expert, actually come out to site for a several days and count trucks and look at the actual route they take? How is BRE contributing to the upkeep and maintenance of the roads its trucks damage.	The state of Brooks Road with respect to potholes is a Township issue and should be dealt with by the Township when they review their road network and decide which roads need improvements. As Brooks Road is used by trucks to access the BRE landfill, it should be designated as a truck route and should therefore include a pavement structure that can accommodate heavy truck traffic. Truck traffic is not set to increase because there is no change to the annual fill rate limits with the proposed expansion. The project is proposing to increase the capacity of the landfill to be operational for approximately two additional years. GHD completed one weekday and one Saturday count at the site driveway and at Hwy 3 to get the a.m., mid-day, and p.m. peak hour turning movement counts and observed what routes the vehicles took. At the time of the count, there was actually had more traffic to/from the site than usual due to some transfer of clean clay to another property which resulted in an additional 75 loads throughout both days. BRE is not required to maintain Brooks Road, this is the responsibility of the Township of Cayuga.
22	February 1, 2024	Email	Site Operations	We have lived on the McFarlane Rd. for 48 years on a piece of property where we have planted pine and walnut trees that have matured into a little park. We have a little running stream, lots of wild life and before the dump fresh odourless air to breath. Now we breathe methane gas air. Methane gas is hazardous to our health and well being. It causes cancer, heart and lung disease. I note the summary from the Environmental Screening Report indicated the expansion will have no impact on recreational activities, however on warm windy days, I can no longer enjoy sitting outside by the pool because of the smell which travels from the facility. While the report suggests all environmental impacts are negligible because mitigation and management measures are currently in place, I raise serious concerns about the proponents compliance with said management measures. The proponent is not overseeing the dump with the regulations they promised to implement. Secure fencing was only put in place after the community requested it for safety reasons, despite being a requirement to stop wildlife from entering the site.	Comment noted.
23			Odour	The report indicates "best practice" odour management will be implemented. There is no detail on what this means. The existing site currently emits a foul odour of methane gas. It occurs even when there is no wind, damp, and foggy. It travels south and sits in the gully. What "best practice" measures have been put in place to mitigate odour, what additional mitigations will be put in place from the expansion and what improvements have been made in odour control?	The Odour Best Management Practices are detailed in the Odour Management Plan Report found in Appendix D of the ESR.
24			Site Operations/Groundwater	I also have concerns regarding the impacts to surface water, groundwater and hydrogeology. The summary noted existed mitigations are sufficient, but that a large aquifer also exists below the site. The proponent has not done a sufficient job communicating how it	According to the ECA, the landfill is permitted to receive only solid non-hazardous ICI waste, including contaminated soils, and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant).

Comment #	Date of Comment	Method of communication	Topic	Public comment	Response
				treats leachate. The summary report notes a larger area will now flow into the treatment pond and additional planting will be used to support existing surface water conditions. There has also been no information provided on the type of waste the facility is taking and potential health risks - for example, is there potential for the waste to contain PFAS or PFOA particulates? And are the existing management measures sufficient to stop this leeching into groundwater supplies?	The MECP has set standards for landfill liners and collection and treatment of leachate. Leachate or contact water is contained within the landfill cell footprint and is either hauled out of the landfill by truck (and discharged at an approved wastewater treatment plant receiver) or treated in the on-site leachate treatment system. BRE is required to meet groundwater quality standards for the entire site at the site property boundary.
25			Site Operations	BRE also has a history of non-Compliance regarding leachate levels. MECP issued an order for the company to remove leachate level is at or below 196.75 metres. The order was meant to be rectified by March 12, 2020 and is now past due. The residents surrounding the dump should not have to monitor the actions of the BRE.	Comment noted.
26			Site Operations	The proponent has also failed to put the daily cover on which was a commitment made to the community. This resulted in garbage blowing to the north side of the fence and affects our visual amenity of the area.	Comment noted.
27			Site Operations	There have also been instances where the proponent has impacted private property while carrying out works on the site with no rectification undertaken until the landowner raised the issue, this included bulldozing landfill into a farmer's field. Is this the approach taken toward environmental management?	Landfilling of waste is restricted to the existing waste site and within the original property boundary. The rail lands to the north are currently used for stockpiling of clean soil during construction, filling, and closure activities at the Site.
28			Paving the on-site road	2017 Ministry of BRE Landfill site Vertical Environment Assessment the dump promised to pave the inside of the dump entry. We visited the dump in October 23, 2023 and it has not been paved. Another example that proponent does not carry out management measures as promised.	Road is scheduled for paving in 2024.
29			Site Operations	We also have concerns about the general conditions of the site where critical infrastructure is not maintained to appropriate standards, thus increasing the likelihood of an incident. The Leachate Digester has an outlet pipe which is held up by bracing with 5 gallon plastic pails 5, which exits into an underground tank. When we went to look take a closer look, we were told to get back as the smell would be dangerous. The Febreze mister pipe was being held up by sticks, that a strong wind storm would blow down. The febreze is just one more chemical smell to cover up the methane.	Comment noted.
30			Site Operations/Leachate	With the amount of rain we have had this year the pump would be running 24-7 in order to keep up, not just 5 days a week. This again contributes to concerns I have about how overflow of the treatment pond will be managed, especially as climate change means more frequent adverse whether events including heavy rainfall and flooding.	Leachate or contact water is contained within the landfill cell footprint and is either hauled out of the landfill by truck (and discharged at an approved wastewater treatment plant receiver) or treated in the on-site leachate treatment system. The Site is graded to convey clean stormwater away from active landfilling areas to reduce leachate generation. Clean stormwater is conveyed to on-Site internal perimeter ditching that directs collected stormwater to the existing stormwater management (SWM) pond. Site grading, ditching, and the SWM pond have been designed to manage storms up to and including the 100-year storm, noting that the stormwater management pond performance allows sufficient capacity for multiple storm events. Modelling

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					of the 100-year storm event indicates that approximately 0.44 metres of vertical capacity will remain in the SWM pond prior to overflow conditions occurring.
31			Site Operations	Where they test the level of the leachate at the pipe it was all over grown with grass at least 2 ½ feet high. Another example of basic maintenance not being undertaken around the site.	Comment noted.
32			Transparency	During a scheduled tour, we asked to visit the northeast corner of the of the dump to see if they had the proper ditching. We were told we were unable to visit that section of the site for safety reasons and the tour abruptly ended. This again raises concerns that BRE are not being transparent with the community.	Comment noted.
33			Reporting	BRE says the water they are putting into the ditch is safe and not contaminated, but there is no ongoing communication to residents about monthly reporting figures, any incidents or issues.	Operations and Monitoring Reports are available to view on BRE website (**Documents | br-environmental (brenvironmental.com)**)
34				The Stoney Creek dump is presently having trouble with environment due to foul smells of methane. The Hamilton Wentworth District School Board has complained from families for health issues from their children. I spoke to one of the parents that go to the school and she was just livid. Similar to BRE, they are looking to expand this dump as well. The Tom Howe dump in Hagersville was closed in 2015 but still gives off toxic gas from it's pipes or stacks.	Comment noted.
35			Traffic and road maintenance	The number of heavy vehicles which travel to and from the dump, have also damaged the local road. While trucks are not mean to access or exit the site via McFarlane Road, they do on numerous occasions. The road is not built to support the weight of large trucks and their constant use has led to deterioration of the road. How does the dump plan to manage the transport impacts? The report says there are no transport impacts. How is this possible?	The state of Brooks Road with respect to potholes is a Township issue and should be dealt with by the Township when they review their road network and decide which roads need improvements. As Brooks Road is used by trucks to access the BRE landfill, it should be designated as a truck route and should therefore include a pavement structure that can accommodate heavy truck traffic. Truck traffic is not set to increase because there is no change to the annual fill rate limits with the proposed expansion. The project is proposing to increase the capacity of the landfill to be operational for approximately two additional years. GHD completed one weekday and one Saturday count at the site driveway and at Hwy 3 to get the a.m., mid-day, and p.m. peak hour turning movement counts and observed what routes the vehicles took. At the time of the count, there was actually had more traffic to/from the site than usual due to some transfer of clean clay to another property which resulted in an additional 75 loads throughout both days. BRE is not required to maintain Brooks Road, this is the responsibility of the Township of Cayuga.
36			Social Benefits	The social impact of the dump is probably one of the greatest concerns. Nearby residents have to put up with the smell, change their plans or activities based on how strong the smell is on a given day and waste time ensuring compliance. The summary report notes the dump contributes to the local economy through jobs. How many jobs? And what about benefits to nearby residents? Across the world, projects are acknowledging that communities most impacted by these types of activities should also benefit from their presence.	BRE employs a combination of people who reside within the boundary of Haldimand County and adjacent municipalities. BRE provides a positive economic impact by: • accepting waste material from Haldimand's Operation department; • Payments associated with hauling treated effluent to Haldimand's waste water treatment plant;

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					• Sourcing fuel, potable water, equipment, materials, and many on-going services to companies located in Haldimand County and the adjacent areas; • Donating clay material to assist 6 Nations with the material needed for final cover installation to allow their landfill to meet closure requirements. BRE would be willing to restart a program that would provide to support to the broad community programs such as the food bank or community related projects that benefit the entire community. BRE would be pleased to support local sports teams through jerseys, sponsoring which provides wide benefits to the whole community .
37			Social Benefits	There is another dump that two reserves split Oneida Nations and Chippewas on the Thames are both compensated through a community benefit agreement. They split 4 percent of the gross revenue and $4 per tonne from the landfill. The two communities split $1,000,000 a year from the people who owns the dump. What community benefit program are they proposing for the residents nearby to mitigate the long-term impacts from the dump?	BRE employs a combination of people who reside within the boundary of Haldimand County and adjacent municipalities. BRE provides a positive economic impact by: • accepting waste material from Haldimand's Operation department; • Payments associated with hauling treated effluent to Haldimand's waste water treatment plant; • Sourcing fuel, potable water, equipment, materials, and many on-going services to companies located in Haldimand County and the adjacent areas; • Donating clay material to assist 6 Nations with the material needed for final cover installation to allow their landfill to meet closure requirements. BRE would be willing to restart a program that would provide to support to the broad community programs such as the food bank or community related projects that benefit the entire community. BRE would be pleased to support local sports teams through jerseys, sponsoring which provides wide benefits to the whole community .
38			Northern Rail Road	The property along the north railway line is being used right now as a buffer zone and a place to store the clay to put on the existing landfill for a daily cover. Where will the buffer zone be? In 2014 Dave Bruce went to a council meeting June 17,2014 where the BRE wanted to amend the Designation of the official plan and zoning by-law 1H86 of the subject property to facilitate the extension of the northern rail line to act as an additional buffer zone and temporary storage of clean clay relocation of groundwater monitoring wells. It has been assured by the proponent that there will be no land filling on the added lands and no change to existing waste footprint of the land site will take place. The BRE want the extension of the rail line to expand	The assurances made at the time of the zoning change are correct. Landfilling of waste is designated for the existing waste site and within the original property boundary. Waste placement will not occur on the rail land property. The rail lands continue to be used as a buffer zone.

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				the dump. We cannot believe anything they say. They are note held accountable to any commitments they make.	
39			Visual Screening	The outside of the landfill is disgraceful, garbage everywhere, and carcasses of dead animals. BRE has also committed to planting vegetation eg. Trees & shrubs along the berm but this has not yet taken place. Will this be the same approach they take to measures proposed to mitigate impacts to the expansion?	The landfill is screened along the western property boundary by a vegetated screening berm constructed to an elevation of approximately 203 to 204 metres above mean sea level (m AMSL), approximately 5 to 6 m higher than the Brooks Road approximate elevation of 198 m AMSL. A fence with a privacy screen has been installed on top of the western screening berm, increasing the visual barrier to an elevation of approximately 205 to 206 m AMSL (almost 8 m higher than Brooks Road).
40			ESR	The new BRE Environmental Landfill Expansion Screening Report is 2,617 pages. BRE did very little to help the community understand what the report meant, likely project impacts and the proposed mitigations. The summary report provided was very high-level, contained a lot of jargon and essentially said, there are no impacts to anything. We have outlined our complaints in the above and do not want to police the Brooks Road Landfill Expansion Environmental Screening to the north railway line. Little by little, the site keeps expanding and keeps encroaching on our way of life. Our community takes the garbage from all over Ontario but receives no benefit from BRE, despite the profits they take in. The information we have been provided is not sufficient for us to understand the impacts and how they will be managed. We do not support the approval of the expansion of the dump and believe it will have negative environmental and social impacts on the surrounding area.	The Environmental Screening Report itself is a 120-page document that provides a summary of technical studies undertaken for the project. The appendices include technical reports to support the results and findings of the studies. BRE conducted two Public Open Houses to provide information regarding the project in a simplified format including display boards with figures and key points.
41	February 1, 2024	Email	Petitions	Please find attached names and phone numbers of local residents that do not wish the Brooks Road Landfill to expand, in other words they are objecting to the expansion!	Comment noted

This a protest from Haldimand County Residents against the Brooks Road Landfill Capacity Expansion. Presently the Brooks Landfill is at 100,000 cubic metres and they want to increase it to 219,400 cubic metres. The information that received at the on going PLC meetings that the dump should have been filled to capacity roughly by the past June or end of this year.

Mary Pearson 905-520-2232

Star Dove 289-684-7956

David Bruce 289-370 0208

Tony Townsend 519-807-9899

Ann Hamwin 289-370-0228

CHARMAINE QUIGLEY 905-719-0080

ROY QUIGLEY 905 719-8037

Bertha Sobrey 289 736 0027

Ulrike Bachmann 905 536 8946

[illegible] 905-772-5055

Colleen Lemky 905-772-5016

[illegible] 905 772 55 77

Bev. Bassindale 519 420 7250

Lorna Williams 905 776 2438

Lois Armstrong 905-772-3686

Joanne Armstrong 905-772-3797

Beverly Sackett 905 772 3387

Murray Sackett 905 772 3387

Fred O'Neil 905-768 8520

Ruby McWilliam 905 768 8520

Ruth Austin 905 768 5329

Eleanor Bell 289-736-0077

Heather Hastings 905 979-7060

Ruth Visser 905-979-8820

Matt Visser 289-237-5475

Michael DiFrancesco 905-870-6686

* Chris Dunsmuir 905-746-3644

Richard Tebbutt 905 772-3419

SAM STOPPARD 905-536-0220

MURRAY KINNEAR 905 772 1234

DARLINE KINNEAR ✓ 289-439-7474

TARA LINDEMANN 416 938-9952

Ulrike Bachmann 905 536 8946

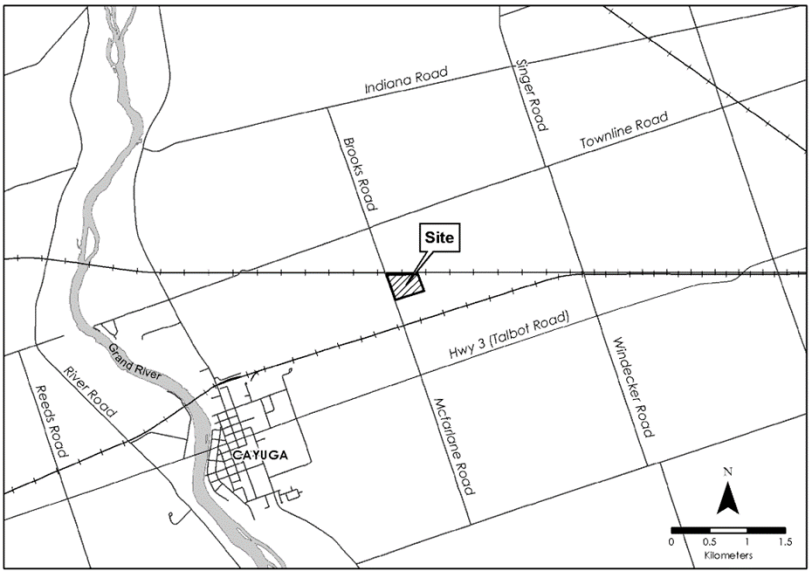
Gloria Bowder	905 515-7857
Liz O'Hara	905-772-5944
Joe Hara	905-772-7283
[illegible]	905-772-5961
Leona Summerfield	905-774-4953
Don Gray	416-884-7954

Appendix J

Notice of Completion

Brooks Road Landfill Capacity Expansion

Notice of Completion



Brooks Road Environmental, owners and operators of the Brooks Road Landfill, have completed an Environmental Screening Process for the proposed expansion (vertical and horizontal) of the Brooks Road Landfill, located at 160 Brooks Road near Cayuga, Haldimand County, Ontario. The capacity expansion proposed under this Environmental Screening Process is for approximately 219,400 cubic metres (including waste and daily/final cover).

The proposed capacity expansion would allow Brooks Road Environmental to respond to the growing demands from waste generators and customers who need a safe and reliable waste management facility for disposal of their post-diversion solid, non-hazardous industrial, commercial and institutional waste. The proposed capacity expansion will add capacity equal to approximately two additional years of waste acceptance over and above the remaining/current approved capacity. There are no changes to the annual fill rate limits proposed as part of this project.

The Environmental Screening Process

The proposed project is subject to the Ministry of the Environment, Conservation and Parks' (MECP) Environmental Screening Process for waste management projects, in accordance with O. Reg. 101/07 under the *Environmental Assessment Act.* It is being conducted in accordance with the planning and design process outlined in the MECP's "Guide to Environmental Assessment Requirements for Waste Management Projects."

The Environmental Screening Process involved identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects.

The results of the process were documented in an Environmental Screening Report, which will be available for a 60-day calendar day review period starting April 3, 2024, and ending on June 2, 2024. The Report will be posted online at https://www.brenvironmental.com/.

Hard copies of the report are available at the Cayuga Public Library & Heritage Centre at 19 Talbot Street West in Cayuga, Ontario during the library's operating hours of Tuesday to Thursday from 10 a.m. to 8 p.m. and Friday to Saturday from 10 a.m. to 5 p.m. If you require an alternative format, please contact:

Blair Shoniker, MA, RPP
Senior Waste & Environmental Planner
GHD Limited
Tel: 905-429-5040
Email: blair.shoniker@ghd.com

Visit the project website to learn more and sign up for project updates.

In addition, a request may be made to the MECP for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name. Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request. Please visit the ministry's website for more information on requests for orders under section 16 of the Environmental Assessment Act at: https://www.ontario.ca/page/class-environmental-assessments-section-16-order.

The request should be sent in writing or by email to:

Minister Ministry of the Environment, Conservation and Parks 777 Bay Street, 5th Floor Toronto ON M7A 2J3 Minister.mecp@ontario.ca	Director, Environmental Assessment Branch Ministry of the Environment, Conservation and Parks 135 St. Clair Avenue West, 1st Floor Toronto ON M4V 1P5 EABDirector@ontario.ca	Tim Danyliw, P.Eng, PMP Project Manager, Brooks Road Environmental 162 Cumberland Street, Suite 300 Toronto ON M5R 3N5 tim@gpenvironmental.ca

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